P U B L I C H E A R I N G

before

ASSEMBLY AGRICULTURE AND ENVIRONMENT COMMITTEE

on

AR-51

(A Resolution to Study Aerial Spraying of Sevin To Control Gypsy Moths)

Held:
October 2, 1980
Assembly Chamber
State House
Trenton, New Jersey

MEMBER OF COMMITTEE PRESENT:

Assemblywoman Barbara Mc Connell (Acting Chairperson)

ALSO:

Norman Miller, Research Associate
Office of Legislative Services
Aide, Assembly Agriculture and Environment Committee

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ASSEMBLY RESOLUTION No. 51

STATE OF NEW JERSEY

INTRODUCED JULY 28, 1980

By Assemblywomen McCONNELL, KALIK and Assemblyman STEWART

Referred to Committee on Agriculture and Environment

AN ASSEMBLY RESOLUTION directing the Agriculture and Environment Committee of the General Assembly to conduct a study of the alleged threats to public health posed by carbaryl-containing insecticides and their effectiveness in combatting gypsy moth infestation relative to alternative remedial methods, to solicit and evaluate recommendations on the advisability of continuing or modifying existing carbaryl-containing insecticide application programs, and to recommend whatever legislation may be appropriate to implement the results of such study.

WHEREAS, The Department of Agriculture, at the request of local units of government and in cooperation with the Federal Government, annually conducts a program to spray selected areas with a chemical pesticide containing carbaryl to combat gypsy moth infestation; and,

WHEREAS, It has been alleged by a number of medical experts and other members of the scientific community that exposure to carbaryl may be related to birth defects and cancers, allegations contradicted by an equally sizeable body of medical opinion; and,

WHEREAS, This controversy, each of the past several years at the onset of the gypsy moth invasion has given rise to charges and countercharges, responsible and irresponsible, on the part of expert and laymen alike, regarding the consequences of the program, the effects of which are to cause belated cancellations of the spraying program in some municipalities, and anger and concern over its implementation in others; and,

WHEREAS, The citizens of the State have a right to a responsible evaluation of the best evidence available to date on the full health and environmental consequences and benefits of the current pesticide spraying program so that they may advise their local officials of their views thereon; now, therefore,

BE IT RESOLVED *by the General Assembly of the State of New Jersey:*

1. That the Agriculture and Environment Committee of the General Assembly is hereby directed to conduct a study of the potential threats to public health posed by carbaryl-containing insecticides and their effectiveness in combatting gypsy moth infestation and to make recommendations concerning the advisability of continuing, modifying, or suspending the existing spraying program;

2. That the committee may meet and hold hearings at such place or places as it shall designate during the sessions or recesses of the Legislature, and shall report its findings and recommendations to the General Assembly, accompanying same with any legislative bills which it may desire to recommend for adoption by the Legislature.

STATEMENT

The purpose of this resolution is expressed in its title.

ASSEMBLYWOMAN BARBARA McCONNELL (Chairwoman): Good morning. My name is Barbara McConnell, and I am Vice Chairman of the Assembly Agriculture and Environment Committee. I want to welcome you here this morning, and thank you for coming to participate in the public hearing on Assembly Resolution 51. Chairman Don Stewart, who is Chairman of the Assembly Agriculture Committee, could not be here today, so I will be conducting this public hearing. To my right is Norman Miller, Committee staff assistant. We hope that some of the other members of the Agriculture and Environment Committee will come throughout the course of this hearing.

In July of this year, I introduced Assembly Resolution No. 51, directing the Agriculture and Environment Committee to study the relative benefits and risks of the aerial spraying of carbaryl insecticide, known under the trade name "Sevin", to control gypsy moth damage; to look into any alternative remedial measures that may be available; and to make whatever recommendations for legislative action that we deem appropriate.

I took this action in the hope that we could belatedly come to grips with what has become a perennial problem in New Jersey -- the problem of how to most safely and effectively minimize the defoliation caused by gypsy moth infestation.

The primary method of control has been, and remains, the aerial spraying of Sevin over selected areas of the State. This spraying program has been conducted by the Department of Agriculture in cooperation with the Federal government in those municipalities that volunteer to participate. But, the program has been criticized by some who allege that Sevin has potentially adverse health effects, that its use has the paradoxical effect of increasing the numbers, strength, and persistence of surviving sypsy moths, and that safer biological or parasitic controls are available, or could be developed with more funding.

While may of the allegations that Sevin may increase the likelihood of birth defects have never been confirmed, similar claims have come from responsible sources, and have aroused public concern and anxiety. Municipalities have thus been placed in the unenviable position of trying to balance almost certain damage to their trees against the less likely, though allegedly real, threat to the health and safety of their residents. Increasing numbers of municipalities have thus dropped out of the program, perhaps the key factor leading to this year's record devastation.

In response to those health concerns, my colleague, Assemblywoman Barbara Kalik, introduced a resolution that was passed early this summer, insterting in the budget language that prohibited the use of State funds for the purchase of Sevin until its safety could be assured. That language was struck by the Governor in his veto message of June 30, 1980. In explaining his action, the Governor said: "This is a complex environmental health issue, and should be resolved in a deliberative hearing process, not the appropriation process." So, today we begin that deliberative hearing process.

The Federal Environmental Protection Agency has been studying Sevin thoroughly for the past several years. Its definitive report is due to be released soon. A letter indicating the preliminary results of that study will appear in the transcript of this hearing. The record will be kept open for two weeks to provide those who could not attend today, or those here who may want to supplement their testimony, with an opportunity to make their views known to the Committee.

With this, I will call upon Mr. William Cranstoun, Director, Division of Plant Industry with the Department of Agriculture, to present to us his testimony. Mr. Cranstoun.

W I L L I A M M. C R A N S T O U N: Thank you very much. My name is William Cranstoun, and I am Director of the Division of Plant Industry for the New Jersey Department of Agriculture. Secretary Phillip Alampi wanted very much to be here today to testify on this matter which he considers vitally important, and he has asked me to express his personal regrets for his absence. He has also asked me to deliver these prepared remarks in his behalf and answer any questions which you may pose regarding the Cooperative Gypsy Moth Suppression Program. In delivering the Secretary's remarks, I hope to provide you with a broad overview, and two of my staff persons are also here to discuss the details of our program.

We welcome the opportunity to testify at this forum regarding the gypsy moth suppression program and the use of the chemical, carbaryl. As the Governor so indicated in his comments on the appropriations bill, it is important that concerns, such as those expressed in this resolution, be addressed in a deliberative process. We also feel that this is a timely review, and we are hopeful that these concerns can be resolved now, so that we can see a smooth running, safe, effective suppression program for 1981.

Our Department's activity in the area of gypsy moth suppression is based upon statutory authority. The Legislature decalred the gypsy moth a public nuisance, and its control a subject of public welfare in 1921. By law, the Department was given certain responsibilities regarding the gypsy moth, including authority to inspect public and private lands, and the authority to use such "recognized measures" as the Department deems advisable for suppression.

Since that time, the question of recognized measures the Department deems advisable has been tested several times, both in the courts and in the media.

We are pleased that the Legislature in its wisdom has consistently supported careful, scientific, and professional handling of this matter, and we believe that the Department of Agriculture has acted responsibly in meeting the legislative mandate.

Had other state legislatures been as consistent as the New Jersey Legislature, perhaps we would not today be attempting to suppress this pest in our own state's borders. Unfortunately, although Massachusetts lawmakers supported a program to control the gypsy moth following its outbreak there about 100 years ago, it stopped short of the extra effort needed for eradication.

When the pest first traveled to New Jersey, more than 60 years ago, by way of neighboring New York State, New York refused to take action to control the pest. But, New Jersey did respond, and in the 1920's we completely wiped out the infestation which then covered about 400 square miles of the Garden State.

Today, however, the pest is considered "established" in New Jersey and eleven other states, including all of the Northeast, Maryland, and Michigan as well. The gypsy moth is also fund in several states south and west of us and has been the subject of eradication efforts as far west as California.

When we say that the gypsy moth is "established," we mean that the gypsy moth has made itself a permanent home here and no longer are official efforts aimed at wiping out the pest in these twelve states. Instead, we work to supress the gypsy moth and keep its damage below an economically significant level.

This is one point of frequent misunderstanding on the part of the public. They ask us, "If you are doing it the right way, why haven't you wiped it out?" The truth is that the goal of this and many other pest control programs is not eradication, but control to the point where we can live with it, below an economically significant level.

In New Jersey, the gypsy moth is battled on many fronts and several agencies have responsibility for the control of the pests in our State's forests:

The Federal Animal and Plant Health Inspection Service, known as APHIS, and which is part of the United States Department of Agriculture, has a regulatory role, and is concerned primarily with controlling man-made spread of the pest and preventing its introduction into states which are not already infested.

The U. S. Forest Service coordinates the Cooperative Gypsy Moth Suppression Program in twelve states, including New Jersey, and provides the major source of funding - $350,000 this past year was returned to New Jersey for municipal control efforts. The Forest Service also coordinates the development of environmental impact statements by New Jersey and other participating states. They are reviewed by the Federal Environmental Protection Agency. This cooperative, voluntary program, which relies upon the selective use of chemicals for treatment of recommended acreage, is focused upon residential and recreational forests.

State owned lands are controlled through our own State Department of Environmental Protection. The New Jersey Environmental Protection Department also prepares an environmental impact statement for review by the Federal Environmental Protection Agency.

Federally-owned lands in New Jersey are protected by the gypsy moth control efforts of the United States Department of Agriculture. I am referring here to land such as Earl Amunition Depot, Maguire-Fort Dix, Picatinny Arsenal, and so forth.

All of these efforts are coordinated by the National Gypsy Moth Management Board. New Jersey plant officials assisted in organizing this board, whose membership includes state and federal officials, as well as lumber and other forest industries, environmental and consumer groups. Bill Metterhouse, of our Department, serves as the current Chairman of this National Board.

Mr. Metterhouse and John Kegg, our Entomologist for this program, will describe in their testimony the details of how the cooperative, voluntary program works in New Jersey, and how our biological control efforts fit into the overall integrated pest management practices of our Department. But, it is important to explain at this point the policies which guide us in putting those programs into action for the benefit of the public welfare.

1. Local Option: Since the cooperative suppression program is aimed at protecting those trees which are of high value to local residents, the decision to participate in the voluntary program is made at the local level. Our trained entomologists make aerial and ground surveys, and based upon these surveys and several other factors related to past defoliation levels, biological activity, and our established priorities, we make recommendations to the municipalities. Once those recommendations are made, the ball is in their court, so to speak, as local officials must determine whether or not to participate.

We believe in this program. We believe that each year we have made adjustments and improvements, and that we are in the position to offer a sound method of controlling damage and minimizing tree loss. Our recommendations represent what we believe is the best way to go, but we do not mandate implementation. This is a State program, where home rule is respected, and local governments must make the decision. I might add at this point that the success of our program has been copied by both New York State and the State of Pennsylvania.

In recent years, many local government officials have really had to sit in the hotseat as local controversy focused upon the measures used for gypsy moth suppression. Some residents oppose the use of the chemical carbaryl, and some oppose aerial application of anything. But, other residents want the aerial spraying to

take place, and, thus, you have the stage set for controversy. In towns where everyone wanted the program, or no one wanted the program, there obviously was no conflict. Only in those towns where there were residents disposed to both pro and con was there any argument. And, there certainly was argument.

2. Chemical Selection: Regarding the selection of chemicals in the suppression program, it is our policy to consider all available alternatives. Law requires that any chemical used must be approved and registered by the Federal Environmental Agency, and it must be used in accordance with the guidelines established by that Agency and the label instructions. The Federal Environmental Agency is cautious. A chemical approved for use on one plant variety in one part of the country may not be automatically used on another plant variety in another part of the country. It must be approved and labeled for each use, and departure from labeling instructions is not permitted. So strictly is this enforced, that we must obtain clearance in order to dilute a chemical for use at less than the recommended dosage.

Based upon Federal EPA guidelines and approvals, we have selected and used various chemicals during the years that we have been involved with this program. Our selection is based upon many factors, beginning with the label instructions approved by the Federal EPA.

The chemical carbaryl has shown itself to be the best that we can recommend for our program in New Jersey. Labeled as a "general use" pesticide, it is sold in retail garden stores for use by the general public. It is approved for use on everything from lawns and flowers and vegetable gardens to flea collars for household pets and for treatment of lice on humans.

We have been told by the Federal EPA that there is more data available on this chemical than on any other. That Federal Agency has just completed an extensive four-year review of the chemical again. We are expecting a final decision on that review any day now.

Assemblywoman McConnell, I believe you mentioned that you did have a letter from EPA. I do have a letter here to submit. It was addressed to Mr. Philip Alampi, dated September 30, 1980, and which the Director of the Special Pesticide Review Division, Marcia Williams, sent for this hearing. In essence, she states that they expect that Sevin will be returned to registration in the near future without any change in its labels. In other words, after the four years of study and the nine million dollars invested in research, they can find nothing at this point. I think we all agree that we need to continue to look at pesticides, but at this point there is nothing they feel needs to be changed in its label instructions.

ASSEMBLYWOMAN McCONNELL: You will submit that as part of the record?

MR. CRANSTOUN: I will. (see page 1x)

Our Department's policy is that any change in use instructions would signal an additional review by us regarding the chemical's use in our total program. Our number one concern is for the health and safety of our citizens and their environment.

We are not salesmen for this chemical. We have made a deliberative and conscientious effort to keep up to date on every development related to this and other chemicals which may be a part of a New Jersey treatment program. Again and again, review by our scientists and other State and Federal scientists concerned with the safe use of all chemicals has indicated that this is an appropriate chemical for use in the manner in which we use it. Our own State Department of Health has been involved in testing for carbaryl, and our own State Environmental Department

has recently conducted its own review.

3. Aerial Spraying: Regarding aerial spraying, which is the second part of the issue for the general public, we stand by our recommendations after exhaustive review of this and other alternatives. Yes, aerial application is less costly for widespread acreage, but this is not our only justification for this measure. It is our desire to minimize unnecessary exposure to any chemical which prompts us to rely on this sound method of application.

Aerial application permits us to place the chemical where we want it, and that is on the leaves of the trees. New Jersey Department of Health studies indicate that within minutes after spraying, eighty percent of the chemical has adhered to the leaves of the trees. When spraying from the ground, we do not believe the results are as desirable. Also, when the chemical is applied from the air we are able to apply a lesser amount and achieve greater protection. Aerial spraying actually lessens the amount of chemical needed for treatment.

Each year following the spray program, when the damage caused by the gypsy moth caterpillars becomes devastatingly apparent in untreated areas, we receive desperate pleas for help from residents who wanted the spray program in their areas. In many municipalities, for one reason or another, the local officials opted not to participate, and individual residents contrated privately for aerial or ground spraying. Some residents undertake treatment of the trees on their own property themselves. We believe that aerial, State supervised, application is more desirable than these methods in terms of minimizing unnecessary exposure.

We are concerned about the public welfare; we have a scientific understanding of the gypsy moth and the appropriate control measures, and we have professionally-certified applicators and professionaly-trained field supervisors, and we have a moral and financial incentive to avoid waste or unnecessary use.

4. Public Participation: In previous years, the comments we received on the Environmental Impact Statement we file before beginning treatment of forestland have included compliments on New Jersey's public participation and notification procedures. One reviewer observed that New Jersey goes to great lengths to make sure that the public is notified about the program and provides opportunity for public participation. It is our policy to do this, and I might add it is also written into our State statute. It is also our policy to respond to the public's concerns in a responsible manner. In 1979 there was considerable demand for an alternative to the use of carbaryl. We worked very hard to make the biological agent B.t. available. We also gained the support of the U.S. Forest Service, who agreed to fund this expensive measure at the same percentage as the other. For many towns, this alternative solved a lot of problems.

My purpose in explaining these policies of our Department is to show that we are complying with the legislative mandate to use not only "recognized measures", as called for in the law, but that we are also constantly reviewing our measures, weighing the alternatives, and keeping abreast of all available data so that we may recommend the best measures for a sound, efficient program to control the gypsy moth in residential and recreational forests. We may not always recommend this particular chemical for use. If we are able to find an approved chemical or an alternative method which is even better than this one in the future, we will recommend it. Right now, it is our professional judgment that this chemical, as part of our total integrated pest management program, is the best way. Thank you.

ASSEMBLYWOMAN McCONNELL: Thank you, Mr. Cranstoun.

MR. CRANSTOUN: May I introduce the rest of our program? Mr. Metterhouse is the Deputy Director, and he will speak of our program on the integrated biological aspect.

ASSEMBLYWOMAN McCONNELL: Yes. I do want to hear from them. Are you going to be staying at the hearing?

MR. CRANSTOUN: Yes, I will.

ASSEMBLYWOMAN McCONNELL: Because I would like to ask some questions, and if you would prefer that Mr. Metterhouse and Mr. Kegg give testimony first before I ask questions of the Department of Agriculture, that will be fine with me.

MR. CRANSTOUN: I would appreciate that ever so much.

ASSEMBLYWOMAN McCONNELL: Thank you, then we will call on Mr. Metterhouse. Mr. Metterhouse is the Deputy Director, Division of Plant Industry, Department of Agriculture.

W I L L I A M W. M E T T E R H O U S E: Madam Chairman, my name is William Metterhouse. I am Deputy Director in the Division of Plant Industry within the New Jersey Department of Agriculture and I do appreciate the opportunity to speak to you today about the biological control methods and how they fit into our Cooperative Gypsy Moth Program.

I would like to point out first that the New Jersey Department of Agriculture, for many years, has emphasized integrated pest management programs, employing chemical and biological methods. In fact, the origin of the Department's biological control efforts were initiated back in 1923, with the Japanese beetle. It was at that time that parasites were secured from Asia, particularly a small nematode a round worm, milkey spore disease, and parasites, which significantly reduced the Japanese beetle population and caused it to stabilize. In fact, today milkey spore disease acts very significantly on the suppression of the Japanese Beetle and causes it to be cyclic.

Presently, the Department is involved in six different biological control programs utilizing insect parasites and predators, as well as diseases, for the suppression, of course, of the gypsy moth, the alfalfa weevil, the cereal leaf beetle on grains, the Mexican bean beetle on soy beans, the European corn borer, and the musk thistle. Again, I would like to point out that the Department is not only interested in effecting programs against insects, but also biological control of weeds as well, and most thistle is included in that.

During the past year, over two million dollars was saved resulting from pesticide usage as achieved from the success of our biological control efforts. Such efforts not only benefited the farmers of the State, but it also benefited all of the citizens in the State of New Jersey.

Integrated pest management programs are being emphasized throughout the nation today by the President's Office of Environmental Quality, the United States Department of Agriculture, the Environmental Protection Agency, and many colleges and universities throughout this nation.

The goals and the benefits of best management: 1. Reduce insect resistance. 2. Provide long-term benefits derived from the self-perpetuating nature of biological control organisms. For example, when a parisite is released and becomes established, it becomes a permanent resident of the eco system. However, there are times when it is necessary to augment those populations and to make, in some cases, annual releases. 3. Reduced costs resulting from savings in pesticide usage. 4. At the same time, we also can conserve energy as a result of reduced pesticide application. 5. Reduced pesticide loads being placed into the environment.

Gypsy moth, being an introduced pest in 1867 in Medford, Massachusetts, did not have the many parasite species to attack it in this country as were established in Europe and Asia. The United States Department of Agriculture recognized this deficiency early and introduced through those years of 1905 through 1933 approximately 50 species of parasites, eleven of which became established. Of this number, seven are considered significant in causing the gypsy moth to become stabilize or to become cyclic in its nature. Had not these parasite species become established in this country, more frequent gypsy moth outbreaks would have occurred, and a more rapid spread of gypsy moth would have occurred in this country.

Since 1963, the Department, with its background in biological control, became involved in the rearing, releasing, and distribution of gypsy moth parasites. In addition, we carried out a very careful monitoring and evaluation program to determine the establishment and the efficiency, or effectiveness, of these parasites, and this guided us in our laboratory as far as production was concerned, and where we need to make releases.

In carrying out the work of this program, the Department maintains two rearing facilities in Trenton of approximately 11,000 square feet, in addition to two field laboratories, one being located in the Jockey Hollow National Historic Park, Morristown, and in the Lebanon State Forest. It is from these field laboratories and the personnel that the parasites are released into the environment, and it is from these laboratories that the evaluation and the monitoring is carried out.

The biological program is based on the philosophy that parasites, predators, and disease organisms are significant regulating factors contributing to the population collapse or stabilization. The real objective is to cause the gypsy moth to become cyclic in its nature, to reduce this foreign insect to a native insect classification. As we realize, many native native insects in this country and in New Jersey are cyclic in their nature because of the biological pressures exerted against those insects - this includes weather, which is a very important instrument as well.

It must be recognized, therefore, that outbreaks will occur, until such time that there is developed by research and development the capability of managing the gypsy moth through the munipulation of biological control factors. Unfortunately, we do not know all we should about gypsy moth population dynamics.

The U. S. Department of Agriculture, this past year, is recommending five million dollars more in monies to be placed in gypsy moth research for the purpose of understanding gypsy moth dynamics, and being able to manipulate or manage the gypsy moth. We have been - that is, the Department of Agriculture - cooperating with the U.S.D.A. in that effort.

The first objective of the biological program in New Jersey was to collanize in New Jersey those known imported and established parasites, as found in New England resulting from those early releases in New England by the U.S.D.A. Resulting from redistribution efforts, which included collections from the New England states, and from our own laboratory rearing in Trenton, seven parasite species, including one predaceous beetle are known to be well established throughout the State; however, that is in varying degrees. These parasite species have contributed importantly to the stabilization and the dampening of those populations following virus collapse of the gypsy moth, particularly in the northern and central areas.

One of the significant factors following defoliation in bringing that population down or in causing it to decline is the virus disease. Once that population has been reduced by that virus disease, the parasites then act as a damper on the population and we fall into a period of stability. Therefore, it is the purpose

of the methodology employed in our integrated chemical biological program to apply insecticides discriminately during the outbreak years, from the roadside 200 feet to the back property line to protect the high-value shade trees in our residential community against tree mortality. Most of the area remains unsprayed in New Jersey, and it is from these unsprayed areas that parasites will build up and spread. So, these back areas, the unsprayed areas, act as reservoirs where this build up will occur. This is our basic philosophy as to how this integrated program does work.

Now, another important objective in our parasite program is to attempt colonization of new or exotic species of parasites. And, I do want to point out here that these are parasites that are introduced from foreign lands. These parasites do not bite, sting, or become a nuisance in and of themselves. It is the purpose, therefore, with these releases to increase the biological pressure against the gypsy moth, hopefully to reduce the periodic, disruptive outbreaks. There are associated with the gypsy moth in Europe and Asia over 100 species of parasites, not found in any one area, but scattered throughout the world, and the Department, of course, has sought through the U.S.D.A. to import these into this country.

At the present time, the Department maintains a cooperative agreement with the Animal-Plant Health Inspection Service, U.S.D.A., for the receipt of parasites, for the laboratory colonization, and for the release of these exotic species within New Jersey, and so to provide shipments to other states.

The biological program within the Department is the largest such effort in the Northeast, and our personnel are recognized for their expertise in biological control technologies.

In addition, the Department continues to cooperate with the U.S. Forest Service and the Agricultural Research Service in the pilot testing of various other biological control techniques, including the use of microbials and the sex attractants. For example, we have, in the past years, conducted pilot testing of disbar lure. Disbar lure is a sex attractant. The female emits a sex attractant. This material now has been isolated and synthesized and there are various uses for disbar lure. One of the great uses is, it is to be used as a detection tool. For example, little cups in which the attractant is placed can be placed out into the environment. These can catch male moths and so we use it as a detection tool. The U.S. Department of Agriculture uses this technique in determining where gypsy moth is found throughout the nation.

Another aspect of using disbar lure is in what we call a confused method - to take this disbar lure, to encapsulate it, or place it in small flakes, to distribute this over vast forest tracts, and by placing so much of this material into the lare, to literally confuse the male moth so that he cannot orient on to a female. This works, however, in low population areas only. So, we do have the potential of using this out on the leading edge of the gypsy moth population, out into the Virginias, and Pennsylvania, and the other states where gypsy moth is not being introduced. In high population levels, the gypsy moth males can find the females by sight. So, this does not have a potential in the outbreak years, as in New Jersey. It can be only used, therefore, in low population levels.

Another material that we have worked with and pilot tested, along with the U. S. Forest Service is Gyp Check. This virus disease of the gypsy moth has great potential. At the present time it is irratic in its results, and, therefore, it cannot be implemented into a control program at this time.

The U. S. Forest Service at this time is trying to develop new application

methods or formulation techniques, for one of the problems with the virus, of course, is to find the proper sun screens to protect the virus against ultra violet light once it is placed into the environment. We also have to have the proper stickers by which to cause it to stick to the leaf. We also need anti-evaporants to place in this material, so that this being an aqueous solution the material will actually reach the ground and not evaporate before it reaches the ground. These are the problems that we have with Gyp Check. It is not available at this time for use in our program.

There are other methods. The chemo-sterilization method -- and here we can produce this in the laboratory. Males chemically steralize them and place them into the environment, twenty to one. We do not have the capability of such mass production, and again this technique can only be used in low population levels, and not in outbreak situations.

In addition, we have juvenile hormones, feeding stimulants, feeding inhibitors -- the future is exciting, and I think that in that future we will develop these tools so that they can be incorporated into our program. Thank you very much.

ASSEMBLYWOMAN McCONNELL: Thank you, Mr. Metterhouse.

Mr. Kegg, Supervising Entomologist, Department of Agriculture.

J O H N D. K E G G: Madam Chairman, my name is John Kegg. I am Supervising Entomologist with the New Jersey Department of Agriculture, and I thank you for the opportunity to speak to you today about the use of carbaryl in the Cooperative Gypsy Moth Control Program.

The State Department of Agriculture has employed the chemical carbaryl, which is commonly known as Sevin, since 1962 for control of gypsy moth infestations. This insecticide was chosen as a substitute for D. D. T. because it was found safe for use around pasture areas and it had a relatively short residual life in the environment. Also, the material is registered for use on a wide variety of feed, fruit, and vegetable crops. Admittedly, carbaryl is toxic to hone bees but measures have been developed over the years to reduce these losses to minimum levels.

During te past 18 years of carbaryl's use in New Jersey for control of gypsy moth, not one documented case of detriment to human health has been received, desipte its usage in spraying thousands of acres of forested residential and recreational areas. State Department of Agriculture employees as well as spray pilots and ground support crews have been monitored by the State Department of Health on several occasions, and according to the Health Department report, blood and urine samples showed no observable or detectable adverse effects after repeated exposure to carbaryl. Furthermore, the State Department of Health concluded in an April, 1979, study "that the application of carbaryl to wooded residential areas, as presently conducted by the Cooperative Gypsy Moth Control Program, N. J. D. A., poses no measureable threat to human health."

In addition, the Department of Health, during the 1978 spray program, monitored several streams in treatment areas and found no detectable levels of carbaryl in the water - sensitivity 0.5 parts per million.

The Department of Agriculture, in its efforts to control damaging gypsy moth populations, has used at least once each insecticide labeled and registered for aerial control. In our opinion, of the five materials registered, carbaryl is the most efficacious. It provides not only the best foliage protection but also the best caterpillar reduction of all materials tested. In addition, the need to re-treat the same residential area the following year is rare.

Since the objective of the gypsy moth spray program is to prevent tree losses in residential and recreational forested areas, it is important that the municipalities be given the opportunity to choose carbaryl since it has been demonstrated to be the most effective material registered.

In any event, spraying is only done on a voluntary basis with local governments that are willing to fully accept the following responsibilities for participation in the aerial spray program. The local government will:

1. Request in writing and egg mass survey to determine the status of the gypsy moth infestations in residential and recreational forests.

2. Arrange for financing the total cost of any treatments recommended to make contractual agreement with spray vendor, either provided by State or obtained by local bidding.

3. Assist in the administration and coordination of the spray program, providing labor to assist in marking spray block boundaries.

4. Adopt a resolution declaring the gypsy moth a "Public Nuisance."

5. Notify the occupants by a properly served notification of the intent of the spray program.

6. Certify to the Department that these notices have been served as outlined in the guidelines. No work will begin until this certification is filed with the Department of Agriculture.

If any one of the above steps are not adhered to by the local government, the Department of Agriculture will not participate.

In turn, the New Jersey Department of Agriculture will:

1. As requested by municipal and other cooperating agencies, conduct gypsy moth egg mass surveys on a prioritized basis to determine the areas in need of treatment this spring.

2. Propose aerial spray blocks in residential and recreational forests where the threat of tree loss is the greatest - in this case, in areas where you have a second consecutive year of heavy defoliation.

3. We will evaluate the status of bio-control agents in proposed treatment blocks, and if they are sufficient to prevent heavy gypsy moth leaf feeding, these blocks will then be deleted from the program.

4. We will develop spray contracts for competitive bidding.

5. We will train municipal employees who will assist the Department in the aerial spray program.

6. We recommend the insecticide dosage and supervise the spray operation to insure that proper insect development and weather conditions are present when the application is made.

7. Apply for federal cost-sharing funds and distribute them to participating municipalities.

8. Evaluate the effectiveness of aerial spray treatments.

It must be emphasized that the Department of Agriculture considers the use of aerial spraying as a last resort in order to protect valuable forest resources threatened with loss.

Aerial spraying is carried out on a selective basis and only a small portion of State's forest actually receive spray treatments. Since the spray program is selective in nature, resistance by the insect - that is the gypsy moth caterpillar - to carbaryl has not occurred in New Jersey and the impact on natural enemies of the gypsy moth has been minimal. For example, last year the Department treated 35,480 acres, whereas the total damage by the gypsy moth was nearly 412,000 acres. Obviously, with such a huge area of untreated woodland, the parasites and predators are given every opportunity to combat the gypsy moth without human interference.

Last May, for the first time, the use of the biological insecticide B.t. was offered as an alternative to carbaryl in the gypsy moth program. Sixteen municipalities involving 16,963 acres chose B.t. while 41 municipalities with a total of 18,517 acres used carbaryl. However, in some cases, where the gypsy moth populations exceeded 3,000 or more egg masses per acre, the forests still sustained heavy defoliation before the B.t. could take effect. Also, in some cases, the B.t. did provide foliage protection, but in recently completed egg mass surveys the egg laying in the B.t. treated areas remained sufficiently high enough to require re-treatment next spring. Therefore, in our opinion, in cases of extremely high populations, the insecticide carbaryl offers the only insecticide that can protect valuable shade trees from defoliation.

The State Department of Agriculture was the first to fully develop the concept of integrated pest management and selective voluntary control programs in high value residential and recrational areas. Since the Department began its

Cooperative Gypsy Moth Control Program in 1970, other states have modeled theirs after ours.

The Department of Agriculture has used all federally-registered insecticides and carbaryl has proven to be the most effective.

The Department has remained in constant liaison with the Federal Environmental Protection Agency and the State Department of Health to insure that label requirements are met and its safety to humans and the environment are within acceptable risk levels.

The Department, therefore, urges the continued use of carbaryl, on a voluntary basis, for municipalities participating in the gypsy moth aerial spray program. Thank you very much.

ASSEMBLYWOMAN McCONNELL: Thank you, Mr. Kegg. I will begin with asking you some questions. Could you tell me what year the Department of Agriculture started your gypsy moth control program? I know that it is in your testimony, but would you repeat it for the record, please?

MR. KEGG: The Cooperative Effort, with the township participation, began in 1970.

ASSEMBLYWOMAN McCONNELL: In 1970?

MR. KEGG: Right.

ASSEMBLYWOMAN McCONNELL: So, you have been applying this program to various municipalities or counties in the State since 1970? Is that correct?

MR. KEGG: That is correct.

ASSEMBLYWOMAN McCONNELL: Can you tell me how many acres of trees or forest you treated this year in the State of New Jersey with this program, or that you identified as being hit with gypsy moth -- this year?

MR. KEGG: The total defoliation this year was nearly 412,000 acres.

ASSEMBLYWOMAN McCONNELL: 412,000 acres this year -- the spring of 1980.

MR. KEGG: The spring and summer of 1980.

ASSEMBLYWOMAN McCONNELL: How many acres were there last year, in 1979?

MR. KEGG: 193,700 acres in 1979.

ASSEMBLYWOMAN McCONNELL: So, in spite of the gypsy control program, we have seen an increase in forests affected by gypsy moth, is that correct?

MR. KEGG: That is correct, yes.

ASSEMBLYWOMAN McCONNELL: Okay. Can you tell me what the insecticide dosage is that you use, or does it vary? You explained to us that you make a survey of the affected area and make certain recommendations to the municipality. Do you also make recommendations as to the insecticide dosage that you would use, or is it a standard throughout the state?

MR. KEGG: E.P.A. has a labeled registered amount that can be used. For Sevin there is a maximum of thirty-two ounces for oil per acre. We had done some work several years ago to show that we can use less material and get very effective foliage protection. We are recommending to the towns that they use 24 ounces of Sevin, versus the 32; so we are actually using less than the registered amount.

ASSEMBLYWOMAN McCONNELL: All of these are acceptable according to E.P.A. standards, and the Department of Health standards?

MR. KEGG: Yes.

ASSEMBLYWOMAN McCONNELL: In your testimony, Mr. Kegg, you admit that carbaryl is toxic to honey bees and, I assume, to other insects, is that correct?

MR. KEGG: Yes, Sevin is toxic to honey bees and families in the hymenopteron, or wasp, group. However, during the time of application there are only certain parasites present that might be adversely affected. The fly parasite, which is also a very important parasite, is not affected by the material.

ASSEMBLYWOMAN McCONNELL: Is there any evidence that the use of carbaryl affects birds or kills bird life?

MR. KEGG: In the Community Program and actually since we have used it in 1962 during the eradication work, we have never had any documated case of any bird or any animal--

ASSEMBLYWOMAN McCONNELL: Being affected?

MR. KEGG: Being killed by the pesticide.

ASSEMBLYWOMAN McCONNELL: Perhaps you are not the one from the Department of Agriculture to ask this question of, but I will, and if you can't answer it we will refer it to one of the other gentlemen. Can you tell me, in terms of dollars, the estimated damage or loss to New Jersey, in terms of forest, as a result of the gypsy moth?

MR. KEGG: As a result of gypsy moth? We don't have dollar figures, because it is highly variable. A single residential oak, being killed by the insect, may cost $50 to several hundred dollars to remove; so it is hard to get a standard for that. But, we do know from aerial and ground surveys taken since the gypsy moth has been established in New Jersey, that we have lost at least four million oak trees, and most of them are in the uninhabited forest. But, where they occur around the homes, of course, it can be quite high.

ASSEMBLYWOMAN McCONNELL: You told us how many acres are affected by the gypsy moth, but how many acres have been totally lost or destroyed as a result of the gypsy moth?

MR. KEGG: The insect may totally defoliate a mountain, but it does not totally destroy or, let's say, kill the mountain. There is refoliation. Many of the areas have refoliated. However, if they are hit for two consecutive years, from our studies in the Newark Watershed where we have monitored the infestation during its life history from the point of the beginning to the collapse of the outbreak, we have monitored as much as a 60% loss of oak in these areas where the insect went unchecked and there were repeated defoliations. So, it can be quite high.

ASSEMBLYWOMAN McCONNELL: Let me ask you another question, and then I will move on to Mr. Metterhouse. In your opinion, when you go in and spray a municipality that you have determined to be hard hit by the gypsy moth-- And, there has been testimony given this morning that your program is a control program; you do not claim to totally eliminate gypsy moth. It seems to me that your program, your integrated pest control program, may be inconsistent with the gypsy moth control program, but let me ask you a question: When you go into the municipality and spray, obviously you don't kill all of the gypsy moths, do you?

MR. KEGG: No.

ASSEMBLYWOMAN McCONNELL: Those that survive, are they stronger, or do they come back next year and produce more, or do they become more resistent to other methods of control? What is your opinion of that?

MR. KEGG: In a selective type program, it is virtually impossible to develop resistence within a gypsy moth population. As I mentioned, we sprayed about 35,000 acres on a selected basis and over 400,000 developed. To get resistance in an insect population has happened rarely with forest insects. But, I know of one case in the State of Maine where they sprayed, yearly, millions of

acres with D.D.T., and the populations of bud worms - and this is not the gypsy moth - that did remain did develop resistance because they treated the whole population. Obviously, the survivors survived the D.D.T. and were left to multiply, and this created a situation of a very quick resistance.

ASSEMBLYWOMAN McCONNELL: Do you have any evidence that this has happened with the gypsy moth?

MR. KEGG: In 18 years, we have never seen any resistance anywhere with this insecticide.

ASSEMBLYWOMAN McCONNELL: How do you account for the fact that more acres of forest were affected this year - considerably more than last year - and yet we have been in the program since 1970?

MR. KEGG: Well, New York State had the heaviest damage in history this past year. They had about three million acres. Connecticut, that has done no aerial spraying, had over 370,000 acres. It is just a cyclic insect, and it just happens that climatic conditions have created the worst situation ever.

ASSEMBLYWOMAN McCONNELL: Do you mean they are coming down from other states?

MR. KEGG: Well, originally they came from other states, but now we have our own particular problem here that is cyclic within the state. We should see some declines in the next few years in North Jersey, although I believe Central and Southern Jersey will have some major increases.

ASSEMBLYWOMAN McCONNELL: Mr. Kegg, you mentioned Connecticut - a State, I understand, that has banned spraying of carbaryl for gypsy moth.

MR. KEGG: Right.

ASSEMBLYWOMAN McCONNELL: Do you have any explanation for that?

MR. KEGG: Yes, they really didn't ban the use of aerial spraying, but the requirements to get a permit to aerial spray are so stringent that nobody has done any spraying from the air in Connecticut. But, basically, I believe it was done four or five years ago. The reason I mentioned Connecticut is that despite their banning of spraying in the last five years, they still have major outbreaks, and there is really no relationship between the outbreak and the spray. When the insect is on the increase, it is going to occur regardless of what happens.

ASSEMBLYWOMAN McCONNELL: It is my understanding that the State of Pennsylvania had a reduction in their gypsy moth problem this year, and that they have a very strong parasitic control program for gypsy moth. Can you confirm that, or are we doing in New Jersey similar to what Pennsylvania is doing?

MR. KEGG: In New Jersey we are doing a similar program. Last year Pennsylvania had a massive reduction in the population, in the defoliation, to a level of 8,500 acres. This year, total defoliation in Pennsylvania exceeded 440,000 acres.

ASSEMBLYWOMAN McCONNELL: So, there was a reduction?

MR. KEGG: No, it increased.

ASSEMBLYWOMAN McCONNELL: It increased?

MR. KEGG: About six fold. Well, it was five to six fold. So, although there was a massive reduction last year, the insect is coming back, and I talked with the entomologists in Pennsylvania and they suspect that this coming spring it will even be worse. So, again, it is a cyclic insect. In some years it looks very good, and in other years there is quite a bit of damage.

ASSEMBLYWOMAN McCONNELL: Are each of our 21 counties affected by gypsy moths?

MR. KEGG: This year, the aerial survey revealed that there were defoliating populations in every county, except Hudson.

ASSEMBLYWOMAN McCONNELL: All except Hudson. Well, they have other problems there, so-- The gypsy moth went elsewhere.

I promised to stop asking you questions, but when the State goes into a municipality to spray, isn't it true that farmers may also spray from the ground using carbaryl for other types of insect problems, or even for gypsy moths; also, the Federal Government may spray in some counties, such as Cape May, on federally-owned land? In addition, utility companies may spray. My concern, and what causes the question is, are we getting a concentration of this chemical in some areas? You testified that the dosage you use is controlled and approved by E.P.A., but what about when we get concentrated doses? You are doing it. The municipalities are doing it. Individuals are doing it. And, the Federal Government is doing it. What are your comments on that?

MR. KEGG: Well, basically, the answer is that if we aerial spray in an area for gypsy moth control, that particular area that is sprayed will have foliage protection for the season, and there is really no need to carry on further.

ASSEMBLYWOMAN McCONNELL: But, you have no control over the farmer who may spray?

MR. KEGG: Well, usually the farmer would not be spraying the woodland; he would be spraying a corn field or alfalfa.

ASSEMBLYWOMAN McCONNELL: The crops.

MR. KEGG: Also, probably the biggest use of Sevin would be by the private homeonwer who will hire the equipment and come in and use variable amounts, depending upon the size of the trees, and as a result, many times they use more than is necessary to control the insect.

It is true, the Federal Government does have programs in camp grounds and in military reservations to prevent the spread of the insect to other areas via trains or vehicles. Because it is such a widely used material, there is a lot used throughout the State each year by various factions.

ASSEMBLYWOMAN McCONNELL: I guess what I am trying to determine as a Legislator, because this is the real purpose of this hearing, is to ascertain what, if any, legislation or policy we need to establish in the State of New Jersey. What I am trying to get out is should there be some controls? Should we try and limit the amount of this chemical that is sprayed or concentrated in one particular area? It seems to me that there is an overlapping in programs with people perhaps using this chemical.

MR. KEGG: Well, this is a difficult thing because basically the homeowner would be using licensed applicators, who are licensed by the Environmental D.E.P. So, if there weren't a problem there they wouldn't use it. It would be difficult though at the homeowner level to--

ASSEMBLYWOMAN McCONNELL: To control it.

MR. KEGG: (continuing) --trap somebody. I know in Browns Mills, as I went through an area of very severe defoliation, it was almost a daily ritual to bring out the spray can and spray the sides of a house because it was crawling with caterpillars.

ASSEMBLYWOMAN McCONNELL: Does burlap really work?

MR. KEGG: Everything works in a light population, but when it gets very severe, they have no need to stay under the burlap. You can only fit so many, and

they will crawl up and feed. Tanglefoot has been tried; scraping egg masses has been tried. But, basically, with an epidemic population you are talking about anywhere from one to six million catapillars per acre, and even if you remove 5,000 catapillars you are really not getting very many of the catapillars in an outbreak.

ASSEMBLYWOMAN McCONNELL: What is Sevin and is it harmful?

MR. KEGG: I really am not a chemist. We use materials that are registered by the Federal Government. As I said, our men have been monitored in the field. I have been monitored myself for carbaryl. At the rate used in our program, which is actually below the recommended Federal rate, we have not, in our work, seen any harmful effect, but I prefer to have the toxicologist or someone from the E.P.A. answer that.

ASSEMBLYWOMAN McCONNELL: Thank you, Mr. Kegg. You have been quite patient with answering questions. Norman, do you want to ask any more questions?

MR. MILLER: Thank you. Through you, Madam Chairman: Mr. Cranstoun, perhaps you can address yourself to these questions. You mentioned that you do not expect the E.P.A. to change the labeling requirements on Sevin as a result of their four year study. Could you tell me what the label on Sevin does say, and what cautions and warnings are, in fact, on it?

MR. CRANSTOUN: This is a rather detailed document, and I cannot cover it all.

MR. MILLER: Okay, could you generalize?

MR. CRANSTOUN: To make sure that you have the proper information, I think it would be better if you deferred that question to a Union Carbide employee. Dr. Antoine Puech is here and I think that he could answer that. I could take a stab at it, but I prefer him to answer that.

MR. MILLER: Okay. Dr. Puech, would you like to address that now?

DR. PUECH: I have a copy of that document. (see page 4x)

MR. MILLER: Fine. Perhaps you could give us the answer with as much non-scientific detail as possible.

DR. PUECH: Sevin is a pesticide, which means that at some level it is toxic to insects or animals, and the label for Sevin and for virtually all pesticides has appropriate precautions to avoid over-exposure and to avoid having children and animals in the household coming in contact with it. It makes prudent suggestions for wearing long-sleeved clothing to minimize human exposure to it, which is probably a good idea to do with any chemical when you are applying it. These are the labeled cautions we have on Sevin.

We also have cautions regarding minimizing exposure to honey bees and minimizing exposure by not spraying lakes, streams, and ponds directly.

MR. MILLER: I don't mean to ask this question rhetorically, but does it not say that if Sevin is applied to your garden, for example, you should wait as long as two weeks before you eat lettuce and certain other vegetables that have been exposed to it?

DR. PUECH: The waiting period varies from one crop to another. I have a list here of waiting periods for a large variety of foods and vegetables, and in many cases the waiting period is zero days, and in some cases it might we a week; in other cases it might be three days. Most fruits and vegetables are zero days. There might be some that are three to seven days.

MR. MILLER: Does it not also say that it is harmful if it is inhaled or swallowed?

DR. PUECH: Yes.

MR. MILLER: It is?

DR. PUECH: It is harmful if it is inhaled or swallowed in large amounts. As I said, it is a pesticide. It is a biologically active material and you can ingest enough of any biologically active material and create an adverse effect.

MR. MILLER: Okay, thank you. Mr. Cranstoun, in light of the warnings against the potentially harmful effects of inhaling, or breathing in, large amounts of this, how do you justify aerial spraying on other than economic grounds, as opposed to a more direct, or focused, application? Because a characteristic of aerial spraying is that it is done over wide areas and it is, obviously, not a controlled application.

MR. CRANSTOUN: Let's say it is semi-controlled because we make a lot of effort to control the application. We apply the application in early mornings when the wind velocity is at its lowest. As a matter of fact, if it gets too high, that program is stopped for the day. This enters into another problem in keeping the public informed of what we are doing, because we cannot be sure of what we are going to be doing every day.

We have observations throughout the state of ground applications, where hydraulic pumps or spray equipment are used. First, the majority of the spray equipment cannot reach the top of our larger oak trees. These are the trees we are trying to save. These are trees that are high value to your home and to the residential area where people live -- those that come in contact with people. We cannot get to the top of those in many cases. In many other cases, due to the nature of the application by putting out a stream of pesticide, over-application is usually done on that area. So, we feel that is a greater assault to our environment by going in that direction and putting out a mass, or a high concentration, of the pesticide in one single area.

Now, with the aerial application, we feel that we can come closest to putting it on the leaves, and this is where we want it; we want to protect the leaves. We can come closer to putting it on the leaves by airplane than we can by any other method, and still control it. Now, it is difficult to control it, regardless of what instrument you use for application when you are in the field, but we feel that in the proper condition we can do a better job aerially than we can any other way. As the material comes down, it is deposited on the leaves - 80% of it in most cases.

MR. MILLER: Madam Chairman, may I ask one more question?

ASSEMBLYWOMAN McCONNELL: Yes.

MR. MILLER: On another aspect of this has been testified to, I think, both by you and by Mr. Kegg : this is a cyclic insect. Is there any way of predicting when the bad years will be or when the good years will be? The climatic conditions, I guess, are certainly one factor. How much effort do you put into such prediction, if, in fact, you can be reasonably accurate in your predictions? Might it not be possible to spray during only the bad years, and concede other years since defoliations take place over two year periods -- two year cycles? What I am getting at is, rather than simply having a program whereby you spray in municipalities that request you spray, can you not begin to anticipate locations and years?

MR. CRANSTOUN: We do have some ability to predict, not all that we would like to and not for our long-range biological control methods; we don't have that yet. We can tell from year to year by the number of egg masses and other factors -- the quality of the egg masses, and so forth. We can predict rather accurately, and this is what goes into our recommendations. Now, generally we do not recommend any acreage to be sprayed until the second year of defoliation. In other words, we are not spraying to protect people from frustration or just the nuisance value

of the gypsy moth - and this becomes a very important factor in the whole problem we have. We are concerned with preventing tree mortality and holding on to that natural resource in the State of New Jersey, namely the tree. We have decided we cannot do it all, so we have selected the trees that are the most valuable to the citizens of the State, and they are the trees around the homes, the parks, the recreational areas -- this is where we concentrate our efforts.

Let me see, what else have I forgotten in your question? You had--

MR. MILLER: I was simply suggesting that as an-- Am I to infer from that that if a municipality asks to participate in a program, on occasion you do refuse if in fact that is the first year that that municipality has been exposed to such an infestation?

MR. CRANSTOUN: Absolutely. We have had quite a few problems with a municipality -- why they couldn't do more acreage. As a matter of fact, we have been restrictive in many cases. In other words, there has to be a problem there before we will get involved in it with our State program. The problem is tree mortality.

ASSEMBLYWOMAN McCONNELL: Mr. Cranstoun, in your opinion, the gypsy moth spraying program in the Department of Agriculture is the most effective to date?

MR. CRANSTOUN: Yes it is.

ASSEMBLYWOMAN McCONNELL: To control the gypsy moth.

MR. CRANSTOUN: Yes, it is.

ASSEMBLYWOMAN McCONNELL: In your opinion, do you believe that it poses any public health threat at all? Is it a threat to public health?

MR. CRANSTOUN: At this point I do not. I can assure you - and this is from the Secretary of Agriculture, as well as myself - that if at any time we got any evidence that there was any danger to the people or to the environment, we would want to be the first to say, "scrap it; let's go in some other direction."

ASSEMBLYWOMAN McCONNELL: Under your program, your testimony indicates that you go to great lengths to not only test for the need for spraying in a particular municipality but also really insuring that home rule is applied in this particular program. You require advertising and notification to the residents of that area. What is your answer to the question of when a municipality needs to spray for the control of gypsy moth, can you really control this spraying, aerially, into a contiguous municipality? What if the municipality next door participates in this program, are we getting a concentration of more of the chemical spray than is necessary?

MR. CRANSTOUN: There would be no duplication of the spray in any one area. Now, the total area in square miles or square acreage could be increased in one area that we do not have control on.

ASSEMBLYWOMAN McCONNELL: Do you take adjoining municipalities into consideration?

MR. CRANSTOUN: Very much so, yes. As a matter of fact, it works both ways. Sometimes if we don't control the one municipality, it is not as effective in another municipality. So, we work together so the municipalities will join in their effort. However, the organized programs in the State, such as ours or the Federal's, we have close liaison with and we know where each individual is spraying. We do this for a safety factor, from the air standpoint as well as from the standpoint of the applications that are to be made on the ground. So, I don't feel, nor do I fear at this time, that we are getting too large a concentration of pesticide in any one area.

ASSEMBLYWOMAN McCONNELL: The alternative to spraying is the Pest Control

Management Program that you are attempting to implement in the fringes of the gypsy moth areas.

MR. CRANSTOUN: Right.

ASSEMBLYWOMAN McCONNELL: What is the forecast for 1981? Do you anticipate the need for increased spraying in our municipalities, or do you anticipate that we are getting closer to control of this pest through your parasitic control program?

MR. CRANSTOUN: I wish I could be more positive in this because this is our goal too, to be able to control the gypsy moth without the use of pesticides. We would like to be able to manipulate the biological factors to hold this in a population level where it is not economically significant to New Jersey. But, I do not see this in the near future. We are all making great efforts, and I think we are making some prograess in providing additional research money on the Federal level to obtain the scientific facts that we need to be able to accomplish this. It is embarrasing for some of us that have been working with gypsy moth a number of years to say that we are not further down the line in our knowledge of how this insect operates and where we could make inroads to reduce its population.

ASSEMBLYWOMAN McCONNELL: Let me ask you a couple of questions on the cost of this program. It is my understanding that for the last couple of years there has been an appropriation by the Legislature for this program.

MR. CRANSTOUN: Yes.

ASSEMBLYWOMAN McCONNELL: In addition, you get Federal funds through the U. S. Department of Forests, is that correct?

MR. CRANSTOUN: That's correct.

ASSEMBLYWOMAN McCONNELL: Totally, what do you spend in the State of New Jersey for gypsy moth control?

MR. CRANSTOUN: I don't have--

ASSEMBLYWOMAN McCONNELL: For the spraying program.

MR. CRANSTOUN: Okay. I don't have the exact figures in front of me, but I would say that it is probably in the neighborhood of $450,000.

ASSEMBLYWOMAN McCONNELL: Does it increase each year?

MR. CRANSTOUN: No, it will fluctuate with the population. Now, I am going mostly by the Federal, which is the largest amount. I said that last year we received about $350,000 from the U. S. Forest Service. That is based primarily on the acreage that we treat, and that fluctuates.

ASSEMBLYWOMAN McCONNELL: So, there have been no significant increases in cost?

MR. CRANSTOUN: No. This coming year, I might add, we are hoping to use some of our funding that the legislators have given us to hire two additional entomologists so that we can have better supervision in the field of these programs. We now have, working under Mr. Kegg, one entomologist. We have assigned him in Central Jersey. We hope to be able to hire two more. One will be in South Jersey, and one will be in North Jersey. So, we hope to be able to have a better public relationship for information to the public about what is going on, as well as supervise the program.

ASSEMBLYWOMAN McCONNELL: Are you increasing your resources, or stepping up your efforts on your integrated pest management program?

MR. CRANSTOUN: Yes, we are. As a matter of fact, the Capital Needs Commission has approved a biological laboratory, which we hope we might get underway with shortly and build it. This will be a big step forward in that area.

But, through Mr. Metterhouse, who is recognized as a leader in the country

in this biological effort, I think we are very fortunate in having the staff we have in New Jersey in the biological area, and we are making much progress in the gypsy moth area. We are dependent upon some of the foreign research, or exploration, and that doesn't always come out the way we would like. This past year both the work in the Orient and in Europe could have been improved upon. We may have a few new materials to work with. But, we are encouraging the working, and we think that we have a great future here. This is our ultimate goal, to be able to control it through some of these methods; we don't know which yet.

ASSEMBLYWOMAN McCONNELL: If we did absolutely nothing, would the balance of nature take care of the problem, or what could we expect the results to be -- if we did absolutely nothing?

MR. CRANSTOUN: If we did nothing, we would start losing trees. This is notour objective. We would start losing trees, primarily oak trees, in our highly residential and forest communities, and in areas that our people use. This is what we are trying to save until we get over the hump to get into the biological control period. Now we don't see, down the long road, the use of pesticides for many, many years, but this has to be the stop-gap until we get into a biological control means.

ASSEMBLYWOMAN McCONNELL: Thank you, Mr. Cranstoun. Do you plan to be around for a while?

MR. CRANSTOUN: Yes.

ASSEMBLYWOMAN McCONNELL: Fine. I would like to call Dr. Joan Ehrenfeld, who is Assistant Research Professor of Ecology, Center for Coastal and Environmental Studies at Rutgers. (negative response from audience)

All right. I will then call Dr. Jamie Cromartie, Director, Center for Environmental Research, Stockton State College. Dr. Cromartie, do you have testimony?

W I L L I A M J. C R O M A R T I E: Yes. Madam Chairman, my name is William J. Cromartie. I am Director of the Center for Environmental Research, and Associate Professor of Entomology at Stockton State College.

The following comments are based on a review of the 1980 Final Environmental Impact Statement by the USDA Forest Service and on presentations by Mr. Kegg and Mr. Koeck at the scoping session for the 1981 program held on September 25, 1980 at the New Jersey Health and Agriculture Building.

I agree with the choice of integrated pest management as the alternative for gypsy moth control. Integrated pest management, however, refers to a general approach, not a specific strategy for dealing with a pest. Integrated pest management is difficult because it requires a comprehensive view of the pest's environment, including social, economic, and other "human" factors, as well as physical and biological ones. To view the pest in such a broad context, it is essential to avoid prejudices concerning both the organism and the system to which it is part. Moreover, one must be able to take a long-term view, even when under pressure to act immediately to relieve a nuisance.

The goal of the Cooperative Suppression Project is to effectively manage the gypsy moth while minimizing the impacts of the insecticides on the environment and human health. To carry this out, the integrated control program provides financial support for aerial application of chemical and biological insecticides, management of parasite and predator populations, application of mating disrupting pheromones, and homeowner self-help and forest stand manipulation. This is commendable, but it should be pointed out that it is also the only approach that is reasonable, given our present understanding of pest control. The important question is whether the programs developed by the State of New Jersey to implement this approach represent

the best integrated pest management scheme that can be developed for the gypsy moth, given current knowledge and available materials. I shall consider the plans of the two state departments, Agriculture and Environmental Protection, separately.

Department of Agriculture Gypsy Moth Program -- According to the Environmental Impact Statement filed in 1980, the Agriculture Department's Program is primarily concerned with helping owners of small wood lots to cope with the gypsy moth, and with protecting forested recreation areas, residential areas, and high value timber stands from defoliation leading to mortality and lost growth. The principal objective to implement this goal is to reduce high larval populations by 85% and keep defoliations under 30%. The main control strategies are: 1. Primary reliance on predators and parasites to keep populations at low levels; and, 2. Aerial application of pesticides - Sevin or Bacillus thuringiensis - to control high populations. Aerial application is carried out on a few tens of thousands of acres, under a priority system which takes into account the value of the forst to be treated and the past and probable future history of defoliation. Forested residential areas receive top priority.

This two-pronged approach, reliance on predators to keep low level populations down, and aerial spraying to control high populations, respresents a very crude strategy of integrated control, still heavily reliant on pesticides. Except that less toxic, less persistent materials are used and areas to be treated are chosen somewhat carefully, little has changed from the early 1960's, back before integrated pest management was the accepted method.

Several components of a broad-based integrated control strategy are missing, at least so far as can be seen from the plan described in the environmental impact statement, and the presentations given by the State officials at the scoping session on September 25th.

1. Despite the Federal program specifically including it, there is no provision for the use of phermone to disrupt mating. This can be an effective method to hold low density populations in check, and might also be used following aerial spraying to prevent rebound of the population. The treatment seems cost effective, and could be part of a program of self-help for owners of small properties.

2. Other forms of homeowner self-help are neglected as well. Burlap bands, sticky traps, and various methods of destroying egg masses should be more widely encouraged; or better yet, required in treated areas.

3. Stand manipulation needs to be explicitly encouraged, so that homeowners and small park and woodlot managers will utilize non-preferred trees, rather than susceptible hosts.

These three elements should be implemented as part of the public participation program.

More effort should be made to reduce the impact of defoliation on valuable trees through improved forestry and horticulture practices. As the U. S. Department of Agriculture pamphlet "The Homeowner and the Gypsy Moth" notes, maintaining good growth conditions for trees can reduce both the likelihood of defoliation and the impact of the stress which results from it. Many shade trees are in poor condition to begin with, and so are more apt to die if attacked by gypsy moths. Programs to encourage better care of trees should be part of the overall control plan, and research should be conducted on specific ways homeowners can help their trees recover from defoliation once it has occurred.

The objectives of the program need to be reconsidered to determine whether the target percentages for larval control and foliage protection are correct. Is

such a high degree of control - 85% larval control, 30% defoliation - a reasonable objective? No data are given to support these numbers. My guess is that the reason for these targets is more nuisance abatement than protection of trees, which could be achieved with more modest levels of control. Nuisance abatement is not a stated goal in the environmental impact assessment prepared by the State, although the Federal portion does discuss it, and it is one thing that Sevin does better than any other control method. The importance of nuisance abatement needs to be clarified. I am of the opinion that in the long run the public interest is better served by learning to accept the occasional presence of fairly large numbers of gypsy moth larvae. The key goal should be to prevent exessive tree mortality. Entomophobia - the fear of insects - is deeply entrenched in our society, but I do not think its effects constitute enough of a harm to health and welfare to justify drastic control measures.

The extent to which aerial spraying, and indeed any other articifical control measures are used should be limited to what can be demonstrated to be necessary to prevent excessive losses, i.e. some predetermined percentage excess over natural mortality of valuable shade and woodlot trees. In woodlots used to produce fuel, allowance should be made for some gypsy moth killed trees as part of the expected harvest. Woodlots need not be as strenuously protected as shade trees. The calculated levels of protection need to be based on studies in each different forest region of the State. Data from North Jersey are currently being used to justify programs in South Jersey. This is scientifically unacceptable. Data from forests should be applied only to similar forests, not to suburban areas.

Every effort should be made to set levels of acceptable control that minimize the use of artificial controls, especially pesticides. In the short run, this will insure minimum impact on beneficial insects, including natural enemies of the gypsy moth. In the long run, it will help delay the inevitable appearance of resistance to the artificial controls employed. Moreover, it may prevent the emergence of secondary pests, a phenomenon all too familiar in crop protection programs that rely heavily on pesticides, particularly broad-spectrum types. Finally, concern for public health dictates that we minimize people's exposure to toxic materials, even in minute doses. I do not believe anything that will kill a caterpillar by poisoning can be unequivocally stated to be safe for humans.

Reducing the current reliance on pesticides to supress high populations may also help break down the current animosity between the officials responsible for the program and certain segments of the public. At present, public participation in the program is hampered by the climate of mutual suspicion and intolerance. Of course, no program can hope to satisfy both those people who think that the only good insect is a dead insect, and those people who want no chemicals of any sort introduced into their surroundings. Still, a fresh analysis and review of the problem could help at least some people on both sides of the spraying question to come to a consensus on the most acceptable way to deal with the gypsy moth.

Bureau of Forest Management Program -- many of my comments on the Agriculture Department's program apply here. This program's target figures for 1980 were even more stringent: 95-99% larval control and 90% foliage protection. Do these levels really reflect the long-term damage gypsy moths do to the forests, or is this an unnecessary attempt aimed at nuisance abatement? Estimates of economic damage to forests need to be expressed more realistically in terms of loss of expected revenues based on actual management and harvest plans. Mortality should be expressed in terms of losses in excess of natural mortality in the long run, not for single years.

The noted entomologist, Dr. Vincent Dethier, in his book, "Man's Plague," cites evidence that over the long run, gypsy moth damage does not cause more than a small percentage increase in mortality, because the moths tend to kill trees that would probably have died within a few years in any case. Careful analyses of mortality patterns in a variety of stands on different sites are needed to determine the amount of gypsy moth loss that can be tolerated within the context of predetermined goals for timber and fuel yield. Again, I repeat my view that nuisance effects alone do not justify spraying.

I believe that the supposed loss of recreation value and tourist revenue needs to be more carefully evaluated. What is the actual duration of the period during an outbreak when a site is unacceptable for various uses? Can alternate sites be used during high population levels?

Finally, I would suggest that the impact on non-target organisms may be too lightly dismissed. New England has suffered a serious decline, and even local extinction, of many if its native large moths and other attractive and useful insects. At Stockton's Symposium on Endangered and Threatened Plants and Animals of New Jersey in 1979, Dr. Dale Schweitzer, a lepidopterist from Yale University, and other entomologists familiar with our State indicated that similar declines may be occurring here. Insects are accorded no protection by the non-game and endangered species laws of New Jersey, so they are often neglected in environmental assessments. The loss is nonetheless serious, and the impact of gypsy moth controls on these members of our natural heritage needs to be evaluated.

I might add that the specific section of the report, of which I have supplied a copy, is page 21 to 23, in which Dr. Schweitzer specifically recommends - and this is his recommendation - that aerial spraying be restricted to those situations in which a real danger to public health can be demonstrated. And then, he goes on to mention three specific insects whose decline in the State of New Jersey seem to be attributable to spraying of broad-spectrum pesticides. Thank you.

MR. MILLER: Could you explain what you mean by nuisance abatement?

DR. CROMARTIE: Yes. What I mean there is that when you have a high gypsy moth population, you have a lot of caterpillars around. You have the droppings of the caterpillars falling. Many people get very upset by just the presence of so many insects, and they find them unattractive. They crawl over things; they crawl into things; they crawl on the sides of houses, and this sort of thing. Essentially, if you have a house in an oak forest, you could have an enormous number of catapillars around. On the other hand, there is very little evidence that they do you any specific harm. The damage is all to the trees. There is a little bit of allergy on the part of some people to those things, but it is certainly nothing like hay fever season, in terms of the numbers of people who are severely affected. So, that is what I mean by nuisance abatement.

What I meant by entomophobia is, some people just find them loathsome.

ASSEMBLYWOMAN McCONNELL: You indicated in your testimony that perhaps the main reason we have the Department of Agriculture's program for the control of the gypsy moth is primarily to abate nuisance, or to satisfy people's concern about these catapillars. Are you saying then that if the Department of Agriculture did not have this program our trees and forests would survive?

DR. CROMARTIE: No, let me be very clear about that. I fully agree that the gypsy moth does cause mortality of trees, and that those losses are serious. The question I am raising is whether or not the levels of control that are specified,

and, therefore, the amount of spraying that has to be done is entirely related to the goal of saving trees, or whether a much higher level of control is being set because that also abates the nuisance.

The principle of integrated pest management is that you must have management goals; you must decide what it is, specifically, that you wish to accomplish; explain what is necessary to do that; and then begin to look for the methods that are being used. The thing to be avoided is to pick a method first and then devise a program that includes that method. The Environmental Impact Assessment that I have seen does not provide a lot of information about how the goals were set and, therefore, how the target percentages were arrived at. So, it is difficult to tell from the available information whether that level is justified.

ASSEMBLYWOMAN McCONNELL: You indicated in your testimony that perhaps better management or goals in general for the saving of our forests and trees perhaps would be a better approach. Also, you indicated that strong and healthy trees could survive the cycle of the gypsy moth, and that in many of the areas where these trees have died it is because they were weak to begin with.

DR. CROMARTIE: Where you find a very high percentage of mortality is generally on poor sites, and I think the forresters would acknowledge that. Really health trees can survive even quite severe defoliation, with loss of growth, by the way, but usually they will not die. Almost all trees seem to survive the first year of defoliation, and then in the second year you begin to see some loss. Now, I am personally not clear at what level you begin to see that. Is it 30% defoliation in 2 years that will kill a tree? Is it 60%? What level does it take to kill a tree, and under what kinds of curcumstances? That is not spelled out.

Much of the area that is defoliated in the State, according to the survey, is only 30% to 60% defoliated. That is in the Environmental Impact Statement. So, the question is, are those areas the ones that need to be the targets for control efforts? In fact, probably most of those areas are not sprayed; it is the very heavily defoliated areas that are sprayed.

ASSEMBLYWOMAN McCONNELL: Do you believe that the method of spraying with carbaryl to control gypsy moth works at cross purposes with biological control methods?

DR. CROMARTIE: It does locally for sure. How quickly the predators and parasites recolonize the area, I have no data to answer that. By the way, that is one of the potential advantages of using disbar lure. When you have knocked a population down with spraying, there is a period there where presumably the parasites and predators have to recollonize. So, there is a time where there are no biological control agents. The question I am asking is, would it not be possible at that point to use the mating disruption technique in the sprayed areas with the idea that we will then hold these populations down and keep them down, particularly if you can identify volunerable areas, where you have the feeling, because of the type of stand, of an impending outbreak? Research would have to answer the question of how effectively that would work, but I noted that it is specifically encouraged by the U. S. Forest Service in its Environmental Impact Statement.

ASSEMBLYWOMAN McCONNELL: Is Mr. Metterhouse still here? Mr. Metterhouse, in the areas where you are spraying for the control of the gypsy moth, you testified that you are working on a program that disrupts mating procedures, is that correct? Are you following up in these municipalities with that particular program, or did I understand you correctly, that you are only using these biological methods in the fringe areas of the gypsy moth population?

MR. METTERHOUSE: We are talking about the use of disbar lure, and we are talking about using it as a disruption technique.

ASSEMBLYWOMAN McCONNELL: But, are you doing it in the municipalities where you are spraying?

MR. METTERHOUSE: No, we are not for the simple reason that this would mean additional cost, and once the parasites and predators move into this area and, of course, once we drop that population down and the area falls under stability and the population is low, why would we want to then place a disruption in there when it is balanced, and unbalance the situation? I don't see a place for disbar lure in a situation where we already have a balanced and stable situation.

As far as our 200 foot strip where we are spraying in the community - from the roadside 200 feet - the purpose of our program is to let the parasites disperse into that strip, and this does happen. We have documenation where it does, in the Northern part of the State. When those back areas collapse biologically, the whold area stabilizes, and what we see then is a period of stability anywhere from four to eight years. I would not want to use a disruption technique in low populations because I would not want to then unbalance it.

ASSEMBLYWOMAN McCONNELL: Thank you. Thank you very much, Dr. Cromartie. You will be here for a while?

DR. CROMARTIE: Yes.

ASSEMBLYWOMAN McCONNELL: Okay. Is Dr. Ehrenfeld here? Would you come forward, please? Dr. Ehrenfeld is Assistant Research Professor of Ecology, Center for Coastal Environmental Studies at Rutgers.

J O A N E H R E N F E L D: Madam Chairlady, other members of the Committee, my name is Joan Ehrenfeld, and I am an Assistant Research Professor at the Center for Coastal and Environmental Studies at Rutgers University. I received by Bachelor of Arts Degree with honors in Biology from Barnard College, Columbia University, in 1969. I began my graduate work at Harvard University, and took a Master's Degree in Ecology there in 1970. Returning to New York to start a family, I worked for a year at the Rockefeller University, studying the population biology of fruit flies. I then finished my graduate studies at the City University of New York, in conjunction with the Department of Entomology of the American Museum of Natural History, and obtained a Ph. D. in Ecology in 1975. My thesis work concerned the ecological interactions of insects and plants in Arizona. Since then, I have been working at Rutgers as principal investigator on a variety of research projects concerning the ecology of the forests of New Jersey. Thus, by background has given me a broad experience with insects, forests, and the ecology of their interactions.

My involvement with the problems of gypsy moth outbreaks developed from a study I did for the National Park Service at the Morristown National Historical Park. A massive gypsy moth outbreak in the later 1960's had not been treated, at the direction of park officials. They believed that in a National Park, nature should not be tampered with. The ensuing defoliation and loss of oak trees caused a furor, both in newspapers and in forestry journals, and the Park officials were charged with allowing a "catastrophe" to "destroy" the forest. Ten years later, I studied this forest to ascertain the long-term effects of the catastrophe. Aside from supplying abundant nesting places for a variety of birds and mamals that need dead trees, the death of the oaks had not significantly altered the structure or development of the forest. My results thus vindicated the Park staff. This work led me to study the ecology of gypsy moths, and from these studies I have developed

the ideas I will present to you. My studies at Morristown have been published in scientific journals. My opinions about managing gypsy moths were published in an article on the Opinion page of the New York Times, New Jersey Weekly, last spring.

I wish to stress that my testimony is that of an ecologist, not a medical doctor or toxicologist. I will therefore talk about the ecological aspects of using carbaryl for gypsy moth control, and touch only briefly on the issues of public health.

The hearings today are concerned with the question: should carbaryl insecticides be used in State-sponsored aerial spray programs, primarily to combat gypsy moth infestations? This question is really an amalgam of three separate questions, and it is necessary to address these qustions individually, and to keep their separate significance in mind, if an adequate answer to the basic problem is to be obtained. The three questions that I believe must be addressed are as follows:

1. Will the aerial spray program help control gypsy moth populations; that is, will the insecticide applications reduce the problem next year?

2. What kinds of damage are caused by gypsy moth, and what measures are available to mitigate this damage?

3. What are the implications of our answers to these questions for the human populations in the affected areas?

I will deal with these questions in order.

First, control. When ecologists speak of "controlling" the population of a pest, they are thinking about how the numbers of the creature vary from generation to generation, and how the changes in its abundance may be related to its environment. As Carl Huffaker, a noted entomologist, has defined it, "natural control is the maintenance of population numbers within certain upper and lower limits by the action of the whole environment...." This goal can be accomplished in two ways: one, excess numbers of the insect - from a human point of view - can be killed by man each generation, and, two, the natural forces that act to decrease the numbers of the insect can be bolstered to prevent the insect's numbers from getting annoyingly large. Obviously, the second method holds the promise of being vastly cheaper, as well as less threatening to the rest of the environment. The gypsy moth's populations in the Northeast have reached epidemic proportions every few years; each outbreak has lasted for two to three years and then collapsed. A tremendous scientific effort has been made over the past two decades to try to understand the natural forces that affect these outbreaks, and the results of this work help us both to evaluate the possibility of using the gypsy moth's own biology to control it, and also to fully understand the effects of using chemical sprays to kill the caterpillars each season.

The years of research have shown that a large number of environmental factors affect the size of gypsy moth populations. They include, one, the weather. Warm winters and dry summers - as we have just had - allow moths to increase; whereas, cold winters and wet summers decrease the populations. Two, the available food -- certain kinds of trees, especially oaks, are eaten enthusiastically, but a variety of others are eaten sparingly, or not at all. The relative abundance of favored and unfavored food trees in an area will affect the amount of damage to the oaks. Three, the available resting sites for larvae -- the kind of bark on the trees, the kind of litter on the ground, the abundance of man-made nooks and crannies all determine the abilities of the caterpillars to safely rest and turn into moths. Four, the physical environment of the area -- wet or dry, warm or cool, etc., is important, because it in turn affects, five, the parasites, the minute wasps and

flies that have been laboriously introduced here; and, six, the predators, the small mammals and birds that consume the immature moths. Seven, the numbers of larvae help regulate themselves by succombing to disease, laying fewer, less vigorous eggs, and dying more repidly while still caterpillars, when they are crowded. Eight: Finally, of major importance, the size of the other gypsy moth populations in the region affects the future of any particular outbreak area. Thus, it is clear that gypsy moth populations are responding to a complex mixture of biological, physical, and geographical forces. It follows that from this conclusion simply killing the caterpillars with insecticides each year will have on effect on the problem next year. In fact, as I will discuss later, it may make the problem worse. Only by addressing the complex of factors within our control, such as the presence of parasites, and the abundance of favored food trees, can we hope to ameriorate the problem in a permanent way.

Let's talk about the problem. Let us consider now the second question; that is, what are the problems caused by the moth, and what can be done about them?

First of all, there are short-term problems. People don't like caterpillars and caterpillar feces dropping on them; they don't like to be deprived of shade as the picnic and barbeque season begins; and they don't like the sight of defoliated recreation areas. These are legitimate concerns, but they are matters of convenience and esthetics. The major short-term problem is, however, the death of trees following severe defoliation. This problem can be substantial. However, I believe that for several reasons the problem has been exaggerated. First, the definitive studies of tree mortality following defoliation have shown that the mortality rates for large, health trees are much smaller than the rates for weak, diseased, or suppressed trees. For example, after two years of heavy defoliation, about 5% of the dominant, healthy oaks die, whereas 55% of the oaks in poor condition will succumb. The mortality figures which are generally cited for New Jersey - for example, 60% of the trees killed following the outbreak in the late 1960's - are for forested areas, where many of those dead trees were in the suppressed, weakened class. Lawn trees are most commonly in good condition. They are free from competing trees and are often cared for by the homeowner. Healthy, vigorous oaks can withstand several years of severe defoliation; although their growth may be slowed, they usually survive. Second, within outbreak areas, extensive mortalaity - over 50% of the trees killed - is often restricted to small patches within the larger area. Thus, the probability that an infestation will produce extensive death of the trees around people's houses is not as great as is usually portrayed.

The major long-term problem resulting from gypsy moth outbreaks is the cost of trying to prevent these short-term problems. I think this will become apparent as I discuss the measures that are currently in use.

Since the major problem is the loss of leaves, the major remedy - and the subject of today's hearing - is the use of insecticides, primarily carbaryl, to prevent defoliation. Carbaryl is undoubtedly effective at killing off most of the caterpillars; however, it has unappreciated side-effects on the ecology of the moth, as follows: 1. A small percentage of the larvae always do survive. These larvae then have abundant food and living space, and produce large, vigorous egg-masses that help maintain the outbreak during the next year.

2. The populations of parasites and predators are also diminished by the spray. In succeeding years, the parasites and predators are slower to reproduce than is the moth. Therefore, they become ineffective in controlling the moth

populations, and the pest, free of predatory constraints, becomes ever more abundant. Thus, paradoxically, the application of chemical insecticide helps produce larger pest populations, and makes long-term population control more difficult to achieve. This effect of chemical insecticides has been repeatedly experienced in agricultural situations; indeed, it is one of the important reasons why food prices rise. Of the twenty-five worst insect pests in California, 96% have been made worse by the application of insecticides.

There are other ecological side-effects to the spraying of chemical insecticides: pests become resistant to the chemicals and then require heavier application; in forested areas, the most susceptible trees and forest stands are preserved, thus maintaining exactly those conditions that favor future outbreaks; and, last but not least, there are adverse effects on other organisms -- in the case of carbaryl, bees, aquatic organisms, many other non-target insects, and soil arthropods have been shown to suffer after spray applications.

The point of this argument is that treating gypsy moth outbreaks with chemical insecticides only relives the momentary problem of defoliation and nuisance larvae. In the long term, it aggravates the problem of permanently regulating the moth, and it is likely to lead to ever-increasing costs for control.

Having discussed the ecological aspects of using carbaryl to reduce gypsy moth problems, we can consider how gypsy moth control efforts affect people. Since most of the aerial spraying in New Jersey is done in suburban areas - forested communities - and in the highly used recreation areas in State forests, the impacts on people are obviously critical.

The possible toxicity of carbaryl has been widely discussed, and will undoubtedly be the major focus on your attention today. As I stated earlier, this is not my field of expertise; however, I would like to make a few comments. There have been dozens of research papers published on the toxic effects of carbaryl, some demonstrate such effects, and others show a lack of toxic effects. For example, I have here printouts from the Environmental Information Center at Oak Ridge, Tennessee, listing 65 articles concerning the possible teratogenic action of the chemical, and 63 articles concerning its possible mutagenic effects. I have listed on the attached sheet a few of the limited number of these papers that I have read. The interpretation of these papers may be technically complex, and a definitive conclusion may be hard to reach, but plain common sense should tell us that if there is any doubt about the safety of the chemical, it should not be broadcast into the environment, especially in areas where children, born and unborn, are abundant. It should also be noted that in addition to these major questions of birth defects, there is increasing evidence that carbaryl may help transform mild virus infections into the fatal Reye's syndrome in children.

Even assuming that carbaryl, when applied according to the directions on the label, is not toxic, problems with the application magnify the threats to human health. The drift of spray from both airplanes and groundspray equipment has been well documented. According to one E.P.A. study, up to 60% of the spray travels over 1,000 feet from the intended area. Delays in scheduling have, in several instances in New Jersey, brought the spray planes over children waiting outside for school buses. Accidents with spray planes are not uncommon. Friends of the Earth in Washington, D.C., has collected data showing that 21% of pesticide-spraying planes crash each year. Their research also shows that the frequency of such accidents is reflected in the fact that few crop dusters carry insurance. In densely populated

areas, this poses a tremendous risk. Public notification concerning spray applications is usually not adequate. For example, very few of the people I have spoken with in New Jersey were aware that food from home gardens should not be eaten for a week after carbaryl has been sprayed. Thus, in reality, the possibilities for exposure to toxic amounts of carbaryl are much greater than would be expected from a spray program conducted "by the book." Needless to say, it would be grossly unrealistic to expect that mistakes and accidents could ever be completely avoided during a spray operation.

Finally, the question of using carbaryl for gypsy moths must be viewed in a larger perspective. In this toxic-laden State, every citizen, and every law-maker should consider whether the large-scale introduction of one more chemical into the air and water is warranted by the problem. As I have described, the problem for which carbaryl is being sprayed is a short-term question of esthetics and convenience. The insecticide applications can only affect the long-term problem of gypsy moth outbreaks by making them worse. And, it should be remembered that spray costs will only increase each year. Therefore, in my opinion, there is no justification for large-scale spraying of carbaryl into the environment. In fact, I respectfully suggest that the Legislature and the Department of Environmental Protection should critically examine all aerial spraying of pesticides in our chemical-ridden state. The State of Connecticut has banned aerial spraying of forests, and has severely limited aerial spraying of crops for exactly the reasons I have discussed. New Jersey would do well to follow her example.

Finally, I would like to suggest an alternative strategy for mitigating the damage done by the gypsy moths, a strategy composed of a number of different approaches. Just as the ecology of the moths reflects the importance of numerous environmental factors, a sound management policy relies on combining a variety of control methods. This is, indeed, the fundamental idea behind integrated pest management, and one that I think has been very well addressed in previous presentations at this hearing.

First, there should be extensive education of the public to reduce peoples' fear and horror of seeing caterpillars, and to promote an attitude of tolerance for some inconvenience for the sake of everyone's health and well-being. There should also be public education to stimulate the most extensive possible effort by homeowners to remove egg masses, apply Tanglefoot to trees, and use burlap bands to trap and remove caterpillars. In Berkeley, California, pulic education was an important of the urban integrated pest management strategy that reduced insect control costs by 40%. I might add, in other parts of the world public education has also been very effective. In China it is said that the house fly was eradicated as a public nuisance by simply asking every citizen over a certain age to kill seven flies a day. That was a lot of flies. Viet Nam brought malaria under control by educating the people to use better cultural methods with their rice agriculture rather than using sprays. By education and changes in cultural methods, they were able to solve the malaria problem there.

Second, the estimation of expected gypsy moth damage levels from egg mass densities should be combined with information about the physical and biotic environment of each site, so that areas where defoliation is likely to cause tree mortality are separated from areas where trees are likely to survive.

Third, the use of pheromone traps both by homeowners and in state programs should be encouraged.

Fourth, the parasite introduction program should receive additional support.

Fifth, in those areas where tree mortality is likely, or where particularly valuable trees are growing, spraying should be done with B.t. - Bacillus thuringiensis - preferably with a water-based formulation of this material.

In conclusion, I hope you will consider the question of using carbaryl for gypsy moth control within the ecological context that I have sketched. It is the wisest course for both the health of the people of New Jersey, and the health of our environment. Thank you.

ASSEMBLYWOMAN McCONNELL: Thank you. Do you have any questions, Norman?

MR. MILLER: I would just like address to you a question that I addressed earlier to another witness, and hear your response to it. It seems to be generally conceded that gypsy moth infestations are cyclic. Given that fact, and give the conditions which you have indicated that were reasonably well known to give rise to heavy infestations, do you think that it is possible to predict with any degree of accuracy the locations and the times when infestations will be much more severe? How exact a science do you think this can be?

DR. EHRENFELD: It is not an exact science at all. The most recent publication that I have seen, by Robert Campbell, who is the scientist who has done almost all of the research on the population dynamics of the gypsy moth - he has been studying it for about 25 years, and he is now out in the Northwest - is that the factors that actually control the gypsy moth populations, or ways in which we can keep it under control, are as yet unknown. Certainly, the chemical insecticides do not control it. His conclusions are, as I mentioned before, that the geographical factor is one of the most important. This was borne out in recent years when - I think it was in '78 - we had a much larger degree of defoliation than had been predicted from the egg mass surveys. This was attributed to the spread of moths from Pennsylvania. As Mr. Kegg mentioned earlier, problems in Pennsylvania this year were attributed to moths coming in from New York.

So, yes, it depends upon what you mean by an exact science, or a reasonable degree of prediction. We can get a fairly good idea from egg mass counts what is likely to be the situation in various areas. We have to understand that it may be very different because of situations in the whole Northeast.

MR. MILLER: But, that should play a role in a program.

DR. EHRENFELD: It should play a role in a program, yes.

ASSEMBLYWOMAN McCONNELL: You mention on page 6 of your testimony that of the 25 insect pests in California, 96% of them were made worse by the application of pesticides. What do you base that statement on?

DR. EHRENFELD: That is a statement that was made by Robert Vandenbosh, who was the leading proponent of integrated pest management in the country until he died a year or so ago. He was not only the leading spokesman for it, he was the leading scientific developer of the idea. He was an entomologist at the University of California, and he really developed the whole idea of integrated pest management from personal experience in working with these pests. He made these statements in a book called, "The Pesticide Conspiracy, published by Doubleday, which is, in my opinion, an excellent summary of the role of pesticides in pest management.

ASSEMBLYWOMAN McCONNELL: Is that listed in your bibliography?

DR. EHRENFELD: Not in this bibliography, no. This bibliography is simply carbaryl related. I can provide, if you want, for the record, a list of references dealing with gypsy moths and dealing with pesticides.

ASSEMBLYWOMAN McCONNELL: Would you do that?

DR. EHRENFELD: I would be happy to.

ASSEMBLYWOMAN McCONNELL: Thank you very much, Dr. Ehrenfeld.

Do we have anyone here from the Department of Environmental Protection? (no response) Gordon Bamford, State Forester, Bureau of Forest Management. Would you come forward, please?

G O R D O N B A M F O R D: Madam Chairman, my name is Gordon Bamford. I am State Forester and Assistant Director for the Division of Parks and Forestry in the Department of Environmental Protection. I appreciate the opportunity to make a statement with respect to our Department's position. I am not going to address the question of carbaryl or the use of any insecticides. My statement will bear primarily on the effect of our forest resource, our woodlands, along with our State forests and parks.

New Jersey is a unique State along with its complete urbanization, heavy population, and extensive industrialization, it is still 54% forested. Of this, 1,930,000 acres or forty percent is classed as commercial forest and another fourteen percent as residentially forested. About 83% of New Jersey's forest land is privately owned. The New Jersey Forest and Park system consists of 13% of the total forest land in New Jersey or 247,000 acres. Of this, 92,000 acres possess forest types which are vulnerable to gypsy moth infestation. State forest lands in the northern portion of the State face the greatest potential for tree loss since hardwoods, primarily oaks, are the predominant species there.

The gypsy moth has been a consistent forest pest in New Jersey since 1965 when only five acres were defoliated. The first attempts to eradicate this insect were unsuccessful and now the entire State is considered infested. During the summer of 1980 approximately 412,000 acres of New Jersey's forests received defoliation with 213,000 acres receiving severe defoliation. This is the highest level of defoliation affect New Jersey's forest resource. The gypsy moth with its voracious feeding habits prefer tree species in the oak group, namely white, red, chestnut, and black oaks. Approximately 1,300,000 acres of New Jersey forests contain various components of these preferred species. The situation of our State forests and parks is very serious in light of the potential threat to the forest resource attributable to the gypsy moth. Past histories of major infestations have shown that 26 to 100 percent of the oak species can be killed. Resource management objectives will be disrupted if no suppression measures are undertaken for the Spring of 1981. This can have a serious impact upon forest land which provides aesthetics, recreational opportunities, protection of watershed, wildlife habitat and forage, and wood products for the State's 7.3 million residents.

The present major outbreak started in 1977 and has moved southwestward across the State. In its wake the oaks in Stokes State Forest and High Point State Park have experienced the first major setback due to the gypsy moth. Adequate resources were not available for treatment, as a result 21,000 acres were completely stripped of foliage during the Spring and Summer of 1978 and about 30% of the oaks died during the winter of 1978-79.

In the Spring of 1979 several State forests and parks were treated, thus materially reducing mortality of oaks on these woodlands.

The summer aerial mapping and fall ground mapping of 1979 on State forest and park woodlands indicated that 9,000 acres required treatment. In May 1980, the Department suspended plans for spraying due to the controversial issue of Sevin.

In connection with the situation for 1981, all of this gypsy moth activity has already adversely influenced the health of trees growing within State forests and parks. An aerial survey completed in July has determined that out of

a total of 60,804 acres in 19 forests and parks, 31,555 acres or 52 percent have been moderately to severely defoliated. Among those hardest hit were seven areas that are a part of the Natural Area System. Allamuchy Mountain State Park, Ramapo Mountain State Park, and Cheesequake State Park were particularly stripped of leaves. Normally trees will replace foliage lost by producing a new set of leaves during July and August. Due to the lack of rain this summer, refoliation has been retarded and in some areas - Cheesequake State Park - scattered trees have not even had enough reserves to produce any new leaves and are already dead.

If the Department decides to conduct a viable suppression program in 1981, the Bureau of Forest Management will proceed with a biological egg mass survey to determine the extent and severity of infestation within 83,000 acres of forests and parks. This will provide the basis for determining the location and extent of a suppression program. A preliminary estimate would be about 32,000 acres to protect our valuable forest resource.

At the present time the Department, under the direction of Dr. Alden Mc Lellan, is conducting an in-depth analysis and study of the gypsy moth question, including the use of the insecticide Sevin and other chemical and biological controls. This will provide the basis for a Departmental policy regarding gypsy moth suppression projects. It has not been completed, but shall be available to this Committee.

ASSEMBLYWOMAN MC CONNELL: Thank you very much. I don't have any questions at this particular time, but I do thank you for coming and sharing your Division's thoughts with us. I would appreciate having this report from you as to what your policy is regarding the gypsy moth suppression program.

MR. BAMFORD: Thank you, Chairman Mc Connell, I will see that is forwarded to you.

ASSEMBLYWOMAN MC CONNELL: Thank you very much. Dr. George Halpin, Director of Parental and Child Health Services Program, Department of Health.

D R. G E O R G E H A L P I N: I am here this morning just to provide some comments on Assembly Resolution Number 51, and to provide any other information that I might be able to give to the Committee. My comments are brief and I will try to keep them that way.

This particular pesticide is currently being reviewed by both the State Department of Environmental Protection and the Federal Environmental Protection Agency concerning its safety in general use. They are paying special attention to any possibility that it may cause birth defects. The issues in this case have been under study for a number of years, and as a result this pesticide may be the single most tested pesticide in current production. It appears that the public health risks, beyond those of acute poisoning,appear to be at the very limit of our scientific ability to detect them. This may not conclusively rule out all risk but it does categorize the risk, if present, as extremely small.

A public reivew of the research concerning this pesticide by the Assembly Committee may help allay much of the general public's concern about carbaryl safety in adequately controlled use. However, since some of those opposed to the use of this pesticide oppose its use because they have a categorical opposition to the use of any pesticide, the fruits of such an Assembly review may be limited.

I would like to make two specific points about the wording of the resolution. In the paragraph, lines 6-9, I feel that the use of the phrase "a number" should be changed to "some", since as far as I am aware, there are only few medical experts that feel that Sevin is involved in the etiology of human birth defects. In line 8, the word "cancers" should be deleted. There is no evidence that carbaryl is carcenogenic in any of the many species that the chemical has been tested.

There are two very fine points in the actual wording of the resolution, there is a question as to how many medical experts actually feel that carbaryl may be a cause of birth defects. In my contact with people, when you initially bring that question to them, they say, "It is not even top on their list." They say, "Why are you looking into this."

And, the second is, there is no evidence in any of the recent studies from the EPA that carbaryl is carcenogenic. This was stated by EPA staff members at a recent review they had on the subject in Washington and probably should be stricken from the language in the resolution.

The other items that were mentioned just recently concerning the research on its mutagenicity, it was stated at the EPA conference that it is a weak mutagen, as the Scientific Advisory Committee generally dismissed that as any biologically active compound, probably has some mutagenicity potential, and it would be difficult to eliminate all compounds that could have, in a test situation, some mutagenic activity.

Its possible teritogenic effects had been very well studied, and it is one of the few that I know of that have been studied in Rhesus monkeys, one of the few pesticides where it has been tested on our closest biological neighbor, and found to be --- I would not try to present myself as an expert in this area of carbaryl or any other pesticide, but it seems that this one pesticide has been extremely well tested, and the questions that remain do remain in some degree because of the very nature of the research that was done. In other words, in the case of the one study or two studies in fact where it was shown to be mutagenic, or teratogenic in dogs, the problem is that the data on that research can't be located to re-evaluate whether it was accurate or not. So, the question that remains in that case, particularly, is due in fact because the records from the original research have been lost or destroyed.

ASSEMBLYWOMAN MC CONNELL: Thank you, Dr. Halpin. With regard to page two of your testimony concerning the phraseology of the resolution, perhaps your suggestion that a number should be changed to "some" I think is very well taken. However, your reference to line eight concerning the word "cancers," we were referring to allegations made by some groups. We were in no way implying that this was the policy of the State of New Jersey or that we were substantiating that it was a carcenogenic. That is part of the reason for this public hearing, to try and determine what, if any, threat there is to public health with regard to the use of this chemical.

It is my understanding that the U. S. Department of Health has repeatedly studied 75 people working with carbaryl in this State's pesticide industry. Are you familiar with that study?

DR. HALPIN: In a general way. This was done through a project called pesticide control project in the Division of Epidemiology under Dr. Altman. I have read some of their work. I don't know the material in detail, though.

ASSEMBLYWOMAN MC CONNELL: What were the conclusions?

DR. HALPIN: Well, the conclusions were that in the types of use in the aerial spraying and in other types of applicator exposures, when appropriate precautions and clothing were taken, they found very minimal evidence that the compound had been absorbed through the skin or through other routes, and that it did not present any risk in an occupational sense to those people who were actually having the highest concentration of exposure.

ASSEMBLYWOMAN MC CONNELL: It is my understanding that the weekly exposure was about 30 million times the spray exposure that is being used by the Department of Agriculture and that they did not seem to suffer the ill effects. Do you agree with that?

DR. HALPIN: Yes.

ASSEMBLYWOMAN MC CONNELL: I know that carbaryl has been the focus of many, many studies to determine its effect on health, as well as its effect as regard to gypsy moth control.

Several of those studies were conducted by Union Carbide, and there were a number of other studies that were financed or done by other individuals or groups. Are you familiar with some of those?

DR. HALPIN: Some of those, yes, in a general way.

ASSEMBLYWOMAN MC CONNELL: Can you tell me generally what the findings were?

DR. HALPIN: Well, as they go through the different species, usually they test for mutagenicity or teratogenic would be using mostly rats and other species of rodents. All of those studies had not indicated any teratogenic effect in some cases. So that you were applying a very heavy concentration of the pesticide to the animal and not seeing adverse reproduction in the sense of teratogenic effects on their offspring. How that type of research model applies to human exposure is always difficult. I mean, this is the whole question of, can you take studies that have involved lower species and apply them to humans. Can you take studies that are done over a short period of time with massive doses, and extrapulate that validly to minute concentrations over long periods of time. This type of, shall I say, research issue is not at all clearly resolved, but according to current research procedures, these are more acceptable measures and did not indicate that there was even in those heavy exposures any particular problem.

ASSEMBLYWOMAN MC CONNELL: So, what you are saying is that based upon the studies thus far, those that you are familiar with, it has not been shown---

DR. HALPIN: With the one exception of the studies that were done by the Food and Drug Administration, some years ago, and then by a private research firm using dogs. The data indicated there that at relatively low levels they did have birth defects occurring in the offspring. The problem with that is to go back and re-examine that study, there are no records.

ASSEMBLYWOMAN MC CONNELL: Let's stay on that subject for a moment. You indicate that the results of the study are not available. It was my understanding that this was a study done by the U. S. Department of Health, Education and Welfare in 1968 under the supervision of a toxicologist named H. E. Smalley. Was that the study that you are referring to, and it was the basis for the controversy over carbaryl with regard to birth defects.

DR. HALPIN: The report is there, but to go beyond the report to check to see if procedures, methods, et cetera, are all appropriate, none of the base documents or research material is there, so you can't check to see if there was an error in the calculation of some of the results.

I am not at the level of having looked at the material. I am relying on information that was presented.

ASSEMBLYWOMAN MC CONNELL: It seems to be this study that is the basis for the controversy over the alleged cause of birth defects. Can you explain for the record - because there have been other studies done on humans, monkeys, guinea pigs, rats, other species other than dogs, and there seems to be a distinction between dogs and the other animals that have been used and the way carbaryl is broken down into their systems. Is there a distinction?

DR. HALPIN: I think I would pass on that. I really couldn't give you an answer. I know there are people here from Union Carbide who could give you that kind of detailed information. I know that the metabolite that is picked up in the urine is different between the human and what they would look for in a dog, but what the biological or the bio-chemical handling of the compound in the dog is different than in the human, I really couldn't tell you.

ASSEMBLYWOMAN MC CONNELL: The Department of Health's policy or feeling that the use of carbaryl, then, in the dosage that is being used in the present gypsy moth program is not harmful to humans, and there is no evidence that it does cause birth defects; is that correct?

DR. HALPIN: That is correct, yes.

ASSEMBLYWOMAN MC CONNELL: But you cannot say conclusively, based upon the studies that you are familiar with, that it does not?

DR. HALPIN: Well, there is a point in any research where you can never say something doesn't do something.

ASSEMBLYWOMAN MC CONNELL: It cannot be absolute.

DR. HALPIN: There is no way you can say anything, that under some circumstance, could not possibly do something. You have to test the situation and then say, yes, it did or didn't. As far as we know currently, and we are beginning to develop the capability to monitor the incidence of birth defects in the State much more carefully, there is not a correlation that we have seen to date from where the birth defects are occurring. It was in Cape May where we have been involved somewhat.

ASSEMBLYWOMAN MC CONNELL: Yes, would you elaborate on the Cape May incident, and for the record, there was some concern that came out of that county as a result of, I believe, three women that live within a close distance of each other who had babies with---

DR. HALPIN: It has gone---

ASSEMBLYWOMAN MC CONNELL: Could I finish, please? There was an allegation and some indication that perhaps it was through the use of carbaryl in that particular county that might have caused these birth defects. It is my understanding that the Department of Health got involved in that, and did a study. Could you, for the record, tell us what your Department did?

DR. HALPIN: Okay, I can retell the events as I know them. There was a cluster - a spacial grouping in time, and geography - of birth defects to a group of women who knew each other. That raised their concern that something

must be going on, because these other women they knew from a birth education class had similar problems. This was presented as a concern to county freeholders sometime in early spring of this year.

Subsequent to that, an environmental group called CAPE, who had repeatedly over the years opposed the spraying of various types - gypsy moth, mosquito, et cetera - in the county took that event, or those events,of the cluster birth defects,and tied the two together and said it is because of the spraying that you had these birth defects, because the timing of the birth defects would have been such that the conceptions would have occurred in the late spring, early summer of the previous year.

ASSEMBLYWOMAN MC CONNELL: So, that was their assumption.

DR. HALPIN: That was their assumption. The County Health Officer, Mr. Lamont,had contacted my office and asked if we could help them try to sort out or study the dimensions of this unknown dimension cluster of birth defects in the county. And, in conjunction with my staff and Dr. Altman's staff in the Division of Epidemiology, we did a review of the birth defects from 1977 through the end of the first quarter of 1980 in both Cape May County, Monmouth County and Morris County. The reason we chose the other two counties is we wanted some place to use as a comparison. We wanted counties that were sufficiently large in number of births, and also we chose them because they had been significantly involved in the gypsy moth spraying program in past years. As an initial look-see to see if we were dealing with a real problem, we simply calculated the rates of birth defects. We had some problem getting those. We had to review approximately 36,000 hospital records of births to identify those children that we felt had birth defects of some significant nature.

ASSEMBLYWOMAN MC CONNELL: Excuse me, did you also include miscarriages in the statistics?

DR. HALPIN: No, miscarriages we dealt with only those that had been reported to the Department. In other words, that is 20 weeks gestation and beyond. We have no information, no records on miscarriages---

ASSEMBLYWOMAN MC CONNELL: So that data was not included in your birth defects?

DR. HALPIN: No, what we wanted was the twenty weeks and beyond, so if you had a still birth near term, 20 or 30 weeks gestation,where a birth defect was present, we included that in our data.

We then took those rates calculated by municipalities, the rates of birth defects for all the municipalities in those three counties, and we are dealing with small numbers, because one county may have only 10 or 20 births a year. Others may have fairly substantial numbers. We then took those rates and said, all right, let's look and see if the municipalities that have been in the spraying programs have a higher rate of birth defects from those who do not. When we did that, we found that indeed the municipalities in the spraying program had a lower rate of birth defects than those that were not, and when you looked at it by county, Cape May County had a much lower rate of birth defects than the other two counties. I think some of that reason may be because of the general low industrial development that is in Cape May. You are talking about a rural area. Birth defects have been known to increase in frequency as you get more urbanized and industrialized, and also the fair

amount could be due to the fair amount and the ethnic mix of the people that are there. Some birth defects are very high, depending upon the genetic background of the people, so if you have a population that is not of that stock, you won't see that birth defect in that population.

An example in England, the rate of anomolies of the nervous system will grow increasingly from the southern part of England where they are very rare to northern Scotland where they are very high, and they have been studying that for forty years, and have not been able to explain that variation. But, it seems to be that the Welsh and the Scotch have a much higher rate than the parent English stock of Great Britain.

So, those kinds of issues are very difficult to separate out, and I would have to say that this study was just a type of look you would do to see if you would have a massive problem. It was not a detailed look. We have been subsequently doing detailed work in Cape May County. There is some geographical location of those cases in the southern half of the county, and we have been working with the county and doing a survey, which is almost completed at this point, to try to identify other factors, such as family, genetic type, occupational exposures and things of that nature which possibly impact on the birth defect.

ASSEMBLYWOMAN MC CONNELL: So, you have looked at other factors other than just---

DR. HALPIN: We are in the process of doing that. We have received about 75% of our questionnaires back, and are beginning to do an analysis now.

ASSEMBLYWOMAN MC CONNELL: But you did conclude that the rate of birth defects in Cape May was indeed lower, which is a county where the gypsy moth control program existed?

DR. HALPIN: Yes, these three counties all had the gypsy moth spray program involved.

ASSEMBLYWOMAN MC CONNELL: What were the counties, Morris, Monmouth and Cape May?

DR. HALPIN: Yes. Some of the reasons we took them---

ASSEMBLYWOMAN MC CONNELL: And, the rate was lower in those three counties?

DR. HALPIN: No, the rate was lower in Cape May than the other two, but when you grouped those municipalities that were in the spraying program versus those that were not, the ones in the spraying program had a lower rate of birth defects. Now, there could be many factors that would influence them. I could give you an example. You would probably not spray in the middle of the urban environment. Very little spraying goes on, let's say, in the direct downtown area of Morristown, which is---- Or, if you took another area where you would have a poorer population, that population is also a greater risk for birth defects, for other socio-economic reasons. So, there are a lot of compounding variables in the situation that would require more detailed study to sort them out. But, as a preliminary sounding to see if there was a problem, this type of a look should have indicated something, and it clearly didn't.

ASSEMBLYWOMAN MC CONNELL: So, you do not believe there was any kind of relationship.

DR. HALPIN: At this point I have to say that, with the aerial spraying with the new program, I would say, no, there would seem to be no indication of that at all.

In our detailed work in Cape May where we have actually looked at street addresses and actually looked where the spraying has occurred, they are not in close geographical proximity.

ASSEMBLYWOMAN MC CONNELL: For the record, at what time did these births take place? I don't mean the hour, but the month.

DR. HALPIN: The ones that started the question in Cape May, you were talking about births that occurred late December up through February to March. Most of the ones that are in question were the end of December, early January. But, in our study we looked at birth defects over a three-year period.

ASSEMBLYWOMAN MC CONNELL: In Cape May the three births that we are referring to took place in December.

DR. HALPIN: The end of December and January.

ASSEMBLYWOMAN MC CONNELL: Mr. Metterhouse, when does your spraying program take place, what month?

MR. METTERHOUSE: It usually takes place the last week in May.

ASSEMBLYWOMAN MC CONNELL: Thank you.

DR. HALPIN: The timing would be appropriate. They were in pregnancies that were conceived at the time of the spraying, but we did look at the birth defects in Cape May over the three-year period and we could find no pattern that would say, "Yes, there was a higher rate of birth defects among those pregnancies conceived in the spraying time period as opposed to pregnancies conceived any other time period during the year."

So, that these three occurred at that time would have come by the chance of draw. It was just a clustering by statistical chance, that's all.

MR. MILLER: Are you aware of any position that the Morris County Medical Society has taken with respect to this?

DR. HALPIN: Yes, in the height of this controversy, it was reported, as I understand the situation, and I had talked with the Secretary of the Medical Society of Morristown, that it was reported in the press that they had taken a position saying that they felt that any woman who was pregnant should leave a sprayed area for a period of close to a week. When I contacted the Medical Society to ask them on the basis of what information they had made that statement, they denied making the statement. They said they had been misquoted, and they were not going to stand behind that statement.

MR. MILLER: Just simply for clarification, would you define the terms mutagenic and teratogenic?

DR. HALPIN: Mutagenic means that a compound has the ability to affect the genes of an individual, the genetic structure of that individual in terms of the ovum, the egg, and the sperm. That could have a mutation. An example of that might be Down's syndrome where you have in effect a dislocation in the genes structure of the woman prior to the pregnancy. It is an effect on the gene itself.

Teratogenicity means the appearance of a birth defect, and that can have nothing to do with the development of a mutagen. In other words, you take the Rubella virus. It produces considerable birth defects depending upon the time the woman is affected during the pregnancy and it is not affecting the genes of the infant, but is affecting the cells that develop into either parts of the eye or other aspects of the growing fetus. So, a caritagen can affect any time during the length of the pregnancy and affect the outcome without necessarily affecting the genetic structure.

ASSEMBLYWOMAN MC CONNELL: Are you familiar with the fact that a Federal Scientific Advisory Panel recommended that the Environmental Protection Agency require Union Carbide to label the pesticide sevin commonly used as a possible danger to pregnant women? Are you familiar with that recommendation?

DR. HALPIN: Yes, I was. I was there the day they made that recommendation. It was not at all clear as to whether that was going to be their final recommendation or whether they were going to discuss this subsequently.

ASSEMBLYWOMAN MC CONNELL: Have they changed their policy on that? That was in July of this year.

DR. HALPIN: I don't think the Scientific Advisory Council did, but I think the EPA itself hadn't decided as to whether it was going to make a change on the labeling. The basis for that, as I understood it from that meeting, was that because there was one study which possibly showed some impact as to it being able to induce birth defects, that they felt there should be some change in the labeling. Even though they were willing to admit they couldn't verify the study, and that they recommended at the same meeting that the study be repeated, so, as to how they came to that judgement, I guess, they would have to defend it. My own personal feeling was that the body of evidence that was presented by the various research people there at the meeting, that this was a jump in a very, very conservative way, but that is a personal opinion.

ASSEMBLYWOMAN MC CONNELL: It is your opinion, then, that all of the scares and allegations pertaining to the relationship between carbaryl and birth defects was based solely upon the study done on beagle dogs?

DR. HALPIN: That is the most frequently cited one, yes. There is, I think, one other where everyone felt that the people who reported the study said they couldn't draw any conclusion because they killed most of the animals in the process of doing the study, and so most people do cite this study with the beagle dogs as being the basis for their concern.

ASSEMBLYWOMAN MC CONNELL: Let me ask you about this, a recent review by the Health Advisory Panel of the Marine Bureau of Forestry concluded that there were reasons to think that some components of sevin-4-oil may help to induce Reyes syndrome, a frequently fatal disease of children and may increase the incidence and severity of other viable diseases. Could you comment on that?

DR. HALPIN: This is not a field I would feel very comfortable in commenting on, but I do have a little knowledge on this since this issue has been raised. The question of whether carbaryl or any of its by-products after metabolized might make it easier to switch into a more active form and affect the human in a different way was raised at this Scientific Advisory Council as some preliminary research by a research scientist in Massachusetts. They felt that it was interesting research, but she herself had concluded that she was very far from making any definite conclusion, and it was much too early to say anything about it. You would then jump from that kind of preliminary work to a syndrome called Reyes syndrome, the ideology of which is not completely understood. It is very unclear as to how that specific constellation of symptoms occur in children. It is a bit of a jump for me to make. You are taking a new area of research with a medical unknown and linking them together. As far as I have been able to find out, there is no good medical indication that that link should be made at this time.

ASSEMBLYWOMAN MC CONNELL: Thank you. Do you have any further questions, Norman?

MR. MILLER: I think there is one type of general question that seems to hang over all these proceedings. It is generally conceded by everyone that testified, and perhaps by most educated opinion, that any pesticide and chemical in large doses, concentrated doses, or prolonged doses can in fact be harmful. Aren't we then talking in this case and every other such comparable case simply about dosages and concentrations, the link between a particular pesticide or a particular chemical and the ideology of particular adverse health effects or breakdowns? I guess I am only asking this rhetorically as to the question of concentration?

DR. HALPIN: Essentially, yes. Anything you ingest from aspirin to any active compound, it is a question of dose. If you take enough of something, it can be harmful to you. I can even extrapulate that to food. If you eat enough food, it is harmful to your health. Obesity is a major killer. So, it is a biological law, if you take enough of something it will do something harmful to you.

I think the question is, what are those items that are safe enough that you can put them in the hands of the public in a routine way, so that the dosage toxicity pattern is such that they are least likely to get into trouble, and that would be the difference between medication that is available in any drugstore over the counter, and those that you can get only by prescription. That is the general break that occurs there. I think this is the type of approach that the EPA has taken with classifying certain pesticides as those which are available at certain concentrations, at certain volumes in a garden store and anyone can buy, and those that only a licensed applicator can apply.

So, again, yes, you are correct. It is a question of dose, and in the types of dosages we are talking about, if you took a bottle of sevin and drank it, yes, you would be in trouble. But, it is an acute toxicity. There is no indication to date that you have something of a long term effect that twenty years from now---

MR. MILLER: You have anticipated my next question. Does it in effect accumulate? Does sevin to your knowledge get out to the ground, leach into the soils and become a part of the water supply, and could we at some future date develop concentrations which are not now evident, but which can at some time become evident?

DR. HALPIN: I think this may be a feeling people have as an analogy that was used with DDT, which was able to accumulate in the environment. Carbaryl, as I understand it, is not; it is biodegradeable, and I think the experts from Union Carbide could give you the time frames in that, but my general understanding is that somewhere less than a week on open soil it then becomes inactive.

ASSEMBLYWOMAN MC CONNELL: Have there been any tests done on people in areas that have been sprayed by the Department of Health?

DR. HALPIN: No, we have not, and when that question is asked us, we say State test for what? We have done these types of services---

ASSEMBLYWOMAN MC CONNELL: Are there any traces of sevin in there?

DR. HALPIN: That was done in the people who work with the Department of Agriculture who were involved in the application or would be exposed in the spraying. I think there may have been other work, but not done by the Department of Health.

ASSEMBLYWOMAN MC CONNELL: Did the Department of Agriculture conduct any test on people in any of the areas that were sprayed, Mr. Metterhouse?

MR. METTERHOUSE: This was done by the Department of Health.

ASSEMBLYWOMAN MC CONNELL: What did you find?

DR. HALPIN: They found what we discussed earlier, that the level was extremely low. These were not just the general public, but were people who

were employed by the Department of Agriculture.

ASSEMBLYWOMAN MC CONNELL: There were traces of sevin in their urine?

MR. METTERHOUSE: I believe there was a natural breakdown of product of sevin in those people who handled it every day, as opposed to people in the community they did not find those traces.

ASSEMBLYWOMAN MC CONNELL: I see, these were people who actually dealt with sevin every day. Biologically, do humans have the capacity to metabolize this chemical and eliminate it?

DR. HALPIN: Yes, they do.

ASSEMBLYWOMAN MC CONNELL: I don't have any further questions. Thank you very much.

Dr. Geller and Dr. Hartzog.

D R. M I C H A E L G E L L E R: I appreciate the opportunity to comment on the State of New Jersey's plan to suppress the gypsy moth in selected areas of the State. It can be stated without fear of contradiction that we share a common goal and that we are all concerned about the actual and potential loss of forest resources. Similarly, we share common concerns that any method of protection be consistent with human and environmental health. Beyond these common grounds, many of us part company because we cannot agree, one, on how our resources may be best protected, and, two, on what methods of protection are most consistent with environmental and human health.

Let me briefly review the implications of one of the alternatives available for controlling the gypsy moth. This alternative which has been widely used to control many species of pests, particularly insects, is the spraying of a chemical toxin an herbicide, an insecticide. This method, to be fair, has a remarkable list of credits, especially in controlling insects that transmit human diseases. However, the widespread use of chemicals has fallen from grace recently for a variety of reasons.

One, many of the toxins that were first used persisted in the environment with adverse effects on the health of plants, wildlife and people.

Two, a number of target organisms have developed immunity to these toxins, while beneficial or benign forms have continued to be susceptible. This evolution of resistence necessitated the development of newer, frequently more toxic materials.

Three, the breakdown products in chemical waste generated by a number of companies engaged in the manufacture of these and similar materials have been improperly disposed of creating an understandable chemo-phobia on the part of the populace. Rightly or wrongly, this chemo-phobia has created a certain reluctance in people to tolerate the spread of chemicals in the environment. Now, I must admit to a certain chemo-phobia myself. None of us are completely objective and if you are looking for my bias, this is it.

However, I sympathize with those of you who in the audience have the task of dealing with the gypsy moth problem. I do not envy you, and reading the environmental impact statement and related documents, I found myself wondering what solutions I would espouse if I had to deal with the pressures of being trapped between the gypsy moth and various public interest groups. Nevertheless, this is how I see the problem.

We are in this difficulty primarily because we are dealing with an imported pest and the jargon of ecology and exotic species. Imported organisms usually

have one or two fates; one, they cannot adopt to a strange environment and they die. Unfortunately, this has been the case for many species imported to control the gypsy moth.

The second alternative is that the organism, the exotic species, finds the environment lacking in natural controls found in their native habitats and they survive often too well. Unfortunately, the gypsy moth falls into the latter category.

Given this problem of exotic pests, what are the solutions? One approach which seems appropriate is to kill the offending organisms. The wisdom of this approach is more illusory than real, because it rarely works over the long haul. A good example of this situation is attempt to control the rabbit in Australia with a certain virus. But, the initial results of the virus technique were dramatic, but both the rabbit and the virus evolved towards mutual tolerance.

Populations of insects are usually too well established and reproductive rates are too high for this to be a viable management strategy. At best, this causes temporary reductions in the pest species. Pests then re-invade from the area and must be repeatedly treated with the insecticides. Chemical control to suppress the gypsy moth has the advantage of having a 90% plus mark down of caterpillars within a short period of time after the treatment. This affords maximum protection of foliage with the least expenditure of money and effort. Chemical control has the additional advantage of being easy to apply; unlike biological insecticides, the application of carbaryl, for example, need not be tied to a specific portion of the organisms life cycle. That is, it is toxic throughout the life cycle of the gypsy moth. Unfortunately, it is also toxic to other organisms as well, and this provides a substantial concern for those who would like to see aerial spraying reconsidered. As we have heard today, carbaryl is a broad spectrum toxin. That is, it affects a wide variety of organisms.

The EIS statement is particularly vague about the acute and chronic effects of carbaryl in many species. For example, carbaryl will produce a "temporary reduction in beneficial insects." This is a statement from the EIS. This information is based upon one letter and one scientific paper which focused on the gypsy moth, the elm, the spanworm, and other related species.

From this minimal data base the EIS dismisses the effects of spraying of carbaryl on, one, the insect predators and parasites of the gypsy moth, and, two, beneficial and neutral species of insects, and, three, vertebrate such as birds that depend upon insects for food. A number of these vertebrates are known predators of the gypsy moth. Now, the gentleman from the State will have you believe that parasites, particularly in other organisms like predators, might invade from the surrounding area. My question is, would one then also expect the gypsy moth to invade from the surrounding area, thus perpetuating the need to frequently retreat these areas with something such as carbaryl.

Similarly, the EIS dismisses the effects of carbaryl in populations of birds, even though table six in the document shows that carbaryl causes birds to leave their territories temporarily, there is no information on nestling mortality in the document. One paper used by the environmental impact statement to support the notion that carbaryl has minimal effect on bird populations shows that spraying sevin at two pounds per acre in a grassland suppressed reproduction in populations of small mammals. Bird populations were only superficially mentioned in that document.

Thus, carbaryl can decrease populations of organisms of insects which may act to moderate eruptions of the gypsy moth. It also has a profound effect on wild populations of bees and wasps. While you can't protect domestic populations - hornets are raised for the purposes of pollinating flowering plants - no protection is mentioned for wild populations. The long term repeated use of carbaryl on arthropod populations is at best poorly understood, and the EIS admits that chemical insecticides have the greatest environmental harm of all the appropriate alternative methods.

Given the importance and the desirability of biological controls, and given the uncertainty of repeated use of carbaryl on many of these species, I cannot recommend the use of carbaryl over approximately 50,000 acres of New Jersey at this time.

ASSEMBLYWOMAN MC CONNELL: Thank you. Dr. Hartzog.

D R. S A N D R A H A R T Z O G: My name is Dr. Sandra Hartzog. I have a Ph. D. in Human Genetics from the University of Massachusetts and I am an Associate Professor of Genetics at Stockton College. I am also a Genetics Consultant for the Betty Bacharach Cleft Palate Clinic, which is treating children with cleft palate, which is one birth defect, and they are now broadening to treat children with other birth defects.

I have spent this summer reviewing the medical literature on various causes of human birth defects. So I must say that my information is of literature review, and I am not familiar with the original studies. So, I have to make that distinction.

The real problem is that many of the causes of human birth defects are extremely difficult to determine, and many of the causes remain unknown. We are getting increasing evidence that there may be an interaction of various effects which could be both the genetics of the mother and the fetus; it could be a reaction to drugs ingested by the mother, chemicals from the environment, and especially viruses. I want to talk today about the problem of viruses. Viruses are now known definitely to cause a number of forms of birth defects.

There are several different virus species that are involved, and the specific defect depends upon the time of the mother's infection during gestation, rather than the virus species. So, we heard already today that rubella is the known cause of birth defects. Chicken pox, mumps, a virus called cyto-megalo virus and a number of others are also implicated with human birth defects. In addition, rubella virus infection pre-natally has also been correlated with learning defects in children which don't show up until school age, and also with higher rates of leukemia in children.

Where this might become involved with sevin was information from the main poison control center that sevin may potentiate virus infections in mothers and in children, so that if a mother's resistance is lowered due to exposure to sevin and other pesticides, she might contract a viral infection. Some of the evidence on viral infections correlated with birth defects is that not only can a clinically diagnosed virus damage the fetus, but also some incidences of birth defects that have been associated with virus infections that were so slight, the mother did not know that she was infected, and only blood testing after birth documented the mother had a virus in her system and in the fetus's system.

So, my concern really is that this area should be tested further before sevin in used in residential areas where a large number of population might be exposed, even though the exposure is at very low doses.

ASSEMBLYWOMAN MC CONNELL: Thank you very much. Do you base your recommendation upon the main study pertaining to sevin's connection with possible viral infections?

DR. HARTZOG: In children who are exposed, and also the main sites work on tissue culture - with human tissue culture cells being exposed to virus and to sevin simultaneously.

ASSEMBLYWOMAN MC CONNELL: But did they substantiate any connection between the use of sevin, carbaryl, to these viral infections?

DR. HARTZOG: They correlate sevin with the chicken pox as they have done in Maine.

ASSEMBLYWOMAN MC CONNELL: Are you familiar with any other studies that have been conducted on laboratory animals?

DR. HARTZOG: Yes.

ASSEMBLYWOMAN MC CONNELL: With using the chemical sevin.

DR. HARTZOG: Yes. There are many studies which show no effect. Aside from the one mentioned on beagle dogs, I have found a few studies that cite effects on sevin causing teritologin in fish embryos.

ASSEMBLYWOMAN MC CONNELL: Where was that study conducted and by whom?

DR. HARTZOG: Judith Weiss at Rutgers. It was published in 1979 in a journal called Toxicology. I have the paper with me.

ASSEMBLYWOMAN MC CONNELL: Can that be made part of the record? Is that possible?

DR. HARTZOG: Yes.

ASSEMBLYWOMAN MC CONNELL: Are you familiar with the study that was done on beagle dogs?

DR. HARTZOG: I have read the study, but as I said, I have not been able to verify it by going back to talk to the original researchers.

ASSEMBLYWOMAN MC CONNELL: Other than the study done by Dr. Weiss, are you familiar with any others that have been done that have shown any correlation between sevin and birth defects?

DR. HARTZOG: No. That is to say, I am not familiar with any, but then I have not really exhaustively searched the literature.

ASSEMBLYWOMAN MC CONNELL: I thank you both for coming and sharing your research with us.

There are about six people who would like to testify. I would like to break for about fifteen minutes. There is a snack bar outside, if you would like to get something to drink, or a snack, or something. We will reconvene in about fifteen minutes, because we would like to get on with this.

(Whereupon a recess was taken.)

AFTER RECESS:

ASSEMBLYWOMAN MC CONNELL: Joseph Jannarone.

J O S E P H J A N N A R O N E: My name is Joseph Jannarone. I am the Township Forester for Parsippany-Troy Hills. Parsippany is located in Morris County. In lieu of the time problem, I will be brief.

I would like to say that I support the Department of Agriculture's gypsy moth suppression program. And, I would like to state they do a tremendous public service to municipalities like Parsippany in New Jersey in the supplying of manpower and expertise in the egg nest surveys which they conduct every year. They supply the manpower during, before and after a spray program, and they come in and evaluate a spray program after it has been completed. Without their cooperation and expertise I would venture to say that the gypsy moth problem in New Jersey would be much more sever than it is now.

Parsippany has taken the option of utilizing their spray program on two occasions, one, 1978 and one in 1980. We just completed spraying 2,000 acres this spring. Their cooperation was outstanding in information, manpower, supplying of the baloons, the markings, the information enabling us to adequately notify the property owners that were affected in this area. And, overall, they were a tremendous help. Without that program, we would have less trees in Parsippany today. Thank you.

ASSEMBLYWOMAN MC CONNELL: Thank you very much, Mr. Jannarone. Mr. William Gaughan.

W I L L I A M G A U G H A N: My name is William Gaughan. I am an employee of the Monmouth County Shade Tree Commission. The Monmouth County Shade Tree Commission has been involved in the cooperative gypsy moth suppression program for ten years, and in those ten years we have had no record of any serious adverse effects on people or animals, and secondly we have been involved with the use of different types of chemicals and biologicals and have found that sevin is the only effective control measure.

We strongly support this program.

ASSEMBLYWOMAN MC CONNELL: Thank you. Can you tell me in Monmouth County how many acres have been infested with gypsy moths, or how widespread the problem is in Monmouth County?

MR. GAUGHAN: I believe Mr. Kegg has that exact figure.

MR. KEGG: 15,000 acres in Monmouth County were defoliated.

MR. GAUGHAN: We were involved with the treatment of almost 13,000 acres.

ASSEMBLYWOMAN MC CONNELL: Thank you very much. Ann Baker.

A N N B A K E R: My name is Ann Baker, and I represent the National Organization for Women in New Jersey, and I appreciate the opportunity to express our position on Assembly Resolution 51 which, as I understand it, is directing the Committee to conduct a study. That study, I assume, is starting today but is an ongoing sort of thing. Stemming from our concern about the dangers of radiation from nuclear power, now New Jersey has adopted a position of concern about the alleged numerous threats to reproductive health from environmental hazards and chemical toxic products. We understand that current scientific studies differ on the effects and the hazards of use of herbicides and pesticides. So, we are not looking for any clear-cut answers or definitive positions.

However, I believe that until there are conclusive findings we are justifiably alarmed about the possible consequences about the use of such toxic chemicals to the reproductive health of women and men. Since there is insufficient data, and since they have not been collecting it, and since people have not been alerted to possibly looking for these kinds of dangers, then what we must do is move forward with the collection of data. We think it is entirely appropriate for this Committee to conduct its study and draft legislation which addresses the range of suspected problems connected with sevin.

I would urge that Assembly Resolution 51 be amended to include the study of the uses of dioxin, and other highly toxic herbicides to which there has been some alleged correlation with birth defects, miscarriages, and those are in the areas of reproductive health, but are other adverse health effects as well.

Succeeding our previous speaker, I am from Monmouth County, and from a community which was going to do sevin spraying this past spring, and where a petition was circulated, and we did not do it. It is the community of Roosevelt. We no sooner--- I am a new resident in that town, a new home owner --- signed that petition when the caterpillars appeared. I mean, what was happening in Browns Mills was happening in Roosevelt. We could hear the chomping on the leaves. We panicked briefly. Fortunately, we ran into Joan Ehrenfeld's article in the New York Times, and that was very reassuring. We had done a number of things on our own personal property. I understand there is a difference between what you can do personally on your property and what may be taking place across the street in Green Acres. We have a lot of forestation around Roosevelt by design.

We squished the bugs. We put things around the trunks. We have been out after the moths. We have killed the moths. And, we have gone out looking for the eggs. We have done all of this without using any chemicals. I don't think it is at all pleasant to be squishing caterpillars, but that is what we did, because we were opposed to using sevin. We had a neighbor who used sevin, had the same kind of chomping on leaves that didn't seem to do any good, and that drifted right over into our garden. We really had to talk with him quite seriously.

Now, the consequences of this kind of action for me are very interesting, because our trees releafed. We didn't lose any leaves as such. We had big gobs taken out of maple leaves, and a crab apple tree, which was very largely chewed away, and that releafed just in the course of the summer, and it was a dry summer. So, that is my personal experience, and it is not scientific.

I have four caveats, or three, actually, that I want to express here. One, I have a problem with our reliance on the chemical fix because there are so many adverse consequences to a heavy reliance on chemicals including the disposal of hazardous wastes. Until we understand what those adverse effects are, and until we have collected the data and done the studies and alerted people, I think that we are really playing with fire literally at times. I cannot help but be cynical about the defensive chemicals when I realize that the chemical industry is New Jersey's largest employer. You don't bite the hand that feeds you.

My second caveat is that the use of sevin is encouraged because of apparent concern with forest mortality. I too am concerned with the destruction of trees and other forest and field growths, but my concern is directed far less to the destruction by gypsy moths than to the rampant destruction of fields, woodlands, and valuable marshes by developers of shopping malls, condominiums, and sports complexes. That is not germane to this subject. It is simply a caveat. Maybe

it is more satisfying to kill gypsy moths with chemicals than to oppose the well financed developers that we deal with in this State.

My last caveat is, the assurances we hear regarding the use of chemical insecticides and herbicides in that they are not dangerous and hazardous are all too similar to the reassurances made by the nuclear power industry about how there will not be adverse effects from radiation. I am very suspicious of those reassurances, and I think we need to be very cautious about using these. Anything that can be done to put some sort of restraint on that until we know better what is happening seems to me to be to the advantage of human and environmental life.

ASSEMBLYWOMAN MC CONNELL: Thank you very much, Ann. Susan Shaw.

S U S A N S H A W: I appreciate this opportunity to comment on sevin. The following comments concerning the gypsy moth spray program are my own, but they also represent the views of the Upper Raritan Watershed Association located in Far Hills, New Jersey.

I have a Bachelor's Degree in Biology and am pursuing my Master's Degree in Ecology. I have done a review of the literature concerning carbaryl sevin. It has been suggested that chemical insecticides may prolong the outbreak of the gypsy moths, due to the fact that both natural and introduced parasites of the gypsy moths are killed. In a Massachusetts Audubon Society brochure, it is reported, "That the average infestation in sprayed areas according to research done by several states and the federal government lasts up to twice as long as an unsprayed outbreak." Therefore, it seems to me that we are forced into a vicious cycle of chemical spraying.

While it is true that sevin may give rapid and high mortality of the gypsy moth population, a small percentage of gypsy moths which survive a chemical are left with an abundance of food and with few, if any, natural or introduced parasites. Thus, the possibility exists that a resistant strain of gypsy moths might develop. Also, there is no guarantee that a whole new population of caterpillars will not blow in from another area. According to the same brochure mentioned before written by the Massachusetts Audubon Society, "No New England state any longer recommends aerial spraying of chemicals for gypsy moth control. All but Rhode Island specifically recommend against it." Interestingly enough, Connecticut in 1971 banned aerial spraying of insecticides and B. t. Permits for such use on non-agricultural, as well as agricultural, land must meet strict criteria. Two of the criteria being proof that the insecticide will not be injurious to public health or to pollinating insects. The burden of proof, I might add, is on the person who requests the permit.

The use of sevin is strongly opposed for the following reasons:

1. Sevin is not selective - it kills many beneficial insects.
2. More research needs to be done as regards sevin and birth defects. According to the Mrak Commission report, published under the auspices of what was then the Department of Health, Education and Welfare, sevin is "...virtually completely absorbed through the skin . . .affects kidney function at low doses . . . and may cause embryonic abnormalities." Mr. Douglas Campt, Director of Registration Division, EPA, in a letter dated May 16, 1979 to Mr. W. Cranston, New Jersey Department of Agriculture, "Since experimental exposure to carbaryl has caused birth defects in dogs, carbaryl may have some potential to do so in humans. However, since a teratogenic study of carbaryl in rhesus monkeys was negative, it would appear that the teratogenic potential in humans, if any, is not great."

I would like, however, to point out that a monograph on carbaryl was prepared for the California Department of Food and Agriculture by Peter M. Dolinger Associates, and the authors state the following:

"Carbaryl has been shown in at least two experiments to be a strong teratogen in dogs. Positive results of varying quality in several additional species, including mice, guinea pigs, suggestive, but taken together they indicate that carbaryl is teratogenic in mammalian and other species and that dogs are the most sensitive animals tested so far."

The authors acknowledge that no birth defects were observed in monkeys which were tested. The authors state that it is not known whether or not the parent compound, carbaryl, or one of its breakdown products acts to cause birth defects. They further state that "the hypothesis that dogs metabolize carbaryl in ways different from other animals rests on extremely inconclusive data." They have reached the conclusion that carbaryl can pose a risk of birth defects for humans.

Page 87 of the 1974 Environmental Impact Statement on the gypsy moth spray program states that "aspirin and vitamin A can produce birth defects under exaggerated conditions." I must add here that I have a choice whether or not to take these. With aerial application of sevin, I feel I do not have this choice.

3. According to the Hazard Profile on carbaryl prepared by the Special Pesticide Review Division of EPA, carbaryl adversely affects fish and bird species. More research needs to be done on fish especially birds.

4. The breakdown products of sevin deserve scrutiny. Peter Dolinger Associates have concluded from an unpublished study concerning sevin performed for the National Cancer Institute - by Bionetics Research Corporation 1969 that "Analysis and teratogenic potential of alpha-naphthol results need to be studied further but that the low dose of 10 mg/kg caused borderline teratogenicity and maternal effects in mice."

The 1974 Environmental Impact Statement (EIS) on the gypsy moth spray program mentions the potential harmful effects of sevin's breakdown product, 1-naphthol, and I quote, "1-naphthol is generally more toxic to fish and shellfish than carbaryl itself. Despite carbaryl's degradation, 1-naphthol can form a more persistent precipitate in sea water and can be toxic to estuarine species. Precautionary measures must be sufficient to prevent surface or subsurface runoff as well as atmospheric drift of carbaryl or 1-naphthol into brackish or salt water." As far as I know, no precautionary measures have been taken to assure that this does not happen.

While carbaryl is non-persistent, the persistence of its breakdown product is cause for concern as page 29 of the 1974 EIS states, that when 1lb/acre of sevin 4 oil was applied to an area for gypsy moths, residue of carbaryl was found 114 days after application. I think when they mention residue of carbaryl, they mean the breakdown product. I am not sure.

5. None of the impact statements address the problem of synergism. There have been studies done showing that DDT and PCB's have even been found in mother's milk. Well, we discussed the concentration of sevin before, and, true, maybe a small amount of sevin might not be harmful. But, the thing is, alone it might not be harmful, but maybe when it reacts with another chemical in your body it can be very toxic.

For example, it was reported that carbaryl alone in lab experiments did not cause mortality to rainbow trout, but carbaryl acted to increase the trout's susceptibility to rotenone, a common insecticide for gardens. From laboratory studies, carbaryl has been found to be especially teratogenic in combination with

malathion. As we know, both sevin and malathion are common insecticides for gardens, and in this study they injected the carbaryl into chicken eggs.

6. More research needs to be done regarding chemicals and their ability to be viral enhancers and whether as viral enhancers they can interfere with the body's immune response.

The 1974 EIS states "Again extrapolating from lab experiments with test animals, it is possible that carbaryl effects could be enhanced in man if he was under stress from specific drugs or malnutrition." As early as 1974, the writers of the EIS were aware of this possibility, yet nothing about this is mentioned in the 1979 and 1980 impact statements.

7. Research needs to be done concerning the emulsifiers and solvents used. There have been questions about the safety of inert ingredients in the formulations.

8. Presently, there is no comprehensive plan for identifying and keeping statistical records on pesticide poisonings in New Jersey. There is no law which requires doctors who suspect pesticide poisonings to submit blood and/or urine samples to be analyzed for pesticides by the Department of Health or another lab. The Department of Health has no facilities for testing animals for pesticide poisoning, and dead birds that have been sent to the Clinton Wildlife Management Area have been shipped out to Maryland to be analyzed for bacteria, rather than pesticides.

So, my question is, do pesticides seem safe only because there are not adequate testing facilities in New Jersey for animals and people?

9. Some of the information presented by the Department of Agriculture and in the impact statements appear to be incomplete and of questionable validity. The EIS states that the droppings from the caterpillars may pollute streams and that defoliation of trees along streams will allow more sunlight to reach the stream with the possibility of causing a rise in the water temperature.

David Halliwell, a biologist with the Massachusetts Division of Fisheries and Wildlife mentions that the droppings could act as fertilizer and also serve as food for some insectivorous birds and mammals and that "The composition of streamside vegetation is not compatible with high preference gypsy moth food types except in upland oak stands."

At a public meeting this year, the Department of Agriculture presented slides showing that no drift of sevin occurs yet the 1974 EIS states - page 95 - that "Even with a well-executed aerial spray project, spray deposition in certain non-target areas cannot be avoided. Small openings in the forest canopy, inconspicuous streams, small bodies of water will receive some spray drift. Some unavoidable drift of fine spray droplets may reach larger lakes and streams."

In summary, I would like to say that an economic value has been placed on trees. Why not place economic values on trout and other natural resources? Also, when a risk and benefit analysis is done, the fact that a paucity of information exists concerning the break down products of pesticides and their synergistic effects must enter into the consideration.

Presently, it appears that not enough of the potential adverse effects of chemical insecticides are known, therefore, we should use a water soluble formula of Bacillus thurgiensis, a microbial insecticide, when deemed necessary. I disagree with Mr. Robert Wolfe of the U. S. Department of Agriculture Forest Service, that there is no biological alternative. B.t., I feel, has been proven to be a biological alternative even though it may not have as high or as rapid a mortality as sevin.

I would hope that in the future, the New Jersey Department of Agriculture would supply pamphlets without pictures of massive defoliation and information which causes many people to believe that their only alternative is chemical insecticides.

Furthermore, it has been alleged by the New Jersey Department of Agriculture that 411,000 acres have been defoliated this year. This figure of 411,000 acres has been appearing on the front pages of the newspaper without any explanation as to whether all 411,000 acres were severely defoliated. Also, this 411,000 figure includes many undeveloped areas which many people are not aware. Town councils are supplied with the number of acres in their towns which were defoliated. For example, in my town of Montville, it is alleged that about 4700 acres have been defoliated. What I learned, however, after requesting the map of Montville was that many of the areas were undeveloped and would not have been sprayed anyway. I asked them why these acres are included in the estimate of those areas defoliated? Town councils and homeowners learning that such a high amount of acreage was defoliated are going to get alarmed.

I would also like to say that a gentleman did mention that the EIS cites a study that appeared in the Journal of Ecology, and they said that it does not adversely affect birds. This is the article, and it has nothing to do with birds. I mentioned in my comments on the draft that it had nothing to do with birds, and they did not take that statement out of the draft. They left it in their final. Also, the Department of Health has been carrying on studies to see whether carbaryl has been left in people. I understand in the newspaper that Mr. Shultze was quoted as saying that 1-naphthal was found in people not even exposed to the spraying. So, I called Mr. Hague at the Department of Health and he said that was true, that these people were not even in the area to be sprayed. So I asked him, why, then was 1-naphthol found in their urine. He said, "Oh, it probably was used in their gardens rather than do a scientific study to see if they were exposed to some of the drift.

I could not get a copy of that report. They said that EPA had to look at it firt. Then I had to request it from EPA.

Also, as regards to the harvesting of crops, you have to wait a certain amount of time before you harvest your crop. I have three pages here put out by Union Carbide. There is so much information, they can't even put it on the label. The thing is, homeowners do not have this. The Department of Agriculture has not been sending this information out.

ASSEMBLYWOMAN MC CONNELL: Do you have a copy of that for the record?

MS. SHAW: Yes, I do.

ASSEMBLYWOMAN MC CONNELL: Thank you. I have a couple of questions. Is Mr. Metterhouse still here? Could you provide this Committee with a copy of the 1974 and 1980 Environmental Impact Statements on the gypsy moth program?

MR. METTERHOUSE: Which years?

ASSEMBLYWOMAN MC CONNELL: 1974 and 1980.

MR. MILLER: Excuse me, Madam Chairman, how often are they issued, and how many are there?

MR. METTERHOUSE: Each year--- There is an environmental impact statement that is required. In other words, it is put together by the U. S. Department of Agriculture, which represents the U. S. Fire Service which is then submitted to the EPA.

ASSEMBLYWOMAN MC CONNELL: Could you provide us with one for each year?

MS. SHAW: They keep referring to the 1974 study rather than keep repeating the information in each one every year. In the 1979 and 1980 study they refer back to the 1974 study.

ASSEMBLYWOMAN MC CONNELL: You testified that the alternative B.t. is safer than sevin. You are aware of the allegations about B.t. as well as sevin. There are allegations as to whether or not it is completely safe. How do you feel about that?

MS. SHAW: Well, I have not done any research on B. t. but that is why I suggest a water soluble B. t. I know that xylene is in one of the formulations and I don't know enough about that to really make a statement.

ASSEMBLYWOMAN MC CONNELL: So, you are referring to the water soluble compound rather than that xylene or the petroleum based, right?

MS. SHAW: Yes.

ASSEMBLYWOMAN MC CONNELL: Did you testify that the Department of Health had conducted a study on humans who had been exposed to carbaryl?

MS. SHAW: Yes, that is what Mr. Hague said.

ASSEMBLYWOMAN MC CONNELL: I thought we asked the Department of Health and they said, no. Dr. Halpin. (No response)

MS. SHAW: That was Harding Township and Mr. Shultze was quoted as saying that 1-naphthol was---

ASSEMBLYWOMAN MC CONNELL: Mr. Metterhouse, do you have any information on that?

MR. METTERHOUSE: That was originally an assessment during an aerial spraying for gypsy moths. This was published by the Department of Health. These were funds that were secured from EPA. I do have a copy of that.

ASSEMBLYWOMAN MC CONNELL: Could you provide us with a copy of that?

MS. SHAW: I don't think that is the same study I am referring to, because Mr. Metterhouse was kind enough to send me a copy of that last year. I don't know the year of that. I believe that was another study. I think that just might be concerned with Randolph Township. I think additional studies have been done.

ASSEMBLYWOMAN MC CONNELL: You indicated in your testimony that the Department of Health really did not have the resources to properly test insecticide poisoning in either humans or insect life. Can you substantiate that? On what do you base that comment?

MS. SHAW: I have a woman here today that had livestock die. She suspected pesticide poisoning. I am not saying it was due to any pesticide and I helped her out by calling various people within the DEP and within the Department of Health and she had been to two doctors and neither submitted blood or urine samples to any one lab to test the pesticides. Yet, she was given an antidote for pesticide poisoning. As far as the animals, we searched everywhere to find a place--- It is very expensive to have a private lab test the animals. We tried everywhere just to get some of the animals tested to see if there was pesticide.

ASSEMBLYWOMAN MC CONNELL: And you did call the Department of Health?

MS. SHAW: Yes.

ASSEMBLYWOMAN MC CONNELL: Mr. Metterhouse, did you hear the question?

MR. METTERHOUSE: No.

ASSEMBLYWOMAN MC CONNELL: This young lady testified that she did not believe that the Department of Health had the resources or the facilities to test for insecticide poisoning in animals or insects? Do you know if that is true? If so, does the Department of Agriculture do any testing in this regard?

MR. METTERHOUSE: I know we do it, for instance, with insects. Sometimes, there are honey bees that are suspected of being killed, and we can take those samples to the Department of Health and they can actually do monographs and tell us what the bees were killed from. So, they do have that capability. We in the Department do not.

ASSEMBLYWOMAN MC CONNELL: Do you believe they have the capability to cooperate with existing agencies of State Government, but do not provide such a program to the public, perhaps?

MR. METTERHOUSE: We do cooperate with the Department of Health in our cooperative programs.

ASSEMBLYWOMAN MC CONNELL: I don't think you answered my question. To your knowledge, the Department of Health does not provide this testing for insecticide poisoning to the public or to the medical profession, or---

MR. METTERHOUSE: I cannot answer that question.

ASSEMBLYWOMAN MC CONNELL: Thank you.

MS. SHAW: You could contact Mr. Hague on that. I have spoken to him. He is at the Department of Health. I sent my letter concerning this to Congressman Maguire.

ASSEMBLYWOMAN MC CONNELL: Thank you very much. Lorraine Caruso.

L O R R A I N E C A R U S O: My name is Lorraine Caruso. I am President of the Association of New Jersey Environmental Commissions, a private non-profit organization which serves more than 200 of the State's 300 municipal environmental commissions. My chief obligation is to serve the environmental interests of the ANJEC's membership. My background academically is biological with a Bachelor's and Master's degree and have been a Doctoral Candidate at Rutgers. I work part-time at the Center for Coastal and Environmental Studies at Rutgers, the same place where Joan works.

However, I am talking to you here today as a President of an Association that represents environmental commissions. Together with the Board of Directors, county and regional representatives, a most able Director and a staff of 16, our organization is dedicated to informing the public and helping to direct them to responsible environmental decision-making. We accomplished this goal through educational programs, seminars, panel discussions, short courses, active participation in both local, state, and federal institutional processes, and publications of bulletins, newsletters, and papers.

We have been concerned with the gypsy moth and this is one of the publications that our staff people have disseminated to envirnomental commissions. An additional booklet which we prepared during this past year is called Integrated Pest Management. A biologist on our staff prepared it in cooperation with Bill Metterhouse, Deputy Director of the Division of Plant Industry. There is a section on gypsy moths, and we offer this to our concerned public when they want to know more about integrated pest management.

Among municipal environmental commissioners there exists a growing concern that 800 million pounds a year of pesticides applied to the U. S. envirnoment may not be healthy for human beings. As the links between manmade and environmental pathogens, stress, chronic respiratory diseases, cancer and more recently in the case of agent orange, liver disease and birth defects, continue to accumulate, rather than displaying the wisdom that guides conservative attitudes to the proliferation

of these products, instead we have faced continued and increased pesticide usage with research and development up as much as 25% in just the one year between 1975 and 1976, and total U. S. global sale of pesticides up 5% in 1975 to $2.58 billion, the highest ever.

Integrated pest management is a multi-disciplinary approach to controlling insects which compete directly with man for those natural resources, namely, food, water, building materials essential for human survival. IPM combines the biological disciplines of botany, entomology, biochemistry, and physiology, more specifically plant physiology and plant genetics with insect taxonomy, physiology and behavior. Under the premise that knowing how insects and plants interract is the key, if not to controlling, then at least to guiding this interaction.

The goal of IPM is to work with nature in order to reduce the total amount of pesticide usage by reducing the number of applications and reducing the amount of pesticides per application.

With regard to the gypsy moth, one of my most ardent concerns as a biologist, ecologist, and student of insect population dynamics, and animal behavior has been to attempt to reconcile the State's chemical spray program with what all my academic background tells me really happens in insect populations. Because I am unable to effect this reconciliation, trying to explain the ambivalence I detect to local citizenry is mind boggling. The difficulties I face in trying to reconcile a chemical spray program with a biological control program are obvious. Sevin, the chemical spray used in New Jersey kills the very parasites and predators which the NJDA's Division of Plant Industry is rearing, releasing, and monitoring.

Contrary to what one might think, continued spraying mandates continued intensified spraying. For obvious biological reasons the use of chemical insecticides aggravates the very condition you were supposed to alleviate. Even in a successful sevin spray program, by the Department's own admission, 10% of the moths are not killed. This 10% of the population has a high reproductive rate, high survival rate, abundant food, no competitors or predators. Under the egis of natural selection, the fittest and most pesticide resistant moths survive. During the past ten years, 36 insect pest species have become resistent to sevin. This was published in a book called "The Ecology of Pesticides." It is a review book of pesticide usage.

Mathematical modeling of insect population predicts that also contrary to what one might think, reduction of both predator and prey as occurs when a chemical spray is used results in an increase in the prey, in this case the gypsy moth, and decrease in the predators.

Although attempts have been made to refine the chemical spray program, phone calls and conversations with local citizenry reveals faults within the program itself. Lakes, rivers and streams do get sprayed, although EPA guidelines recommend buffer areas around water bodies. Children, adolescents and adults, as well as food on grills also get sprayed. Beehives do get disseminated. This is from personal testimony in my own municipality and at least 30 other municipalities I have visited as my position in ANJEC dictates. The spray drift is tremendous. Spraying does not necessarily occur during the early morning hours.

I might also say that a lot of what I have to say about the spray program is not always applied to the State program, but applies to spraying in general. Much of the spraying that goes on within this State is done by private contractors, and they are probably my prime targets when it comes to mistakes within the spray program. Pregnant women are under a great deal of psychological stress resulting

from the fear of genetic damage to their fetuses. Yellow journalism abounds in press releases which prey upon people's fear and loathing of insects. Many municipalities which chose to drop out of the State sevin spray program were not able to enter the B. t. program because of municipal budgetary caps and lack of state money to support the B. t. switch. Sevin dropouts were unable to transfer the chemical spray funds allocated at the State level to the biological spray.

In addition, sufficient State expertise for monitoring the B. t. program was not always available. There was also a lack of coordination of local health officers with State agencies. Because of the extra workload, occasionally health officers chose to make up their own rules regarding blocks to be sprayed and left unsprayed. Adequate regulations do not exist to control private tank spray applicators. The State should reject those applicators who have consistently used excessive amounts of pesticides or whose spraying has been ill-timed. The current pesticide applicator's course is not a sufficient safeguard to the public. Mandatory permits to spray should be required at the local level and monitored by the municipal environmental commission and environmental enforcement officer, or the health officer. Along with increasing public consciousness about the environmental as well as the health effects of excessive pesticide usage, an education as to the long range control both through the biological control program, which is the only real control over the gypsy moth, citizens will come to accept the fact that the gypsy moth is here to stay, and that it may also alter New Jersey forest structure. Species composition of the forests may change, however, our forests are ever changing. They have been altered by our past land use practices, logging, forest management, and disease, i. e. the dutch elm and chestnut blight. The longer the change is prolonged, the longer the gypsy moth will be a problem.

Today's immigrant pest is tomorrow's naturalized citizen. I have just a few more comments with some further recommendations. We all are aware of the fact that the gypsy moth has been present in Massachusetts for over 110 years. One of its heaviest outbreaks occurred this year. Obviously attempts at eradication and even control through chemical means have failed. Only recently has New Jersey begun sending parasites and predators in order to establish them in Massachusetts and Connecticut.

The gypsy moth does not actually kill trees. It defoliates trees. No predator wants to destroy its food supply. Draught and a weakened condition leave the tree susceptible to infection by wood boring insects, hence, a fecetious question can be phrased, "Why not get at the insects that actually kill the trees?" Since no spray program will control the gypsy moth, spray the wood boring insects, and for that matter, why not a total spray program? Inch worms and caterpillars also defoliate trees. They were quite prolific this spring and many people mistook them for the gypsy moth. Let's spray them too.

The point that I am making is fecetious, remember that. I am not advocating that we go out and spray everything under the sun. However, there are people who will take this spray situation to an extreme. I have been present at municipal meetings where people have actually stood up and said, "Let's spray everything. I hate mosquitos; I hate flies; I hate all bugs. Let's get rid of them all." I mean, this is because we do have a great deal of unenlightened people sitting out there who think that the ultimate answer to all of our problems is a very fast fix of something.

I wanted to bring in one note about the health effects before I finish. I am a resident of Denville. As a resident, I was where the movement originated that prompted the Morris County Medical Society to make its statement. I hasten to add that I in no way participated - this is as a citizen and then I will go back to the end of my statement - or contributed to any of the events that led to the position taken by the society, but I think I am able to recount what happened since you asked a previous member of the group here. There was an unusual birth defect in Denville. A couple with one normal child had a baby last February with one eye whose development was arrested at two month's stage of gestation. The eye never developed and could never function visually. The pediatrician was baffled by this anomaly and in tracing the gestational history of the mother became aware of ground spray application that they had either performed themselves--- I don't even know the whole history of it - or that they had performed by a private contractor the previous spring. Both people, husband and wife, had been out under the spray at the time and she was just barely pregnant. Caustic Toxic Poison Control Centers at Mt. Sinai Hospital and elsewhere created a degree of suspicion that prompted the pediatrician to take a public stand on sevin and solicit support from the County Medical Society.

Was the defect caused by sevin? No one will ever know. Could sevin have caused the defect? The timing was right. The woman was one to two months preganant at the time of her exposure. Sevin is a neurotoxin and an inhibitor affecting the transmission of nerve impulses. A short circuit in a developing fetus's nervous system could have or could not have affected the developing fetal organs? No one will ever know. That is the simple answer.

There was hysteria in my town. I was not party to it, and never have been. Most of my talking to people has been in strong support of the biological control program. I hesitate to take on sevin. I can't. I have not the expertise or the background material. As for sevin itself, the one thing I knew biologically is that it doesn't control the gypsy moth. It only helps to prevent defoliation. Within three weeks trees grow new leaves, thus sevin is a chemical used for cosmetic purposes only. Is this justifiable use?

A second reason to use sevin - the use of sevin to knock the top off the population peak is sometimes recommended by entomologists. However, the end result of this strategy is an omnipresent gypsy moth at low to moderate levels of density, a population able to become increasingly resistant to pesticides and one which will remain uncontrolled by parasites and predators because they become most effective at higher population densities.

What is my recommendation? I recommend a greatly modified program, despite the fact that we have a conservative aerial spray program. I would recommend further modification whereby sevin, if necessary, is used only on aging specimen trees and trees of historic interest. I would believe in further use of B. t. if it had to be used in larger areas.

I recommend strict controls and new permitting procedures with local monitoring of ground spray applicators working towards the eventual elimination of ground spraying of sevin entirely.

I recommend the necessity of complete unanimity of opinion at the municipal level. I have attended more than thirty municipal council and board of health and environmental commission meetings and participated in local and regional seminars during the gypsy moths two outbreaks in New Jersey during the past ten years.

The psychological stress on the populace caused by lack of information, incomplete information, and misinformation is worse than the gypsy moth itself. In pregnant women, the distress over sevin borders on panic.

I recommend appropriate research funding in New Jersey to settle once and for all the potential birth defect of sevin. Sevin has been on the market for more than twenty years. Why have not definitive studies been performed? Don't feed sevin to test animals. Apply it to the surface of their skin. This is the mode of entrance, and inject it into developing embryos in early stages of gestation. This research could be performed right here in New Jersey. It would take less than a year, and we would have our own research information. The beagle study is fifteen years old, and we are still referring to it.

I would recommend propogation and release and monitoring at the State level on those parasites and predators which are effective at low population densities, such as compsilura, to help keep the population under control after it peaks and declines.

I hear that there is supposedly a new research facility in the works for the population people in the Division of Plant Industry, and I would recommend all haste in getting the facilities established to do the types of rearing and biological control programs that need to be done.

I would recommend that the USDA and US Forest Service institute public education programs. Here again there is a touch of humor. But, I happen to like to see the rosy side of things. Bring people to our parks to see the gypsy moth infestation. Teach them about insects in a living workshop. People do not fear that which they understand. Direct activities in parks during outbreaks away from ridge tops to less infested areas and combine reforestation programs performed by summer YCC employees; research programs on the effects of gypsy moth on forest structure will help us prepare for the gypsy moth's impact upon our state. While the U. S. Forest Service's concern for our forest is commendable, they too must learn to adapt to the gypsy moth's presence and accept it as just another recurrent, chronic forest ailment.

I recommend continued, publicized releases of parasites and predators with research and monitoring to determine the time of release of individual species during its seven to ten year cycles. I mentioned compsilura, a larvae parasite is more effective during the periods between outbreaks. It has been found that bleripa, apanteles, and brachymeria are more effective during outbreak and only service during collapse. Therefore, have mass rearing programs of these particular parasites at the time when they will be most effective. Time the release of these parasites.

I recommend further pheromone studies in the wake of the broad claims made by a manufacturer of 90% mating disruption, while State USDA studies indicate only 59% reduction and proper education of the sometimes all too gullible public as to the real place of pheromones in gypsy moth control. Pheromone is something to be added to the total program, but it is not a solve-all. I have seen brisk sales performed in Morris County where there was a test marketing of pheromone traps, and I have seen a man come in and plunk down $20 for four traps to take back to his property to capture gypsy moths. Well, it was inappropriate, because it was the inappropriate time. We had a heavy outbreak. The traps are supposed to be used when the outbreak is at low intensity. In addition to that, sure, it catches gypsy moths, but if people ask me if I would buy the trap, I would say, no, I would recommend my neighbor buy it. Why not lure all my gypsy moths over

to his or her property. I recommend further research on NPV, neucleopolyhedrosis virus, which at high population densities is really the ultimate controlling factor in the gypsy moth population collapse and decline. Here again, the parasites and predators play a role. The real collapse of the gypsy moth is found within its own reproductive excesses; its own biology is what finally is responsible for its decline. So, albeit, our well-intentioned attempts to control, eradicate, monitor, et cetera, itself is responsible for its own outbreaks and cycles.

I recommend further research by the Bureau of Forest Management on reasons for the gypsy moth's preference for certain tree species. Behavior modification is fascinating. Perhaps we can rear a variety of gypsy moths, using new types of genetic recombinate research, that like to eat the trees the Forest Service considers of less economic value. Switch it over from oaks to less economic--- I mean, it is possible. Research makes everything possible.

ASSEMBLYWOMAN MC CONNELL: Get them to eat weeds.

MS. CARUSO:Why not? I mean, that is carrying it a bit far, but find out why they like to eat certain tree species. Profits from the sale of dead cord wood could help fund the research and reforestation.

And, finally, of course, I recommend the continued cooperation of the Association of New Jersey Environmental Commissions with State and local government and State agencies in helping to educate the public and alleviate their fears.

ASSEMBLYWOMAN MC CONNELL: Thank you very much, and also for the visual aids.

MS. CARUSO: I didn't explain. Those are the critters that are released into the wild by the Division of Plant Industry. They consist of egg parasites, larval parasites and pupal parasites. I think about half a million a year are generally released by the Division of Plant Industry. Mr. Metterhouse was kind enough to allow me to borrow this case, and when I go and talk to people I must say, although his program is dual, I have a lot easier time understanding the biological control aspect of his program than I do the chemical control, although I understand the pressure under which his Division works. I myself speak to people from the area of my expertise and what I know is effective in terms of the biology of this animal. I don't have to deal with anything else. They do work. They are part of the picture. They are not the entire picture. I don't make outrageous claims to biological control, but people, I am afraid, will have to be educated to the fact that if they do have a fear of the increased use of pesticides, then they are going to have to moderate some of their opinions about wanting quick solutions to long-term problems. This is not a quick solution, but it is a long-term effective solution, and it is the only solution, really. There is no other.

ASSEMBLYWOMAN MC CONNELL: So, you believe an education program is something that you very seriously recommend.

MS. CARUSO: Oh, yes. We can only do so much. I help by going out to municipal and environmental commissions. Since September I have been to five meetings ranging from as far down as Evesham Township in Burlington County to Norwood in Bergen County, and the people try to educate themselves through forums, but it would certainly help if publications like this were increasingly available, filmstrips, the whole media.

ASSEMBLYWOMAN MC CONNELL: Mr. Metterhouse, do you have at the Department of Agriculture an education program on pest control? Are you trying to educate the public as to what the gypsy moth is, what it does, the effect that it has?

MR. METTERHOUSE: Yes, we certainly do. Of course, we do have a packet

of materials that we pass out to all the local cooperating municipalities. We do hold regional meetings and each of us hold meetings different times of the year other than those regional meetings. So, there is a continuous program. We try to have exhibits at all the fairs in the State of New Jersey and we appropriately give talks at some of those events as well. So, we are making an active effort to educate people.

ASSEMBLYWOMAN MC CONNELL: Let me ask you another question: We certainly have established that the gypsy moth lives in New Jersey and thrives well on the leaves of our trees and several thousand acres of our forests and trees are affected by this problem. In your opinion, do you feel as much pressure from the fact that gypsy moths do cause the death of so many of our trees, or does it come from the nuisance aspect? Do you feel that you are reacting to people's phobias about insects and the gypsy moth and the nuisance of it, more than you are to the actual mortality of trees and forests?

MR. METTERHOUSE: In actuality from a scientific standpoint we are concerned about the tree mortality. It is, of course, a fact that people are reacting. If one has been in a very heavy gypsy moth population, it is a very dramatic sight. It is very difficult for people to hang clothes out on the line, I mean, caterpillars dropping down on their laundry or dropping down on their body.

ASSEMBLYWOMAN MC CONNELL: But, are you reacting to that? Is your Department reacting to that?

MR. METTERHOUSE: We are not reacting to that. What we actually are basing our program on, that is, have these trees been defoliated before, and our primary objective again is tree mortality, because loss of those trees represent loss of property values, and it represents a great loss if they have to remove those trees personally. So, this is the real concern, because these trees are of higher value, and very frankly people themselves cannot do much, especially in an outbreak situation, at least the second year, and that is what we are treating, the trees that have been defoliated in the prior year. Burlap bands, the various little techniques that we have heard today are not practical in very high population levels. One does not have the ability with the spray device to spray a 75 foot or 100 foot tree.

There are very few choices. The choices are to do nothing, to apply the chemical sevin, or to apply B. t. in a heavy population, and the only problem we have with the use of B. t. is it becomes operationally difficult. Now, we are providing B. t. We are giving the people the choice. But, it does represent somewhat of a problem with B. t. in that it requires two applications instead of one. The timing is extremely critical. You have to apply the material at the second in start. And, as you might know, as we have adverse weather conditions, it is very possible that we could not apply B. t. We could miss the period completely.

So, although we are providing the material, there is that precariousness, the difficulty in applying the material itself. But there are very few choices in a very heavy population or outbreak situation.

ASSEMBLYWOMAN MC CONNELL: Let me ask you just one more question. There is financial assistance to the municipalities who participate in your spraying program. If they want to use B. t., is there financial assistance for that option?

MR. METTERHOUSE: Fifty percent of the cost is financed through the Forest Service, whether it is B. t. or sevin, either one.

ASSEMBLYWOMAN MC CONNELL: So, there is no financial difference except

it is my understanding that B. t. is a more costly program because it requires two applications, or because it---

MR. METTERHOUSE: Well, this past year sevin came in at $7.59 an acre on a State bid. B. t. costs anywhere from $12 to $13 an application, so you are talking about $24 to $26 for two applications per acre.

ASSEMBLYWOMAN MC CONNELL: Is spraying done by private contract?

MR. METTERHOUSE: This is done on a bid basis. A contractor is awarded a bid in the State of New Jersey. It is an open bid.

ASSEMBLYWOMAN MC CONNELL: Thank you. There was some testimony given earlier about the airplanes that are used for this purpose, that they have no insurance. Is that correct?

MR. METTERHOUSE: They have insurance. Of course.

ASSEMBLYWOMAN MC CONNELL: Also, how often do these planes crash?

MR. METTERHOUSE: Not very often.

ASSEMBLYWOMAN MC CONNELL: What is the mortality rate of the crop dusters?

MR. METTERHOUSE: We have not had an aircraft crash in New Jersey. There have been examples back through our history of one helicopter that did have an accident.

ASSEMBLYWOMAN MC CONNELL: Thank you. Nancy Coleman.

N A N C Y C O L E M A N: My name is Nancy Coleman, and I live in the township of Parsippany-Troy Hills. I am a private citizen who only has my own experiences and research to fall back upon. As part of your Committee study on the issues of the use of carbaryl containing pesticides in the State of New Jersey to combat gypsy moth infestations, I would ask you to consider the following concerns:

The 1980 suppression program was a total surprise to many residents until notifications were received ten days prior to the spraying. The majority of residents were not solicited as to their opinions, nor where they given all possible health risks of the pesticides being used. No expert in either the United States Department of Agriculture Forest Service nor the New Jersey Department of Agriculture can profess that the gypsy moth suppression program is at all successful in stopping the spread of the gypsy moth. Mass eradication programs were attempted during the past 50 years; yet, the pesty moth and its cycles continue to spread across the country about 10 miles a year.

The following are questions which I posed to the United States Department of Agriculture Forest Service and the New Jersey Department of Agriculture on September 25, 1980 at an oral presentation. They are questions which both departments are obligated to answer before the mass spraying of 90,000 acres in our State this next spring. In whose hands does the responsibility lie to supply uniform public knowledge of the pest, its cycles, and all the alternatives for coping with the gypsy moth? This includes methods by which the homeowner can help himself.

No agency claims this responsibility; yet, both agencies offer this program and give out pro-spraying information to the public.

How can a program such as this be implemented without the consent and knowledge of every single individual who could be sprayed or who could be subject to spray drift? Can either the U.S.D.A. Forest Service or the New Jersey Department of Agriculture guarantee that all the pesticides used in the suppression program are not harmful in any way to humans, pets, and wild life? Would any official be willing to give a guarantee in writing? Can either of the two agencies involved guarantee that mass spray programs will not, in fact, delay the crash of a population in an area and thereby extend a cycle past the usual three years? How can the rights of those who do not want to be sprayed be upheld? There is no uniform or required method by which a particular property can be guaranteed it will not be sprayed. Air balloons, attached to a mailbox, are no more than a means by which to pacify those who do not want the spraying. No aircraft can ascertain property boundaries this way.

Wind drift, as defined by the State of Connecticut, as well as other sources, is 250 feet for helicopter spraying and 300 feet for a fixed wing aircraft. The E.P.A. uses 500 feet. This would mean that aircraft could not spray within those distances from any property which does not want to be sprayed if those residents are to have their rights upheld. The State of Connecticut has statewide regulations to protect the rights of those who do not want to have themselves or their property sprayed. In order for any person to receive a permit for aerial spraying, a written release must be obtained from every person who could be sprayed, or who would be subject to spray drift within 250 to 3000 feet from the spraying border. This type of regulation allows for the protection of the rights of all individuals.

Why is there not any uniform requirement for official notification as to exactly when and where the spraying will occur? Why is there not any uniform method for citizens to notify their municipality that they do not wish to participate in the spraying program? Notification procedures should be regulated by some

non-involved agency. Where are the checks and balances in this program? The Department who conducts the egg mass studies also handles the spraying program. Egg mass surveys were conducted at only two sites in my own development, a development of 292 homes.

Why is there no legal requirement for notification by local, state and national government spraying of parks and recreation areas? Which agency has the responsibility to make sure that the personnel of a particular municipality are following regulations? To whom can the public complain if their municipality is not abiding by the regulations -- for example, spraying when wind factor is greater than 10 miles per hour?

Since, in residential areas, spraying is done on either side of streets or roads for only about 250 feet from the road, how can the suppression program ever be referred to as an eradication program? The uniform public knowledge which should be given out by either the U. S. D. A. or the N. J. D. A. should stress, in all fairness, that the spraying is only a stop-gap method of preventing defoliation of the trees directly in the spraying zone. Individuals in responsible positions should be advised to refrain from stating that the program is one which is capable of eradication of the gypsy moth, which has occurred in a few papers.

Do health risks posed have to be proven before caution is taken, caution for a program which only prevents some defoliation in the areas sprayed and thereby only prevents the weakening and possible death from other sources of a few trees? The State of New Jersey is obligated to provide legislation to protect the rights of those who do not want their property, families and pets exposed to unwanted spraying with pesticides which are still being questioned. No one can give a guarantee that low dose, long-term exposure to carbaryl-containing pesticides will not affect us adversely in some way. Legislation should be passed forcing the obtaining of written releases from all citizens who would be subject to the spray or spray drift of questionable pesticides.

In closing, I would like to add that my own development - at least my block - was very successful this year in burlaping our entire street's trees, thereby controlling a population that was so heavy in our back yards that it crashed due to the wilt disease. So, nobody can tell me that it cannot be done.

ASSEMBLYWOMAN McCONNELL: Thank you very much, Nancy.

Mr. Metterhouse, I apologize for continuing to call on you, but you seem to be the department that is on the defensive today. Could you explain for the record once again the procedure that your department takes when you undertake a spraying program in a municipality, including notification, citizen involvement, or official request from the municipality.

MR. METTERHOUSE: Well, the first thing we do each year is to fly the entire State and record the defoliation within the State of New Jersey. Within these areas that are defoliated, we send letters to those municipalities informing them of all the acreage of all degrees of defoliation, and ask do they desire to have a survey made.

ASSEMBLYWOMAN McCONNELL: So, you contact them, rather than the municipalities contacting you?

MR. METTERHOUSE: We contact them, although there are communities who call us frequently for surveys.

After we make that survey, if they desire to make a survey - if they do not desire us to make a survey, we do nothing-- If they say yes, they desire a survey, we will actually send a crew, or a team of people, into that area and limit the areas on the basis of what we think needs to be sprayed, again on the basis

that these trees have already suffered defoliation.

At that point in time, that community must appoint a coordinator, and then we do have regional meetings at that point throughout the State of New Jersey. We invite in all the officials that are going to cooperate in the program, and, of course, upon completion of that meeting and receiving information, our inspectors also contact and work with that coordinator. At that point in time, of course-- I lost my trend of thought here.

ASSEMBLYWOMAN McCONNELL: Let me ask you a question. You said that each municipality appoints a coordinator?

MR. METTERHOUSE: Yes.

ASSEMBLYWOMAN McCONNELL: Can they appoint anybody they want to? Does it have to be an elected official, or a member of the Environmental Commission? Can it be anybody?

MR. METTERHOUSE: It could be any member in the community. It could be a member of the Environmental Commission, or whomever. At that point in time, they come back and hold a public meeting. They must decide at that meeting which material they are going to select -- whether they are going to select Sevin or B.t. It is solely their choice at that time. It is also up to the town officials at that open meeting to get a feeling, or a pulse, of how the people feel about cooperation. Do they desire to enter this program or not? Then, of course, we do get word, "Yes, they are going to go ahead and intend to cooperate with the New Jersey Department of Agriculture."

ASSEMBLYWOMAN McCONNELL: Let me back up a minute.

MR. METTERHOUSE: They are actually conducting the program. We are acting as supervisors in this program and seeing that the program is conducted properly.

ASSEMBLYWOMAN McCONNELL: But, you have initiated it. You have told them that they have a problem in their municipality to begin with?

MR. METTERHOUSE: Yes, we have.

ASSEMBLYWOMAN McCONNELL: Okay. And, you have done some testing prior to this public meeting and prior to their appointing a coordinator. You have done testing in that particular municipality, is that correct?

MR. METTERHOUSE: Yes, we have.

ASSEMBLYWOMAN McCONNELL: How extensive is that?

MR. METTERHOUSE: We actually cover the entire community that requests an inspection.

ASSEMBLYWOMAN McCONNELL: What do you mean "you will cover the entire community"?

MR. METTERHOUSE: We will actually survey, on foot, that community, putting in one-tenth acre, or one-fiftieth acre, survey points to count the actual egg masses.

ASSEMBLYWOMAN McCONNELL: So, you test more than two test sites in a municipality?

MR. METTERHOUSE: Yes, we do. We sample, throughout that community, a number of different sites, or many different sites.

ASSEMBLYWOMAN McCONNELL: Okay. Now, do you have any responsibility to publicize this program, to notify through the press, or what have you?

MR. METTERHOUSE: Under the statute of law, it is required that we serve 10 day's notice prior to application. We ask the community to put two notices in the paper, in addition to sending a letter to all the individuals within that community -- within the spray block. We also provide the municipality with a list of bee keepers in that area so all the bee keepers are informed, and so they know

they are going to be sprayed. We try, through our radio and the newspapers, to tell or indicate to the community when the spraying is going to be done. For example, the bee keepers have an option either to move their bees when they are informed, or to put pollen traps on the front of the hives. This, of course, reduces the amount of mortality within the hive.

ASSEMBLYWOMAN McCONNELL: Do individuals have any recourse once the municipality approves a spraying program? Notification is only required ten days prior to the spraying?

MR. METTERHOUSE: Right.

ASSEMBLYWOMAN McCONNELL: What if a group of citizens decide they do not want it at that point? Do they have any recourse?

MR. METTERHOUSE: If this is the majority of the citizenry and if they do not want the program, the program is dropped.

ASSEMBLYWOMAN McCONNELL: The municipality could cancel it at any time?

MR. METTERHOUSE: They would cancel it at any time. We do have some problems where some people decide to have balloons placed over their houses. We try to do that. However, if the aera looks like a checkerboard, that is impossible. It is impossible to conduct an aerial program with a checkerboard. You can't start and stop.

ASSEMBLYWOMAN McCONNELL: What is the purpose of the balloons?

MR. METTERHOUSE: In that case we would recommend that the community drop the program entirely.

ASSEMBLYWOMAN McCONNELL: What is the purpose of the balloons, just to appease these people?

MR. METTERHOUSE: The purpose of the program is to clearly identify the blocks so the pilot can use these as guides in which to make that application.

ASSEMBLYWOMAN McCONNELL: Is that possible?

MR. METTERHOUSE: Oh, yes, it is.

ASSEMBLYWOMAN McCONNELL: To avoid certain areas?

MR. METTERHOUSE: Yes, it is, very much so. Again, if it is a checkerborad pattern, if it is one of these things that is not practical, we actually recommend to the community that it be dropped.

ASSEMBLYWOMAN McCONNELL: Okay, thank you.

Doris White.

D O R I S W H I T E: Before I get going with my prepared speech, I would like to bring a few things to your attention. There are a few things I would like to question. First of all, this is a lovely brochure, put out by the New Jersey Department of Agriculture on the gypsy moth. However, after reading it, I noticed that the photograph on page 3 is really deceptive. I feel that either the picture is over-exposed, or the quality of the photography is poor. The point is, I feel it is a dishonest photo.

The second thing I would like to mention regards insurance for the spray companies. I would like to report that the Tamke Tree Service, of Bernardsville, which I contacted-- Mr. Tamke informed me he does not carry insurance.

The third point I would like to mention concerns--

ASSEMBLYWOMAN McCONNELL: But, does he fly an airplane?

MS. WHITE: He has many pilots that he hires, and I am going to mention that also. According to the Morris County Daily Record, the pilot that flew the plane in Warren Township, where the insecticide came into the bedroom window where

there were children sleeping, came from Cape May, and I don't think he would know too well the Morris County boundaries. Our dentist, Dr. Panzer, of Bernardsville, was up in New York State getting gasoline and the man giving him gas said he flies airplanes for Mr. Tamke. Surely, these distant pilots would not know local boundaries.

The fourth point I would like to mention concerns the bee keepers. I have been a bee keeper. My bees were killed. I was never notified about these measures and how to save them. Also, Mr. Tamke would not reimburse me for my dead bees.

ASSEMBLYWOMAN McCONNELL: Ms. White, what township do you live in?

MS. WHITE: I live in Bernardsville.

Honorable Assemblywoman McConnell and guests: My name is Doris White. I live in Somerset County, and I am a Professor at William Patterson College at Wayne in Passaic County, where for the past 24 years I have taught science courses and courses in how to teach science. All my post high school education was done at the University of Wisconsin, at Madison, where I received a Master of Science Degree in Horticulture, and Ph.D. minor in Entomology. My Ph.D. thesis was on Entomology.

I have done research on phytotoxicity, which is plant poisoning, to squash, Cucurbita maxima from the insecticides D.D.T., Sabadilla, Rotenone, Pyrethrum, and Nicotine Sulfate, in attempts to control squash vine borer. Squash vine borers, like gypsy moths, belong to the same insect order, Lepidoptera.

I have heard it said that Sevin is no worse than many other household cleaning compounds. Is it? Where are the tests? I have yet to make anyone ill by using furniture polish, ammonia, bleach, or lye. But, then again, I have never sprayed furniture polish, ammonia, bleach or lye onto people, animals, plants, or food.

We know that by combining some substances, such as bleach or ammonia, the end products are far more toxic than if they were used singly. This is called Synergism. Could there be a synergistic effect when you combine Sevin and emphysema, or Sevin and high blood pressure, or Sevin and allergies? I have been unable to find such research. All I can find are reports on how much Sevin is needed to kill 50% of a group of rats or mice. Nowhere have I seen studies on the synergistic effects of Sevin, plus the various known polluting chemicals found in New Jersey's air, water and soil.

As part of my work, I travel throughout the Northern part of New Jersey, averaging over one hundred miles per day. I have seen defoliation here and there. I have seen the caterpillars and their tiny black excrement pellets. I have seen some dead trees. But, gypsy moths did not kill every dead tree. Trees have died from diseases, drought, flooding, fungi, other insects such as borers, scales, and web worms, lightning, winter kill, heaving caused by alternate freezing and thawing, nematodes, fires, toxic plants which are nearby, such as black walnuts, air pollution, chemical pollution, oil spills, herbicides, phytotoxicity from insecticides, old age, wrong soil pH, improper fertilizing, not enough light and mechanical damage, such as being hit by a mower or car. Even animals, such as beavers, mice, rabbits and deer can kill trees too. Trees died around here before gypsy moths entered the U.S. Let's not make the gypsy moths the scape goat for everything. New Jersey still looks green to me, and not all that green is mold.

I am adding this paragraph. Europe didn't have the chemical know-how we have today to fight gypsy moths. Europeans had to depend on nature to evolve

parasites to keep things in balance. Even though gypsy moths came from Europe, and still are in Europe, you never hear that they have a problem there. Europeans did not kill off the parasites like we do.

By spraying insecticides, not only have we killed off the gypsy moth parasites, but we have succeeded in getting insecticide resistant gypsy moths to survive. On September 25, 1980, I had the opportunity to attend the U. S. Department of Agriculture's Forest Service Conference on gypsy moth suppression and regulatory activities at the Health and Agriculture Building here in Trenton. How shocked I was to learn that of the 30 people present who represented the Northeastern area of the U. S. Forestry and Entomology Departments, not one person was acquainted with the Federal regulations for use restrictions Carbaryl insecticides, which I received as the latest information from a Union Carbide salesman. Had the foresters and entomologists known the regulations, they would have known that Sevin is harmful if inhaled or swallowed and must not be taken internally. Sevin should not be in contact with skin and eyes. We should wear long-sleeved clothing. They should have been informed that Sevin is a cholinesterase inhibitor. Cholinesterase inhibitors affect the liver and the central nervous system. They never told the public to evacuate when areas are sprayed, although some newspapers did warn the public that pregnant women should evacuate. But, how about the women who are just a few days pregnant? Their babies could suffer the most while the women are unaware that they are even pregnant. That is why x-ray technicians hate to give abdominal x-rays to women patients two weeks before their menstrual periods, as that is when the greatest harm can come to the embryos.

Not one of those foresters or entomologists was familiar with the Federal laws on restrictions on the use of Sevin for crop harvesting following Sevin spraying. I am providing you with four pages of harvest restrictions. Our foresters, entomologists, and the public are totally unaware that when Sevin is sprayed in our gardens, we must not touch most of the vegetables for two weeks. This includes crops such as lettuce, Chinese cabbage, collards, kale, mustard greens, turnips, parsley, beets, spinach, swiss chard, dandelions, endives, escarole, salsify, rice, sugar beets, etc.

With grains, such as milo, you have to wait a full three weeks before it is safe to harvest. There are Federal restrictions on grazing land, yet our pastures were sprayed. Because I was unaware of the waiting period after pastures are sprayed, I illegally sold, at public auction in New Jersey, a goat for human consumption. I didn't know that there was a period where it is unsafe to eat the eggs or drink the milk following a Sevin spray. I am sure that thousands of other farmers in New Jersey sold contaminated meat, milk, and eggs to the public following the Sevin sprays.

This is an incredible case of educational malpractice on the part of the U.S. and the New Jersey Departments of Agriculture, Rutgers, the State University - especially Cook College, which has forestry, entomology, and environmental science departments - the U. S. and New Jersey Health Departments, the U. S. and New Jersey Forestry Departments, the U. S. and New Jersey Entomology Departments, the E.P.A. and the New Jersey Department of Environmental Protection. The public was not informed and not protected.

For your reference, I have also brought four pages of toxic properties of Carabryl, listing symptoms in humans, such as nausea, vomiting, abdominal cramps,

diarrhea, sweating, lassitude, weakness, respiratory problems, blurred vision, eye disorders and eye pain, loss of muscle coordination, speech slurring, twitching and muscle convulsions, which sometimes lead to coma and death. That is found on page 81 of the paper I shall submit if you don't have it now.

After Sevin spraying on our farm in 1979, we had a healthy goat abort twins. The New Jersey Department of Veterinary Medicine could find no disease in the goats. Neither could the Federal laboratory in Iowa, which examined them too. We had healthy rabbits of different breeds in different pens that died following the spraying of Sevin. We had reduced fertility in our live stock and poultry. Abnormal embryos developed - eggs which hatched with the pecking at the wrong end of the shells, which needed to be lifted from the eggs, and they usually died. We even had a female pheasant turn male. All of these things happened after the spraying of Sevin and are detailed in my address to the New Jersey Academy of Science on March 29, 1980. Please read it. We have copies of that here.

Besides the Sevin insecticide problems, we now have a new insecticide to worry about; it is Imidan. Details of the problems with Imidan are given in that paper to the U. S. Forest Services on October 2, 1980. Please read it. I have copies for all of you here.

On the middle of page six of that report, please read my experiences. The spray people are using an insecticide never heard of by the Poison Control Center of the Morristown Memorial Hospital. I was exposed to no more than two minutes of drift from our neighbor's Imidan spray and I had worn a face mask for protection, but it turned out that I really needed a gas mask for the fumes. Even though I immediately washed and changed clothes, I needed treatment at the Morristown Memorial Hospital's Poison Control Center, as our local doctor refused to help me. The Morristown Poison Control Center phoned New York's Poison Control Center to find out what to do. It turned out that in addition to the flooding of my eyes with saline solution, they had to wash me with alcohol, request that my purse, belt, and shoes be placed in a plastic bag to be thrown away, request that I wash at home with green soap which contains a solvent alcohol, and informed me that if I didn't throw away my clothes, they should be washed four times. Later another doctor prescribed Atropine to stop my muscles from convulsing. I am not an epileptic. However, the Posion Control Center forgot to take a blood and urine specimen from me, thus there is no proof it ever happened.

I shall pass around eleven photos for your examination. They are on this pink piece of paper. These were taken after Sevin was sprayed surrounding our farm. Photo A shows our circular pond, 25 feet in diameter which, prior to the 1980 spraying, was filled with bull frogs and provided an excellent environment for rare trees, frogs, and watersnakes. The spray killed every form of animal life. Only silent duck weed survived.

Photo B shows our pet skunk. It was healthy and vigorous prior to the 1980 sprays. It developed convulsions and died on its back with his feet in the air.

Photos C, D, and E show rare chicken and guinea foul killed by the sprays. There were so many that died, I ran out of film and was too ill to go buy more.

Photo F shows three different breeds of rabbits killed by the sprays.

Photo G shows a rabbit, now healthy, which was made sick by the spray. Look how thin he is, and notice his eye damage. He was the father of the baby Angora bunnies shown in photo H, where the babies were born shortly after insecticide spraying

and their skins look like they suffered from freezer-burn. This past week the same parents of Angora rabbits had another litter, and these babies looked perfectly normal.

Photo I shows a pheasant that changed sexes following Sevin spraying. It was an egg-laying female. Now it has male plumage. I am absolutely certain of the sex switch of my pheasant as she was my only female.

Picture J shows the size of the droplets that covered our six acres. The spots were visable for weeks, even after it rained. My youngest son took the dog out while he was wearing a t-shirt and jeans. He broke out in a nasty rash on his arms and neck. He had not heard the helicopter fly over our house during the preceeding hour. By the way, Bernardsville did not hire a spray company. We don't know who sprayed. The dog vomited and so did our cats.

D.D.T. could be detected in the body fat. Sevin is different. It rapidly changes into other chemicals. It is hard to prove it was ever there. When D.D.T became illegal, Chlordane was developed. When Chlordane became illegal, Dieldrin was developed. When Dieldrin was outlawed, Sevin came along. Now that Sevin looks like bad news, chemists have come up with Imidan. When Imidan is shown to be bad, chemists will have to come up with something that is stronger and harder to detect. This could go on forever.

If we were smart, we would let nature take over the control of gypsy moths, and it wouldn't cost taxpayers one cent. Let nature evolve the parasites, not the chemists evolve chemicals. Natural parasites controlled the gypsy moths in Europe; it can happen here. Please let it. I thank you for your kind attention.

ASSEMBLYWOMAN McCONNELL: Thank you very much.

Is there anyone else here who would like to testify? (no response) Mr. Puech, would you come up here and let me ask you a few questions, please? Would you identify yourself, please?

A N T O I N E A. P U E C H: Yes. My name is Antoine Puech, and I am with Union Carbide Corporation, located in Jacksonville, Florida. We are the manufacturers of technical Sevin carbaryl insecticide.

ASSEMBLYWOMAN McCONNELL: Mr. Puech, we have heard a great deal today about Sevin carbaryl. Could you tell us what it is, how long it has been in existence, and exactly what your company has done with regard to testing this product?

MR. PUECH: Madam Chairman, Sevin carbaryl is an organic chemical, derived from petroleum. It is in a group of insecticides called carbamates. It was discovered in 1953 and registered in 1959. Since its discovery, there have been a battery of tests done in all areas of toxicology prescribed by the U.S.D.A., and then, subsequently, by E.P.A.

I could give you a rough guess on the amount of research on Sevin by saying there are over 35,000 research studies on the toxicological effects of Sevin, and only a small percentage of these are paid for and financed by Union Carbide.

ASSEMBLYWOMAN McCONNELL: Only a small percentage?

MR. PUECH: Yes. We do the studies that are required for registration by the Environmental Protection Agency, and previous to that by the U.S.D.A., and beyond that, we supply material and help to other universities or other researchers who are working with the product, or they obtain the produce themselves and do the research themselves.

ASSEMBLYWOMAN McCONNELL: Does the U.S.D.A., or the Food and Drug Administration, or whoever has authority over that-- What do they require of you in terms of labeling?

MR. PUECH: Well, there are very speicifc guidelines for registration of a pesticide, and these are spelled out by the Environmental Protection Agency as part of the Federal Insecticide, Fungicide, and Rodenticide Act. This was recently amended, I believe, in October, 1978. There are a very long battery of tests into areas of birth defects, mutagenicity, cancer, residues in food, acute toxicity - how much would casue an acute response - and a bunch of other things. I could spend a long time telling you about it but--

ASSEMBLYWOMAN McCONNELL: You are not required to put all this on the label though. What you are saying is that these are tests that you are required to make in order to comply with the requirements.

MR. PUECH: These are tests required to identify the safety of a chemical and any hazard that might be related from an immediate exposure or from a long-term exposure to the product.

ASSEMBLYWOMAN McCONNELL: Do the tests that have been made show that this insecticide is harmful if swollowed or inhahed?

MR. PUECH: Well, as I said earlier, in large doses it is harmful, but the doses that cause harm are far greater than what you could possible ingest by eating fruits or vegetables treated with the product. In over 20 years of commercial use, we have had only one death, that we know of, which is related to Sevin, and that was a suicide in Mexico. Unfortunately the patient drank a glass full of Sevin. He made up the concoction and was hospitalized, and the doctor accidentally gave him the wrong antidote. The wrong antidote made the symptoms worse, and the patient died. But, there are many other cases of husbands who tried to kill their wives by giving them Sevin -- mixing Sevin in their coffee. It is very difficult at that level of exposure to cause human death.

ASSEMBLYWOMAN McCONNELL: Has the World Health Organization done any testing or made any statements on Sevin?

MR. PUECH: Yes. I should back-track a bit. In addition to testing the safety of the product, we also provide tests on the effectiveness of the product for different uses, for different crops and for different insects. There are a lot of tests on human exposure and how much is encountered in the diet and on the skin from common use.

In response to your question about the World Health Organization, they are, I guess, a regulatory body of a sense. They do fund research at different universities, and we are aware of these studies. The World Health Organization has set an allowable limit for Sevin in the diet, and I can give you that limit if you like.

ASSEMBLYWOMAN McCONNELL: Yes, I would, for the record.

MR. PUECH: I have all the toxicological information which you would probably be interested in.

ASSEMBLYWOMAN McCONNELL: Yes, I would.

MR. PUECH: The acceptable daily intake for carbaryl in the diet is zero point zero one per kilogram of body weight per day. The actual amount of Sevin that people incur in a diet is seven hundred thousand times less than that.

ASSEMBLYWOMAN McCONNELL: What would the exposure be during a gypsy moth spray program?

MR. PUECH: The exposure during a gypsy moth program was measured by Dr. Schultzie - I am not sure what the exact department was - and the exposure they recorded during the gypsy moth spray program was zero point zero nine miligrams per seventy kilogram person. I can relate that exposure to some of the doses that

cause adverse effects in animals or in humans, if you would like.

ASSEMBLYWOMAN McCONNELL: Yes, I would like that.

MR. PUECH: Well, that exposure is seven hundred and forty thousand times less than the exposure people encounter every day in the manufacture of carbaryl. This is the highest daily exposure to carbaryl, and we have medical records on these people for a period of about 10 years. These medical records are available to the government and to everybody else. We have good health records.

The New Jersey exposure from a spray program is five million times less than the dose that caused no birth defects in rats; thirty-one thousand times less than the dose that caused no birth defects in dogs; two hundred thousand times less than the dose that caused no birth defects in monkeys; two million times less than the dose that caused no mutagenicity in rats; ten million times less than the dose that caused no neuro-toxic effects in chickens. I have several other numbers by which we can relate the exposure to known toxic doses. We have very large safety factors, and I can compare, if you would like, these safety factors to those from drinking a cup of coffee, the consumption of asprin or vitamin A, table salt, alcohol, and the safety factors in those cases often are not specified.

ASSEMBLYWOMAN McCONNELL: Are these comparisons made by your company, or are they based upon the measurements of the World Health Organization, or who?

MR. PUECH: Okay. The exposure on humans has been measured in several different studies, in studies conducted by E.P.A., in studies conducted by the New Jersey -- I will say the Department of Health, I am not sure exactly which department it is, and by Union Carbide. These are all separate studies. The toxic effects that I am relating to you were determined by independent companies in many cases, and by Union Carbide sponsored research in other cases.

ASSEMBLYWOMAN McCONNELL: The figures that you quoted for the record are based upon Union Carbide figures?

MR. PUECH: They are based upon published literature, some of which is Union Carbide, some of which is the National Cancer Institute, or Litton Bionetics Research, or Carnegie-Mellon Institute of Research in Pittsburg, Pennsylvania, and many other contract laboratories in the United States. These laboratories are annually audited -- I shouldn't say "annually", they are periodically audited by E.P.A. for the thoroughness and objectivity of their laboratory data. The laboratories we use have been certified as being scientifically competent by the Environmental Protection Agency.

ASSEMBLYWOMAN McCONNELL: Can you tell us about any studies that have been conducted concerning birth defects that were not conducted by Union Carbide?

MR. PUECH: Yes. There have been, to my knowledge, ten different animal species in which birth defect studies have been conducted.

ASSEMBLYWOMAN McCONNELL: Ten different species, but several studies?

MR. PUECH: Yes, several studies. There are many studies on rats, many studies on mice, and many studies on sheep.

ASSEMBLYWOMAN McCONNELL: Okay. These are not conducted by Union Carbide?

MR. PUECH: A few were and a few weren't. I could give you the exact numerical tally, if you would like. I don't have that information present right now.

All the studies that were conducted in the United States were submitted to the Environmental Protection Agency and to other pediatricians and worldwide experts in the field of teratology. They reviewed these studies and they independently

arrived at the conclusion that except for the dog, Sevin is not a general teratogen. The protocol for doing these studies calles for giving a pregnant animal three dosages levels, and the highest dosage level has to be a dosage that is toxic to the mother. They found that in many cases when you are feeding a dose that is toxic to the mother, you did have an effect on the embryo, which you would expect. Experienced teratologists discound the results from the highest dose because there they are measuring secondary effects of stress and metobolic imbalance and other problems. In fact, some doses lower than that are true teratogenic effects, and only in the dogs did we see symptoms at doses that weren't maternally toxic. And, as Dr. Halpin said earlier, we have tried to go back to get the raw data on the dog studies, and this data has been lost.

I would like to emphasize the--

ASSEMBLYWOMAN McCONNELL: Is there any explanation for that?

MR. PUECH: Yes. You see, the raw data was collected and kept in the files of the Food and Drug Administration. I am not sure where the building was located. I could track that back for you, if you desire. Then the study was published - the results were published - but the raw data wasn't available. When we went back to look at the raw results, we wanted to do that because often when a study is done, the author might think the results mean something, and other experts might dispute those results. I can give you some examples, the most recent one being sodium nitrite, where the Food and Drug Administration was very concerned about the addition of sodium nitrite as a meat preservative. It was thought to be carcinogenic. They had all those slides - 50,000 slides - reevaluated by other experts, and they differed with the interpretations of the original study. Based on the new evidence of the same data, sodium nitrite has been cleared as being non-carcinogenic. That is just an example. I can give you loads of others. Saccharine is one; cholesterol is another -- there are so many other cases where we might initially think that something is harmful, and when we look into it deeper, maybe it is harmful, and maybe it isn't.

In the case of the dog, we can't get the raw data. One of the speakers today said: "Well, let's do the study over, applying the material to the skin of the animal."

ASSEMBLYWOMAN McCONNELL: Yes, have you done any studies?

MR. PUECH: I would like to make you aware that Sevin is registered for use on dogs as a dust for flee control. It is also registered for use on cats, on poultry, and many other mammals. I have reviewed over 15 years of Sevin useage on dogs and cats in this country, and it is probably, I would say, one of the top two or three pesticides for flee control on dogs and cats. We haven't had one single complaint that was documented regarding birth defects resulting from dermal application of flee control.

In the studies where we had birth defects, the animals were dosed in the diet -- a very high dosage compared to what they get on the skin every day for 63 days of gestation. So, you have a study that has tried to produce an effect, using a very high exposure and a different route of exposure than occurs in a gypsy moth spray program.

ASSEMBLYWOMAN McCONNELL: Are you continuing to conduct research on birth defects?

MR. PUECH: We aren't, at this time, studying the birth defect issue ourselves.

ASSEMBLYWOMAN McCONNELL: You are, or you are not?

MR. PUECH: No, we are not at this time. However, we are always open

to doing studies that may be needed because of issues that may arise. Even though carbaryl has been on the market now for say about 23 years, we are annually spending millions of dollars on additional research, and sponsoring additional research to keep finding out more about it. The Environmental Protection Agency has said that more is known about carbaryl than any other chemcial in the area of birth defects. I think that, in a sense, if you take a product and run enough tests on it, and use enough animals, and enough doses, at some point you are going to hit a sensitive species. In the case of Sevin, the dog turned out to be a very sensitive species. But, species closer to human, such as the monkey, did not show birth defects when dosed in the diet.

ASSEMBLYWOMAN McCONNELL: Do you have any questions, Norman?

MR. MILLER: Mr. Puech, do you have a sample label that you can leave with us?

MR. PUECH: Yes, I do, sir.

MR. MILLER: Can it be reproduced?

MR. PUECH: I will just give you the labels, sir.

ASSEMBLYWOMAN McCONNELL: Could I see those?

MR. PUECH: Yes.

ASSEMBLYWOMAN McCONNELL: Could I ask you one more question?

MR. PUECH: Yes.

ASSEMBLYWOMAN McCONNELL: One of the cautions here is to avoid contact with skin and eyes, yet you tell me that you have done extensive testing to say that it caused no effects.

MR. PUECH: Yes. Well, you know, a lot of the cautions--

ASSEMBLYWOMAN McCONNELL: Did you do this by putting it on the skin of cats and dogs?

MR. PUECH: Yes. Well, we have done tests with skins of rabbits and many other animals as well, and we are very sensitive to protecting public health because, believe me, we can't afford to have a product on the market that is creating a health problem. There are a lot of lawyers getting rich off chemical companies, and we can't afford to have a product that we don't really believe is safe. However, in the interest of caution, precaution, and prudence the Environmental Protection Agency makes us put warnings on our labels, because not everybody understands pesticides. We feel these warnings are in good order, and we comply with them and do put them on. But, you could read more into those warnings than is actually warranted by the safety didactic on the product. But, I still support having those warnings on the label.

ASSEMBLYWOMAN McCONNELL: It also says to avoid contamination of food, feed, water supply, streams, and ponds during application or when cleaning equipment.

MR. PUECH: Yes.

ASSEMBLYWOMAN McCONNELL: That is--

MR. PUECH: You know, it is not a good idea to take a pesticide container and swish it out with water and then pour the water into a stream or into a pond. You contaminate somebody else's water supply, perhaps, or somebody else's ground water, and it is just prudence not to dispose of pesticides--

ASSEMBLYWOMAN McCONNELL: It is precaution for full strength.

MR. PUECH: Yes. These are required of virtually all pesticides I know of.

ASSEMBLYWOMAN McCONNELL: Okay. We will make that a part of the record.

MR. MILLER: Is the formula for Sevin that is applied to garden vegetables the same?

MR. PUECH: No, sir, that is a different product. I can give you a label as an example of the product that is applied to vegetables.

MR. MILLER: Is that water soluble?

MR. PUECH: The technical material, Sevin, is not water soluble to any great extent. It has a water solubility of forty parts per million. So, it doesn't move through the soil as if it was highly soluble. All of our water based products are really a suspension of Sevin particles in the water base. If you make a diluted Sevin, you will see all the particles settle out on the bottom of the container.

ASSEMBLYWOMAN McCONNELL: When it is sprayed on vegetables, fruits, fields, or what have you, does it have the capacity of breaking down after a certain period of time?

MR. PUECH: Yes. The product, in contrast to many other chemicals, does not enter the fruits and vegetables physically in significant amounts, and it is trace amounts which might actually penetrate fruits and vegetables. Most of it stays on the surface and is degraded there by a variety of factors, primarily by light, by water, it is photodegraded, it is hydrolized, it is oxydized, and a lot of it is just removed by mechanical abrasion -- wind and rubbing of the foliage against other foliage. Because it hasn't penetrated the foliage, you can take an apple and wash it and remove virtually all the residues on it -- or a tomato, or anything like that. However, our labels don't assume you are going to wash those products; we assume somebody is going to pick an apple and eat it directly, or pick a strawberry and eat it directly. So, we have very high safety factors built in.

ASSEMBLYWOMAN McCONNELL: Do you have any further questions, Norman?

MR. MILLER: No.

ASSEMBLYWOMAN McCONNELL: I thank you very much.

MR. PUECH: I just want to say that we want to cooperate with you in this study of yours, and we will be happy to provide you with any information that is useful.

ASSEMBLYWOMAN McCONNELL: Thank you. If you would leave us your address or phone number, or your business card, we would appreciate it.

I would like to thank all of you for coming, especially those of you who testified, for helping our Committee gather data and do research on this subject. The record will remain open for two weeks, so if any of you would like to submit additional testimony or thoughts or ideas, we would be most appreciative of that.

As soon as the transcript is made available, we will be analyzing it and submitting this to the entire Agriculture and Environment Committee, and perhaps out of that some recommendations will evolve. So, we will be keeping you informed, and thank you again for your help and participation.

MR. METTERHOUSE: Madam Chairman, may I make a statement?

ASSEMBLYWOMAN McCONNELL: Yes.

MR. METTERHOUSE: (statement, from back of room, inaudible)

ASSEMBLYWOMAN McCONNELL: Mr. Metterhouse, if you would like that statement to be a part of the record, because it is in answer to some testimony given by Ms. White, I don't believe the court reporter got your entire statement. You were commenting on a statement that Ms. White had made about a spraying in her community.

MR. METTERHOUSE: Yes, it was about the spraying in her area. I don't believe that the spraying was conducted under the State's Gypsy Moth Cooperative Program. She also implied that Imidan was used. The State does not use Imidan

in its program. Imidan is a material that can only be applied from the ground, and not by air.

ASSEMBLYWOMAN McCONNELL: Thank you, Mr. Metterhouse.

The hearing is now adjourned.

(hearing concluded)

SPECIAL DELIVERY

State of N.J. will Pick up

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, D.C. 20460

SEP 30 1980

Mr. Philip Alampi
Secretary of Agriculture
New Jersey Department
of Agriculture
P.O. Box 1888
Trenton, New Jersey 08625

Dear Mr. Alampi:

This is a follow-up to a telephone conversation I had with William Metterhouse on September 26 concerning the upcoming New Jersey legislative hearings on the continued use of Carbaryl in the state gypsy moth control program. Unfortunately, the EPA's decision document on Carbaryl is still undergoing final editing and is not yet releasable. However, since I wrote to you on May 7, 1980, the Agency has held a public meeting on the risks of Carbaryl. I would like to take this opportunity to summarize that meeting for you and to send you a copy of the official transcript in the hope that the information will be helpful to you in the New Jersey hearings.

EPA requested that a subcommittee of the FIFRA Science Advisory Panel consider the Agency's position on Carbaryl due to the large amount of public interest on that chemical. Such a public meeting was held on July 23, 1980 and it was attended by EPA scientists, Union Carbide scientists, other current researchers, and the interested public.

EPA's position in that meeting was to present available data in the areas of mutagenicity, oncogenicity, teratogenicity, viral enhancement, and exposure. Our current position on Carbaryl can be summarized as follows:

> "We believe it is useful to share with the SAP this morning our reasons for why we are not proposing to RPAR Carbaryl. We believe that this can be an example for us to share with the SAP on how we do draw that line between when to RPAR and when not to RPAR, when we know that the basic information base on risk is a continuum.
>
> I'd like to summarize quickly EPA's position on Carbaryl at the moment. First of all, there is very little disagreement that the usage and the benefits of Carbaryl are very, very large. On the risk side there is also very little disagreement that the available data base is

probably one of the largest that we have on any chemical. In fact, certainly on the chemicals I've seen in the RPAR process, it is the largest data base.

Historically, the first concern that was raised on Carbaryl was with the teratogenic and the fetotoxic effects, and in this area we definitely have the largest data base in terms of covering various species.

The second major concern is with mutagenicity and that also has another very large data base.

In looking at the risk data, where we come out is that the data are very equivocal. The study results have been difficult to replicate, and any informal kind of a weight of an evidence argument that we try and go through would suggest to us that first the human teratogenicity risk and mutagenicity risk from proper Carbaryl use are expected to be low, and the existence of a trigger is very uncertain because of the large amount of uncertainty in our assessment of a low risk. We believe in this case the responsible call is not to begin an RPAR.

Also, we feel that were we to go ahead with a full RPAR and do a complete risk-benefit analysis on each use of Carbaryl it is not likely that the end result of that would significantly change the use patterns. In other words, we don't think that we would get a lot of output, in terms of risk reduction, for going through an RPAR right now because of the largeness of the benefits, the lowness of the risk and the large uncertainty around the risk.

Finally, because we think the data base is so large and larger than most others, and because our assessment has been so thorough in trying to make sure we have looked at all the information, we do not believe that a lot of new information would result from an RPAR. And we suspect that what would happen is we would spend quite a large amount of time and resources going through the information that the Agency has already reviewed and spent a number of years looking at already."

The position document which we expect to issue in the very near future will reflect the scientific and regulatory position which EPA presented in our public meeting. Although the SAP requested that the Agency consider the appropriateness of additional label warnings, they did not disagree with the Agency's scientific

assessment of the risk data. Moreover, the SAP recommendation on labeling was not unanimous but was approved on a 3-2 vote, as shown in the meeting transcripts. I have enclosed a copy of the SAP report to EPA on Carbaryl. While the Agency will pursue the need to develop additional label restrictions, the Agency does not believe that any adverse action against the continued registration of Carbaryl is warranted at this time.

Sincerely yours,

Marcia E. Williams
Director
Special Pesticide Review Division

Enclosures

Forage, Field and Vegetable Crop Insect Control

CROPS	INSECTS CONTROLLED	AMOUNT TO USE** (Active SEVIN® per A)	LIMITATIONS
Alfalfa*, Clovers*	Alfalfa caterpillar, alfalfa weevil larvae, armyworm, bean leaf beetle, blister beetle, clover head weevil, corn earworm, cucumber beetles, cutworms, Egyptian alfalfa weevil larvae, Essex skipper, European alfalfa beetle, fall armyworm, green cloverworm, Japanese beetle, leafhoppers, lygus bugs, Mexican bean beetle, stink bugs, three-cornered alfalfa hopper, thrips, velvetbean caterpillar, webworms, yellowstriped armyworm	½ to 1½ lbs.	Day of harvest or grazing. Tolerance 100 ppm on forage and hay.
Asparagus*	Asparagus beetle on seedlings or spears Asparagus beetle, Apache cicada on ferns or brush growth	1 to 2 lbs. 2 to 4 lbs.	1 day before harvest. Post harvest application only. Tolerance 10 ppm.
Beans* (dry, green, lima, navy, snap, southern peas, including crowder, black-eyed peas and cowpeas)	Alfalfa caterpillar, armyworm, bean leaf beetle, blister beetles, corn earworm, cowpea curculio (on southern peas), cucumber beetles, cutworms, European corn borer, fall armyworm, flea beetles, green cloverworm, Japanese beetle, leafhoppers, limabean pod borer, lygus bugs, Mexican bean beetle, stink bugs, tarnished plant bug, three-cornered alfalfa hopper, thrips, velvetbean caterpillar, webworms, western bean cutworm	½ to 2 lbs.	Day of harvest. Tolerance 10 ppm on beans, 5 ppm on peas, 100 ppm on forage or hay.
Cabbage*, Broccoli*, Brussels Sprouts*, Cauliflower*, Kohlrabi*	Armyworm, corn earworm, fall armyworm, flea beetles, harlequin bug, imported cabbageworm	½ to 2 lbs.	3 days before harvest. Tolerance 10 ppm.
Chinese Cabbage*, Collards*, Hanover Salad, Horseradish*, Kale*, Mustard Greens*, Radishes*, Rutabagas*, Turnips*	Armyworm, aster leafhopper, corn earworm, fall armyworm, flea beetles, harlequin bug, imported cabbageworm, leafhoppers, stink bugs, tarnished plant bug	½ to 2 lbs.	3 days before harvest of root crops, 14 days before harvest of leaf crops. Tolerance 5 ppm on horseradish, radishes, rutabagas, turnips; 10 ppm on Chinese cabbage; 12 ppm for collards, kale, mustard greens, turnip tops.
Carrots*, Celery*, Parsnips*, Parsley*	Armyworm, aster leafhopper, corn earworm, fall armyworm, flea beetles, leafhoppers, lygus bugs, spittlebugs, stink bugs, tarnished plant bug	½ to 2 lbs.	Day of harvest of carrots, 3 days of harvest of parsnips, 14 days of harvest of parsley. Tolerance 5 ppm on parsnips, 10 ppm on carrots, 12 ppm on celery and parsley.
Corn* (field, sweet, pop)	Armyworm, chinch bugs, corn earworm, corn rootworm adults, cutworms, European corn borer, fall armyworm, flea beetles, Japanese beetle, leafhoppers, sap beetles, southwestern corn borer, western bean cutworm	1 to 2 lbs. (1 to 6.5 lbs. for cutworms)	Day of harvest. Tolerance 5 ppm on corn, 100 ppm on forage.
Cotton*	Boll weevil, bollworm, cotton fleahopper, cotton leaf perforator, cotton leafworm, fall armyworm, flea beetles, leaf rollers, leafhoppers, lygus bugs, pink bollworm, saltmarsh caterpillar, stink bugs, striped blister beetle, tarnished plant bug, light to moderate infestations of western lygus bugs, (aphids will be repressed by repeat applications in a schedule), thrips, yellowstriped armyworm (cotton cutworm)	½ to 2½ lbs.	May be applied after bolls open. Tolerance 5 ppm on cottonseed, 100 ppm on forage.
Cucumber*, Melons*, Pumpkins*, Squash*	Cucumber beetles, flea beetles, leafhoppers, melonworm, pickleworm, squash bug	½ to 1 lb.	Day of harvest. Tolerance 10 ppm. (Do not use SEVIN on watermelons in Florida.)
Dandelion*, Endive* (Escarole), Lettuce*, Salsify*	Armyworm, aster leafhopper, corn earworm, fall armyworm, flea beetles, harlequin bug, imported cabbageworm, leafhoppers, lygus bugs, spittlebugs, stink bugs, tarnished plant bug	½ to 2 lbs.	3 days before harvest of lettuce, and salsify roots, 14 days before harvest for other leaf crops. Tolerance 10 ppm on endive, lettuce, and salsify tops; 12 ppm on dandelion; 5 ppm on salsify roots.
Forage Grasses*, Pasture*	Armyworm, black grass bugs, chinch bugs, Essex skipper, fall armyworm, range caterpillars, range crane fly, striped grass looper, thrips, white grubs (green June beetle)	1 to 2 lbs.	Day of harvest of grass and pasture. Tolerance 100 ppm on grass and hay.
Garden Beet*, Spinach*, Swiss Chard*	Armyworm, aster leafhopper, corn earworm, fall armyworm, flea beetles, harlequin bug, leafhoppers, stink bugs, tarnished plant bug	½ to 2 lbs.	3 days before harvest of garden beet roots, 14 days for garden beet tops, spinach and Swiss chard. Tolerance 5 ppm on garden beet, 12 ppm on spinach and Swiss chard.

CROPS	INSECTS CONTROLLED	AMOUNT TO USE** (Active SEVIN per A)	LIMITATIONS
Okra*	Corn earworm, stink bugs	1 to 2 lbs.	Day of harvest. Tolerance 10 ppm.
Peanuts*	Alfalfa caterpillar, armyworm, bean leaf beetle, blister beetles, corn earworm, cucumber beetles, cutworms, fall armyworm, green cloverworm, Japanese beetle, leafhoppers, Mexican bean beetle, red-necked peanutworm, stink bugs, three-cornered alfalfa hopper, thrips, velvetbean caterpillar, webworms, whitefringed beetle adults	½ to 2 lbs.	Day of harvest or grazing. Tolerance 100 ppm on forage and hay, 5 ppm on peanuts.
Peas*	Alfalfa caterpillar, alfalfa looper (in Washington State only), armyworm, Colorado potato beetle, cutworms, leafhoppers, pea leaf weevil, pea weevil, yellowstriped armyworm	1 to 1½ lbs. (2½ lbs. Washington State only.)	Day of harvest. Tolerance 10 ppm on peas, 100 ppm on forage.
Potato, Tomato, Eggplant, Pepper	Colorado potato beetle, cutworms, European corn borer, fall armyworm, flea beetles, lace bugs, leafhoppers, stink bugs, tarnished plant bug, tomato fruitworm, tomato hornworm, tomato pinworm	½ to 2 lbs.	Day of harvest. Tolerance 0.2 ppm on potato, 10 ppm on tomato, eggplant and pepper.
Rice*	Armyworm and stink bugs in the Mississippi Delta and Texas Armyworm, leafhoppers and tadpole shrimp in California Chinch bugs, fall armyworm	1 to 1½ lbs. 2 lbs. 1 to 2 lbs.	14 days before harvest. Tolerance 5 ppm on rice, 100 ppm on straw. Do not apply propanil within 15 days of SEVIN application.
Sorghums* (milo, grain sorghum, sweet sorghum, hybrids)	Armyworm, chinch bugs, corn earworm, cutworms, fall armyworm, sorghum midge, southwestern corn borer, stink bugs, webworms	1 to 2 lbs.	21 days before harvest of grain. Tolerance 10 ppm. No time limit on sorghum forage. Tolerance 100 ppm.
Soybeans*	Alfalfa caterpillar, armyworm, bean leaf beetle, blister beetles, corn earworm, cucumber beetles, cutworms, fall armyworm, grape colaspis, green cloverworm, Japanese beetle, leafhoppers, Mexican bean beetle, painted lady (thistle caterpillar), saltmarsh caterpillar, stink bugs, three-cornered alfalfa hopper, thrips, velvetbean caterpillar, webworms, yellowstriped armyworm	½ to 2½ lbs.	Day of harvest or grazing. Tolerance 100 ppm on forage and hay. Do not apply a combination of SEVIN and 2,4-DB herbicide to soybeans.
Sugar Beets*	Armyworm, beet leaf beetle, cutworms, fall armyworm, flea beetles, leafhoppers, webworms	1 to 2 lbs.	14 days before harvest. Tolerance 100 ppm on sugar beet tops.
Sweet Potato*	Corn earworm, flea beetles, sweet potato hornworm, sweet potato weevil, tortoise beetles	1 to 2 lbs.	Day of harvest. Tolerance 0.2 ppm.
Tobacco	Budworms, fall armyworm, flea beetles, green June beetle grubs, hornworms, Japanese beetle, June beetles, suckfly, tobacco flea beetle	0.25% spray solution in plant beds. 1 to 2 lbs. in fields.	Allow 3 days before priming or cutting.
Grasshoppers			
Forage, field, vegetable crops: Nymphs on small plants or sparse vegetation in wasteland, ranges, ditchbanks, borders Mature grasshoppers or when material is applied to crops requiring greater coverage		½ to 1½ lbs. ½ to 1 lb. 1 to 1½ lbs.	Follow pre-harvest and grazing use limitations listed for each of the previous crops.
Tree Fruit and Nut Insect Control			
Almond*	Fruit tree leaf roller, navel orangeworm, peach twig borer, San Jose scale	1 lb. per 100 gals.	28 days. Tolerance 40 ppm on hulls, 10 ppm in whole almond. Do not exceed 5 lbs. per acre.
Apples, Pears	Apple aphid, apple maggot, apple mealybug, apple rust mite, apple sucker, bagworms, California pearslug (pear sawfly), codling moth, eastern tent caterpillar, European apple sawfly, eyespotted bud moth, forbes scale, fruittree leafroller, green fruitworm, Japanese beetle, lecanium scales, lesser appleworm, lygus bugs, orange tortrix, oystershell scale, pear leaf blister mite, pear psylla, pear rust mite, periodical cicada, plum curculio, red-banded leaf roller, rosy apple aphid, San Jose scale, tarnished plant bug, tentiform leaf miners, white apple leafhopper, woolly apple aphid, yellowheaded fireworm	¾ to 1 lb. per 100 gals. (West of the Rocky Mountains) ½ to 1 lb. per 100 gals. (East of the Rocky Mountains)	1 day before harvest. Tolerance 10 ppm. Application within 30 days after full bloom may also provide apple thinning. To avoid this, delay use until at least 30 days after bloom. For thinning apples: Use ¼ to ½ lb. of active SEVIN per 100 gals. of dilute spray. On hard to thin varieties, use ½ to 1 lb. Apply in one spray timed 10 to 25 days after full bloom.

CROPS	INSECTS CONTROLLED	AMOUNT TO USE** (Active SEVIN per A)	LIMITATIONS
'us Fruits pefruit, lemons, :s, oranges, :elos, tangerines, :s citron, quats, hybrids)	Avocado leafroller, black scale, brown soft scale, California orangedog, California red scale, citricola scale, citrus cutworm, citrus root weevil, citrus snow scale, fruittree leafroller, orange tortrix, western tussock moth, West Indian sugarcane borer (adults), yellow scale	¾ to 1 lb. per 100 gals.	Five days. Do not apply more than 20 lbs. of SEVIN carbaryl per acre per application. Do not apply less than 10 gals. of dilute spray mixture per mature tree.
:stnuts	Chestnut weevil	3 lbs. per 100 gals.	No time limit. Make 4 weekly applications starting in late July.
:ert	Filbert aphid, filbert leafroller, filbertworm	1 lb. per 100 gals.	No time limit. Tolerance 5 ppm.
ves	Olive scale	¾ to 1 lb. with 1½ gal. summer oil per 100 gals.	No time limit. No more than two applications per season. Tolerance 10 ppm.
aches, ricots, ctarines	Apple pandemis, codling moth, cucumber beetles, European earwig, fruittree leafroller, Japanese beetle, June beetles, lecanium scale, lesser peachtree borer, olive scale, orange tortrix, Oriental fruit moth, peach twig borer, periodical cicada, plum curculio, redbanded leafroller, San Jose scale, tarnished plant bug, tussock moth, variegated leafroller	1 lb. per 100 gals.	1 day before harvest of peaches, 3 days before harvest of apricots and nectarines. Tolerance 10 ppm.
cans	Black margined aphid, fall webworm, hickory shuckworm, lesser webworm, pecan leaf phylloxera, pecan nut casebearer, pecan spittlebug, pecan weevil, twig girdler, walnut caterpillar	1 to 2½ lbs. per 100 gals.	No time limit. Tolerance 1 ppm. Do not apply more than 7.2 lbs. active SEVIN per acre per application.
stachios	Navel orangeworm	3 lbs. per 100 gals.	No time limit. Apply full coverage spray at onset of hull split.
ums, unes, ierries	Black cherry aphid, brown soft scale, cherry fruitworm, cherry maggot, codling moth, eastern tent caterpillar, European earwig, eyespotted bud moth, forbes scale, fruittree leafroller, green fruitworm, Japanese beetle, lecanium scale, lesser peach tree borer, mealy plum aphid, orange tortrix, oystershell scale, peach twig borer, plum curculio, prune leafhopper, redbanded leaf roller, rose chafer, San Jose scale, tussock moth, variegated leafroller	¾ to 1 lb. per 100 gals.	1 day before harvest. Tolerance 10 ppm.
alnut	Calico scale, codling moth, European fruit lecanium filbertworm, fruittree leafroller, frosted scale European earwig	½ lb. per 100 gals. 2 lbs. per 100 gals.	No time limit. Tolerance 10 ppm on whole walnuts, 1 ppm in nut meats.

Small Fruit Insect Control

ackberries, spberries, ewberries, oysenberries, oganberries	European raspberry aphid, Japanese beetle, leafhoppers, leafrollers, omnivorous leaf roller, and raspberry sawfly in California, rose chafer, snowy tree cricket	2 lbs.	7 days before harvest. Tolerance 12 ppm.
ueberries	Blueberry maggot, cherry and cranberry fruitworms, European fruit lecanium, Japanese beetle	1½ to 2 lbs.	Day of harvest. Tolerance 10 ppm.
anberries	Cutworms, cranberry fireworms, cranberry fruitworms, Japanese beetle, leafhoppers, rose chafer	1½ to 3 lbs.	1 day before harvest. Tolerance 10 ppm.
apes	European fruit lecanium, grape leaffolder, grape leafhopper, western grapeleaf skeletonizer Cutworms, eightspotted forester, grape berry moth, Japanese beetle, June beetles, omnivorous leafroller, orange tortrix, redbanded leafroller, saltmarsh caterpillar	1 to 2 lbs. 2 lbs.	Day of harvest. Tolerance 10 ppm.
rawberries	Flea beetles, meadow spittlebug, omnivorous leaftier (strawberry fruitworm), strawberry leafroller, strawberry weevil	1 to 2 lbs.	1 day before harvest. Tolerance 10 ppm.

Adult Mosquitoes

asture, Rangeland, on-agricultural nds **ited Areas** :, lower shade ee foliage, shrubbery, wer beds)	Adult mosquitos	¼ to ½ lb. in mist blowers, ½ to 1 lb. in aerial sprays, 1 lb. in low pressure ground equipment.	Day of harvest.

CROPS	INSECTS CONTROLLED	AMOUNT TO USE** (Active SEVIN per A)	LIMITATIONS
Pest Control In and Around Buildings			(For Use By Pest Control Operators Only)
(Homes, apartments, warehouses, barns, municipal recreation areas) Interior & Exterior Wall Surfaces, Ceilings, Eaves & Roofs of Dwellings made of Wood, Metal, Bamboo, Cement, Brick, Thatch or Whitewashed Clay	Cockroaches, ants Brown dog ticks, earwigs, fleas, millipedes, silverfish Adult mosquitoes in subtropical and tropical regions	¾ lb. per 4 gals. ¾ lb. per 10 gals. ¾ lb. per 4 gals. of water; apply the prepared spray per 2000 sq. ft. of surface area.	Spray surfaces; don't sp spray or spray animals. Don't treat fabrics or us in dairy barns. Don't us more than twice per we Protect all food. Food handling surfaces should protected and cleaned after treatment.
Lawn and Area Insect Control			
	Ants, armyworm, bluegrass billbug, centipedes, chiggers, chinch bugs, cutworms, earwigs, Essex skipper, European chafer, fall armyworm, fiery skipper, fleas, grasshoppers, June beetles, leafhoppers, luceine moth, millipedes, mosquitoes, sod webworms (lawn moths), sowbugs, springtails, ticks, white grubs, yellowstriped armyworm	1 lb. to 1½ lbs. in 150-200 gals. of water per 5000 sq. ft. of lawn.	No time limit.
Forest, Shade Tree and Ornamental Insect Control			
Herbaceous Annual, Biennial, Perennial Plants Shrubs, Trees including Sugar Maples, Woody Plants	Ants, apple aphid, armyworm, azalea leafminer, bagworms, birch leaf miner, blister beetles, boxelder bug, boxwood leaf miner, brown tail moth, cankerworms, catalpa sphinx, chiggers, cooley spruce gall aphid, cutworms, cypress tip moth, Douglas fir tussock moth, eastern spruce gall aphid, elm leaf aphid, elm leaf beetle, elm spanworm, eriophyid mites, European pine shoot moth, fall armyworm, flea beetles, fuller rose beetle, gall midges, gall wasps, green striped mapleworm, gypsy moth, hackberry nipplegall maker, holly bud moth, holly leafminer, Jackpine budworm, Japanese beetle, Jeffrey pine needle miner, June beetles, lace bugs, leafhoppers, leaf rollers, locust borer, mealybugs, mimosa webworm, Nantucket pine tip moth, oak leaf miners, oak leaf skeletonizer, oakworm complex, oleander caterpillar, olive ash borer, orange striped oakworm, orange tortrix, periodical cicada, pine sawfly, pine spittlebug, pitch pine tip moth, plant bugs, poinsettia hornworm, plantbugs, psyllids, puss caterpillar, redhumped oakworm, rose aphid, rose chafer, rose slug, saddled prominent, sawflies (exposed), scale insects, sowbugs, spiny elm caterpillar, springtails, spruce budworm, spruce needle miner, subtropical pine tip moth, tent caterpillars, thorn bug, thrips (exposed), ticks, walnut caterpillar, webworms, western hemlock looper, western spruce budworm, willow leaf beetles, yellow poplar weevil	1 lb. per 100 gals. (Ground application) 1 lb. per acre (Aerial application)	No time limit. Do not spray on Boston Iv Virginia creeper, maidenh fern. May also injure Virginia and sand pines in early season.
	Ips engraver beetles, mountain pine beetle, roundheaded pine beetle, western pine beetle	20 lbs. per 100 gals.	No time limit. Treat barl as a preventive treatmen
Poultry Insect Control			
Chickens, Ducks, Geese, Gamebirds, Pigeons, Turkeys	On birds: Chicken mite, fleas, lice, northern fowl mite	1 lb. 5% dust per 100 birds, 1 gal. 0.5% regular spray per 100 birds, 1½ gals. 4% fog spray per 1000 birds.	7 days before slaughter. Avoid contamination of nests, eggs, feed and wat troughs. Tolerance 5 ppm on meat and fat, 0.5 ppm interim tolerance in eggs.
	In premises: Bedbugs, chicken mite, fleas	1 to 2 gals. 0.5% spray per 1000 sq. ft.	
	Fowl tick	1 to 2 gals. 2% spray per 1000 sq. ft.	
	On floor litter: Bedbugs, chicken mite, fleas, lesser mealworms, lice, northern fowl mite	1 lb. 5% dust per 40 sq. ft.	
	Dust bath boxes: Chicken mite, fleas, lice, northern fowl mite	2½ lbs. 5% dust per box for each 50 birds.	
Dogs, Cats	Brown dog tick, fleas	5% SEVIN dust: rub in skin and apply in sleeping quarters weekly.	Do not treat kittens unde 4 weeks old.

CROPS	INSECTS CONTROLLED	AMOUNT TO USE** (Active SEVIN per A)	LIMITATIONS
Cutworm Baits Containing 5% Sevin® Carbaryl			
Cucumbers* Melons*, Squash*, Alfalfa*, Cotton*, Peas*	Armyworm, crickets, cutworms, darkling ground beetles, grasshoppers, sowbugs	20 lbs. 5% bait. 30 lbs. 5% bait.	No time limit. No time limit on alfalfa and peas, 7 days before harvest or grazing cotton.
Vegetable* and Field Crops* **(beans, carrots, corn, forage, sweet corn, eggplant, okra, pepper, potato, tomato)**	Armyworm, crickets, cutworms, darkling ground beetles, grasshoppers, sow bugs	40 lbs. 5% bait.	No time limit.
Asparagus*, Strawberries	Armyworm, crickets, cutworms, darkling ground beetles, grasshoppers, sowbugs	40 lbs. 5% bait.	1 day before harvest.
Root Crops* & Leafy Vegetables* **(broccoli, Brussels sprouts, cabbage, cauliflower, head lettuce, garden beet roots, horseradish, parsnip, radish, rutabaga, turnip)**	Armyworm, crickets, cutworms, darkling ground beetles, grasshoppers, sowbugs	40 lbs. 5% bait.	3 days before harvest.
Root Crops* & Leafy Vegetables* **(sugar beet, collards, endive, garden beet tops, kale, leaf lettuce, parsley, spinach, Swiss chard, turnip tops)**	Armyworm, crickets, cutworms, darkling ground beetles, grasshoppers, sowbugs	40 lbs. 5% bait.	14 days before harvest.

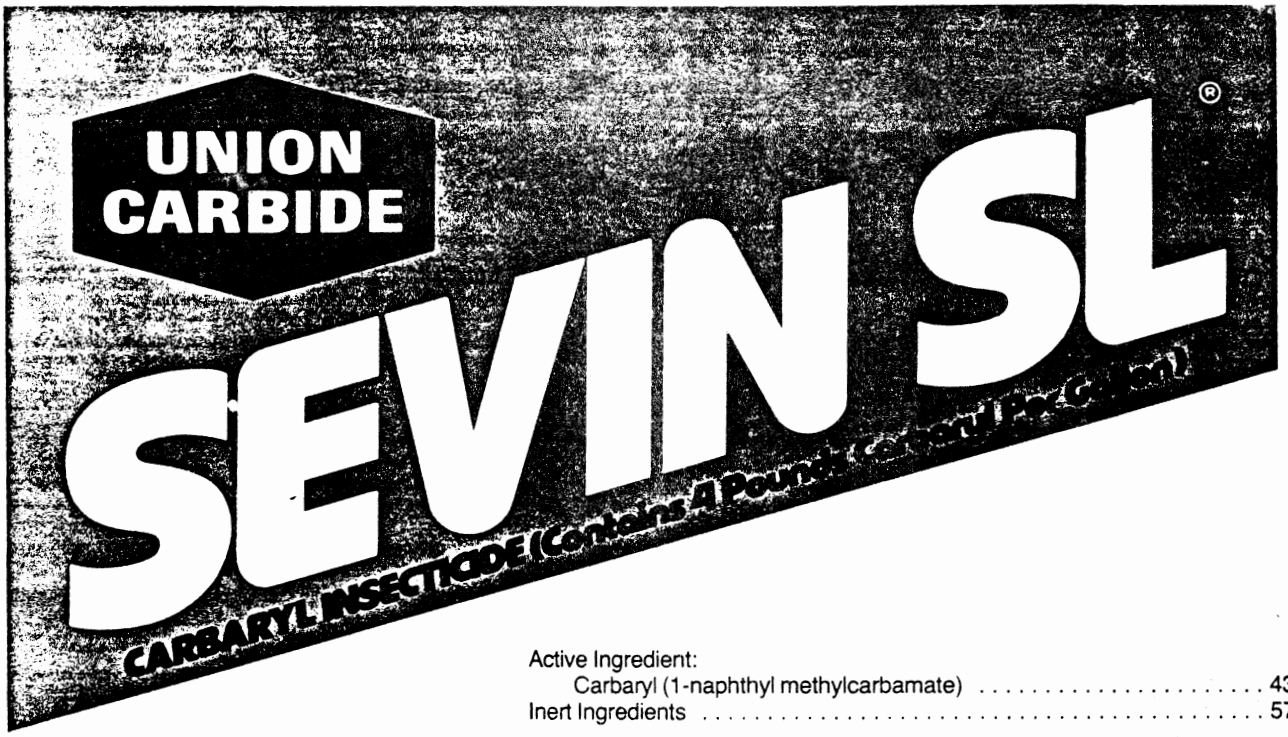
***When label directions for use are followed, forage, vines, hay, citrus pulp, and almond hulls may be fed to meat and dairy animals.**

**One pound of active SEVIN equals 2 pounds of SEVIN 50W, 1¼ pounds of SEVIN Sprayable, 1 quart of SEVIN XLR or SEVIMOL® 4, 1 quart of SEVIN 4 OIL® or 20 pounds of SEVIN 5% Dust formulation. A solution of one pound active SEVIN per one hundred gallons equals 1¼ tablespoonfuls of SEVIN 50W, 1 tablespoonful of SEVIN XLR or SEVIMOL 4 per gallon. SEVIN also comes in various granular, bait and flowable formulations.

For additional specific information on the use of SEVIN, read the label on the package you buy and consult your local pesticide supplier or custom applicator.

UNION CARBIDE
AGRICULTURAL PRODUCTS COMPANY, INC.
7825 Baymeadows Way
Jacksonville, FL 32216

8x



Active Ingredient:

Carbaryl (1-naphthyl methylcarbamate)	43% by wt.
Inert Ingredients	57% by wt.

EPA Reg. No. 264-335 EPA Est. No. 264-M0-02

KEEP OUT OF REACH OF CHILDREN

CAUTION

PRECAUTIONARY STATEMENTS

HAZARDS TO HUMANS AND DOMESTIC ANIMALS:
HARMFUL IF INHALED OR SWALLOWED. Avoid Breathing of Spray. Do Not Take Internally. Avoid Contact with Skin and Eyes.
Wear regular long-sleeved work clothing. Change to clean clothing daily. Wash hands and face before eating. Wash thoroughly after handling.
NOTE FOR PHYSICIAN: Carbaryl is a moderate, reversible cholinesterase inhibitor. Atropine is antidotal.
Do Not Use 2-PAM, opiates, or cholinesterase inhibiting drugs.
ENVIRONMENTAL HAZARDS:
Avoid direct application to lakes, streams and ponds. Do not apply when weather conditions favor drift from area treated. Do not contaminate water, food, or feed by cleaning equipment or disposal of wastes.
BEE CAUTION: MAY KILL HONEYBEES IN SUBSTANTIAL NUMBERS. This product is Highly Toxic to Bees Exposed to Direct Treatment or Residues on Crops. Protective Information May Be Obtained from Your Cooperative Agricultural Extension Service.
Do Not Use When Value of Bees as Pollinators is More Important than Insect Control. Before Applying, Warn Beekeepers to Locate Hives Beyond Bee Flight Range Until 1 Week After Application or to Take Other Equally Effective Precautions.

FOR CONTROL OF INSECT PESTS

IN CASE OF EMERGENCY, TELEPHONE COLLECT (24 HOURS A DAY) IN THE U.S.A. (304) 744-3487

WARRANTY

1. The manufacturer warrants (a) that this product conforms to the chemical description on the label; (b) that this product is reasonably fit for the purposes set forth in the directions for use when it is used in accordance with such directions; and (c) that the directions, warnings and other statements on this label are based upon responsible experts' evaluation of reasonable tests of effectiveness, of toxicity to laboratory animals and to plants, and of residues on food crops, and upon reports of field experience. Tests have not been made on all varieties or in all states or under all conditions. THE MANUFACTURER NEITHER MAKES NOR INTENDS, NOR DOES IT AUTHORIZE ANY AGENT OR REPRESENTATIVE TO MAKE, ANY OTHER WARRANTIES, EXPRESS OR IMPLIED, AND IT EXPRESSLY EXCLUDES AND DISCLAIMS ALL IMPLIED WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE.
2. This warranty does not extend to, and the Buyers shall be solely responsible for, any and all loss or damage which results from the use of this product in any manner which is inconsistent with the label directions, warnings or cautions.
3. BUYER'S EXCLUSIVE REMEDY AND MANUFACTURER'S OR SELLER'S EXCLUSIVE LIABILITY FOR ANY AND ALL CLAIMS, LOSSES, DAMAGES, OR INJURIES RESULTING FROM THE USE OR HANDLING OF THIS PRODUCT, WHETHER OR NOT BASED IN CONTRACT, NEGLIGENCE, STRICT LIABILITY IN TORT OR OTHERWISE, SHALL BE LIMITED, AT THE MANUFACTURER'S OPTION, TO REPLACEMENT OF, OR THE REPAYMENT OF THE PURCHASE PRICE FOR, THE QUANTITY OF PRODUCT WITH RESPECT TO WHICH DAMAGES ARE CLAIMED. IN NO EVENT SHALL MANUFACTURER OR SELLER BE LIABLE FOR SPECIAL, INDIRECT OR CONSEQUENTIAL DAMAGES RESULTING FROM THE USE OR HANDLING OF THIS PRODUCT.

UNION CARBIDE AGRICULTURAL PRODUCTS COMPANY, INC.
7825 BAYMEADOWS WAY, JACKSONVILLE, FLORIDA 32216

MADE IN U.S.A.

UCC-2500920
AG-80123

GENERAL INFORMATION

SEVIN SL is a suspension of microfine SEVIN carbaryl insecticide in an aqueous medium. It readily disperses in water to form a spray which may be applied by air or ground. The directions on this label are based on tests and field experience relating to (a) effectiveness, (b) possible injury to plants and animals, and (c) residues in food, feed and milk. READ THIS LABEL BEFORE USE. STRICTLY OBSERVE LABEL DIRECTIONS AND CAUTIONS, AND APPLICABLE FEDERAL AND STATE REGULATIONS.

Treated areas may be reentered immediately after the spray has dried.

PREHARVEST AND GRAZING USE INFORMATION AND LIMITATIONS

Tolerances established under the Federal Food, Drug and Cosmetic Act permit the sale of crops bearing probable carbaryl residues when this product is used in accordance with label directions. If used as directed, treated forage may be grazed or used as feed for dairy and meat animals without causing illegal residues in meat or milk. This product may be applied up to and including the day of harvest or grazing of forage crops. Application may be made without removing livestock from area being treated.

PLANT RESPONSE PRECAUTIONS

To avoid possible injury to tender foliage, do not apply to wet foliage or when rain or high humidity is expected during the next two days.

SEVIN injures Boston ivy, Virginia creeper and maidenhair fern. During early season, it may also injure Virginia and sand pines.

Observe label instructions on apple thinning and on combinations with certain herbicides on rice and soybeans.

DIRECTIONS FOR USE

It is a violation of Federal law to use this product in a manner inconsistent with its labeling.

Read Entire Label. Use Strictly According to Label Directions and Cautions. Do not use application methods, dosages, concentrations, or frequencies not listed on labeling. Do not apply against target pests or crops not listed on labeling. Do not mix with fertilizers.

SPRAY PREPARATION

TO ASSURE A UNIFORM PRODUCT, AGITATE, STIR OR RECIRCULATE ALL SEVIN SL CONTAINERS PRIOR TO USE. Remove oil, rust, scale, pesticide residues and other foreign matter from mix tanks and entire spray system. Flush with clean water.

Fill spray or mix tank with ½ to ¾ the desired amount of water. Start mechanical or hydraulic agitation. Slowly add the required amount of SEVIN SL, and then the remaining volume of water. Include rinse water from container. Prepare only as much spray mixture as can be applied on the day of mixing.

MAINTAIN CONTINUOUS AGITATION DURING MIXING AND APPLICATION TO ASSURE A UNIFORM SUSPENSION. DO NOT STORE SPRAY MIXTURES FOR PROLONGED PERIODS.

COMPATIBILITY

SEVIN SL, when diluted with an equal volume of water, is compatible with a wide range of pesticides. It is not compatible with diesel fuel, kerosene, fuel oil or aromatic solvents. If compatibility of SEVIN SL with another product and the resulting crop response is unknown, it should be tested on a small scale. Curdling, precipitation, greasing, layer formation or increased viscosity are symptoms of incompatibility. WHEN PREPARING COMBINATION SPRAYS, FIRST ADD SEVIN SL TO AT LEAST AN EQUAL VOLUME OF WATER, MIX THOROUGHLY, AND THEN ADD COMBINATION PRODUCTS TO THE MIXTURE. DO NOT APPLY TANK MIX COMBINATIONS UNLESS YOUR PREVIOUS EXPERIENCE INDICATES THE MIXTURE IS EFFECTIVE AND WILL NOT RESULT IN APPLICATION PROBLEMS, EXCESSIVE RESIDUES OR PLANT INJURY.

Unstable under highly alkaline conditions. Not effective if used with alkaline materials such as Bordeaux, lime-sulfur and casein-lime spreaders.

APPLICATION

On all crops, use sufficient gallonage to obtain thorough and uniform coverage.

Calibrate spray equipment to deliver the required volume. The flow rate of SEVIN SL diluted 1:1 with water is similar to water.

Use 50 mesh slotted strainers in spray system and behind nozzles.

Avoid applications just before rainfall as poor insect control may result.

To clean spray system after use, drain and flush with water.

STORAGE AND DISPOSAL

Store unused SEVIN SL in original container only, in cool, dry area out of reach of children and animals. Do not store in areas where temperatures frequently exceed 100°F.

Do not contaminate water, food or feed by storage or disposal.

Unused pesticide, spray mixture or rinse should be disposed of in landfill approved for pesticides or buried in a safe place away from water supplies. Open dumping is prohibited.

Decontaminate empty bulk tanks and drums with water rinses. Do not reuse empty plastic drums or drum liners. Recondition metal drums before reuse. Destroy by burying in approved landfill or other safe place.

Consult Federal, State or local authorities for approved alternative procedures.

September 25, 1980

To: U. S. Department of Agriculture, Forest Service
Health and Agriculture Building
Trenton, New Jersey,

My name is Doris White, I live in Somerset County and am a Professor at William Paterson College at Wayne in Passaic County, where for the past 24 years I have taught science courses and courses in how to teach science.

All my post high school education was done at the University of Wisconsin at Madison, where I received a Master of Science Degree in Horticulture, and a Ph.D. Minor in Entomology. My Ph.D. Thesis concerned Entomology.

I have done research on phytotoxicity, which is plant poisoning, to squash, Cucurbita maxima, from the insecticides D.D.T., Sabadilla, Rotenone, Pyrethrum and Nicotine Sulfate in attempts to control squash vine borer.

Squash vine borer, like gypsy moths, belong to the same insect order, Lepidoptera.

I have heard it said that Sevin is no worse than many other household cleaning compounds. Is it? Where are the tests. I have yet to make anyone ill by using furniture polish, ammonia, bleach or lye. But then again, I have never sprayed furniture polish, ammonia, bleach or lye onto people, plants or food.

We also know that by combining some substances, such as bleach and ammonia, the end products are far more [illegible] than if they were used singly. This is called "Synergism."

12x

I have yet to see tests of Sevin plus something else. such as Sevin plus human allergies, or Sevin plus emphasema, or Sevin plus irregular heart beat, or Sevin plus high blood pressur or Sevin plus gestating human babies.

Nowhere have I seen studies on the effects of synergistic effects of Sevin plus the various known polluting chemicals known to contaminate New Jersey's air, water and soil.

All I can find are research reports as to how much Sevin is needed to kill 50% of a group of rats, rabbits or mice. Nowhere can I find out how much is needed to make you or me vomit, or for our muscles to convulse.

The goal of the poison manufacturer is "Profit." "Complete tests" might show harm to us from the insecticides. Their investments in developing the products would be lost. Thus no profits.

As part of my work, I travel throughout the northern part of New Jersey, averaging over a hundred miles per day. I keep reading of the tremendous devastation by gypsy moths. True, I have seen defoliation here and there. I have seen the caterpillars and their tiny black pellets of excrement. And I have seen some dead trees. But some of the dead trees I have seen have died from causes such as disease, drought, flooding, mechanical damage from mowers and cars, other insects, heaving due to alternate freezing & thawing; age, fungi, lightning and winter kill. Many people blame gypsy moths for every dead tree they see. Trees died around here before long pH, not enough light or soil fertility, nematodes, gypsy moths entered this country. Let's not make gypsy moths the scape goat for everything.

New Jersey still looks green to me, and not all that green is mold.

For years the decision making people in the United States have completely destroyed all of nature's efforts to seek a balance between gypsy moths and other life forms. By repeatedly spraying tons of insecticides, the poison pushers have succeeded in destroying every parasite nature has come up with including parasitic spiders, wasps and Caterpillar Hunter Beetles.

The gypsy moths which survive the insecticide assaults show resistance to each insecticide as it comes along. Chemists have to continue inventing new and stronger poisons to attack these chemical-resistant gypsy moths.

Europe didn't have the chemical know-how in fighting gypsy moths. Europeans had to depend on nature to evolve parasites to keep things in balance. Even though gypsy moths came from Europe and are still in Europe, you never hear about gypsy moth damage in Europe today. No! They didn't kill off the parasites like we do.

Chemical lobby groups have convinced politicians that millions of dollars must be appropriated to poison gypsy moths. And if the money is appropriated, it must be spent.

I am fed up with surprise assaults with unknown poisons being sprayed on us by helicopters and airplanes operated by anonymous pilots. These repeated surprise attacks have caused illness to every member of our family. We have had

the babies have freezer burn patches. We have had defective chick, duck, goose and peafowl embryos develop. Of those which hatched, many pecked on the wrong end of the eggs. We have had stock suffer from reduced fertility, even sterility. The same is true for neighborhood farmers.

Since goats are so similar anatomically to deer and we have had gross problems with muscle convulsions, abortion, etc. with our goats, I worry about what is happening to our deer. It is reasonable to assume deer have been seriously affected. Has anyone checked?

I am shocked that no one has informed the public as to what the label says on the insecticide container of that which is being sprayed. This is the worst case of educational malpractice I have ever heard of.

It is dishonest that the public is not told that Sevin is a cholinesterase inhibitor. The public has not been told that cholinesterase inhibitors affect the liver and the central nervous system. No one has told people to evacuate if they have bad livers, although some papers have warned pregnant women to evacuate. But how about the women who are just a few days pregnant. Their babies could suffer the most while such women are totally unaware that they are even pregnant. That's the main reason x-ray technicians hate to give abdominal x-rays to women patients two weeks before their menstral periods are due. That is the period when greatest harm comes to the embryo.

15x

Doris White/Sevin

The public has not been told that Sevin is harmful if inhaled or swallowed. The public has not been told not to breathe Sevin or to get it on skin. Sevin should not be taken internally. Yet, Sevin is often sprayed in the early morning hours when people are still sleeping, and the people are totally unaware of the presence of the poison when they go outside. Or worse yet, the poison is sprayed directly on people while waiting for school buses, walking or working.

The Sevin label however, warns of these harms. The spray people do not tell us what's on the label. My youngest son went outside after an aerial spray wearing jeans and a T-Shirt. He broke out in a nasty rash on his arms and neck from the Sevin. He was asleep when the helicopters went over our house during the preceeding hour. His pet skunk wasn't that lucky. It died on its back with its feet in the air. Nowhere could we find a laboratory to test the animal for the presence of Sevin. Not even through Trenton could we locate a laboratory. No test, no proof! Therefore Sevin must be safe!

When trees are sprayed, so are pastures and vegetable gardens. No one has informed the public that if Sevin is sprayed on vegetable plots, the vegetables should not be touched for at least two weeks. Are the people spraying the insecticide ignorant, negligent, or sadistic? of what is on the label, in informing us,

I have never seen or heard a report warning the public

that when pastures are sprayed and livestock consumes the pasture, the milk, meat and eggs from such animals should not be consumed for 60 days.

Because I did not know about this 60 day waiting period, I illegally sold a goat for human consumption at a New Jersey public auction. There must have been hudreds or more likely thousands of other farmers who did the same. We were all ignorant of this 60 day break-down period for Sevin before eggs, milk and meat should be safe for human consumption.

On a Friday afternoon in 1980 following a spray drift episode on our farm, I phoned the "Hot Line" listed in the telephone book. The woman in Trenton told me that on Monday I should report this to either the Department of Agriculture, the Board of Health or the Department of Environmental Protection. There was no help available on weekends.

On Monday I phoned the New Jersey Department of Environmental Protection. A woman there said she really didn't know what we should do. She asked me if I thought we should contact the New Jersey Department of Agriculture or the State Board of Health. She's an "Investigator?"

Our local animal warden took specimens of affected and dead animals as well as samples of our water and pasture to the local board of health. They immediately notified the State Board of Health, but no one came for the specimens. A couple of weeks later these rotting specimens were thrown out.

After our neighbors hired a spray company to spray with

Imidan, I had to go outside to release the baby goat to nurse the mother as the goat needed milking and we were afraid to drink her milk.

I was outside no more than 2 minutes holding my breath as long as I could and wearing a face mask for "protection." Turns out, the face mask keeps out dust particles but not fumes. I really needed a gas mask.

Even though I came right in, changed all my clothes and bathed completely, I was miserably sick from the Imidan. Our local doctor refused to treat me. He said I must go to the nearest poison control center which was Morristown Memorial Hospital. There they flushed out my eyes with a saline solution. Meanwhile they phoned the New York City Poison Control Center to find out what "Imidan" was. They had nothing in their data bank about it.

The New York City Poison Control Center told them to wash me with alcohol and to prescribe green soap to use at home as green soap contains the solvant alcohol. They said all my leather garments must be thrown out, such as shoes, belt and purse. They should be placed in a plastic bag and thrown in the trash. They preferred that I throw away my clothes, but if not, I should wash them thoroughly 4 times with strong detergents.

No one at the Poison Control Center thought of taking a blood or urine sample from me to determine exactly what poison was sprayed. How can I prove it ever happened? No test, no proof! - Later another doctor prescribed Atropine to stop my muscles from convulsing. I am not an epileptic.

Doris White/Sevin

I had prompt medical attention from the best possible place, a Poison Control Center. I wonder what happens to migrant workers who get sprayed. Do they get such wonderful service?

With D.D.T., the poison remained as D.D.T. in the body's fat. Sevin and Imidan are different. Within hours, they break down into other chemicals. You cannot prove these chemicals were ever there with the poison testing system in effect today.

Since I have permanent liver damage from hepatitis, I am advised to evacuate whenever we are sprayed. But where can I evacuate to? Most all of New Jersey gets sprayed without notice. If we went to urban hotels during the spray period of May, June and July, who would pay our bills? And who would care for our farm? Meanwhile the crops would turn to weeds. And livestock needs care twice a day.

How do I know when to evacuate?"

When D.D.T. became illegal, Chlordane was used. When Chlordane became illegal, Sevin was used. Now that Sevin looks like bad news, they've come up with Imidan. When Imidan is found to be bad, chemists will have to come up with something stronger, and which breaks down even faster. This could go on forever.

If we were smart, we would let nature do the evolving, not the chemicals. It happened in Europe, it can happen here. Please let it. I thank you for your kind attention.

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ADDENDUM

of

REMARKS PREPARED BY THE

NEW JERSEY DEPARTMENT OF AGRICULTURE

in

RESPONSE TO QUESTIONS ASKED DURING THE

ASSEMBLY HEARING (AR 51)

AGRICULTURE AND ENVIRONMENT COMMITTEE

on

OCTOBER 2, 1980

TRENTON, NEW JERSEY

QUESTIONS and RESPONSES

1. Why is the New Jersey Department of Agriculture attempting eradication and/or containment of the gypsy moth?

Since the early 1970's the Department has not been concerned with eradication or containment but how do we best live with the gypsy moth. The Department's answer and approach to the gypsy moth problem is to provide for the implementation of an integrated program employing both chemicals and biological controls. The chemical portion of the program is voluntary with the local municipality for the purpose of preventing tree mortality in the forested residential community. The municipality has the option of selecting either Sevin or Bt (Bacillus thuringiensis, a biological insecticide). The spray materials are applied from the roadside, 200 ft. to the back property line. The unsprayed contiguous wooded areas act as reservoirs from which gypsy moth virus disease, parasites and predators will build up and disperse eventually stabilizing the population.

2. Will spraying perpetuate and cause the gypsy moth to become resistant to pesticides?

It is recognized that insects develop resistance, particularly those pests that have more than one generation per year and where pesticide applications are applied several times during the year. Gypsy moth produces only one generation per year. Secondly, spray applications are applied in a limited and discriminate manner. Treatments are made only to areas expecting defoliation for the second year in an effort to prevent tree mortality. Selected forested residential areas are usually treated one time during a gypsy moth outbreak, therefore, reducing the development of resistance. Sampling and testing of

gypsy moth larvae collected from different areas of the State do not indicate development of resistance to Sevin, the chemical employed in the Department's integrated control program.

Chemical treatments as recommended in the Department's program are applied to small acreages, therefore, discouraging a continuum of high or repetitive outbreak of gypsy moth populations.

3. Does spraying kill beneficial insects?

Regardless of the spray materials used within a control program, the mortality of the host or gypsy moth caterpillar also reduces the parasite population. However, the objective of the program is to spray only small acreages, thus, relying on the contiguous unsprayed areas to provide for reservoirs from which parasites will build up and disperse. It has also been determined that parasites and predator populations are not as high in residential areas since the activities of man have disturbed the natural environment, thus, reducing parasite niches.

4. Does Sevin kill fish and birds?

From the tests and monitoring provided over the years, the impact on wildlife is very low. In the many years that the Department has been involved in treatment programs employing Sevin, no confirmed specimen of bird or fish has been recorded as being killed. It is also known that birds may temporarily migrate from an area because of reduced insect food. However, the same effect is observed in areas defoliated by the gypsy moth, resulting from lack of shade and increased temperatures.

5. Should the gypsy moth sex attractant (Pheromone) be employed in the State program?

The Department has actively participated with the United States Department of Agriculture in the pilot testing of the gypsy moth sex pheromone. All the tests conducted in New Jersey and other states indicate that the sex attractant, whether dispersed by air or ground traps, are not effective in high gypsy moth populations. In such high population levels, the male moth is capable of searching and locating the female moth by sight. The testing does, however, indicate some potential use of the pheromone in very low population levels at the leading edge of gypsy moth infestations, particularly, in newly infested states. To apply the pheromone in low stable gypsy moth populations within New Jersey could affect parasite and predator ability to survive, thus, triggering gypsy moth outbreaks.

6. Should only water based Bt formulations be employed within the Department's program?

All Bt formulations are water mixes. The public objection to the Bt product (Thuricide 16B) used in the 1980 program centered on the three percent xylene incorporated into base formulation. The Thuricide base formulation included not only the xylene which is a stabilizer to prevent deterioration while in storage, but other additives to prevent evaporation and sticking ability for the final preparation. One quart of the base material is mixed with one gallon of water for application on one acre. Xylene, once mixed with the water evaporates rather quickly and does not reach the ground in application, thus, poses no environmental risk. For any biological pesticide

to be effective, it is essential that a sun screen be added to protect the living spores against the ultraviolet light, in addition to antievaporants and stickers to provide for some degree of longevity when applied to the foliage. Bt, without the additives, would be extremely erratic providing poor control results.

7. Can people help themselves by placing burlap bands around infested trees?

Removing egg masses of the gypsy moth, tanglefoot, and placing burlap band around tree trunks can have some effect at low population levels. When the population is in the outbreak stage, only spraying with a chemical or biological insecticide is effective in reducing the gypsy moth population. Shade trees usually of a height of 75 to 100 feet tall limit the homeowner in his ability effectuate controls not having proper spray equipment. It is therefore, necessary that commercial applicators be recruited to effectively control the population. It must also be pointed out that homeowner attempts at control introduce heavy loads of pesticides into the environment with little success of control.

8. Spray materials employed in control programs should carry guarantees of safety?

All spray materials used in control programs are approved and registered with the United States Environmental Protection Agency. All pesticides are in a continual process of review. For example, Sevin is now being recommended for return to full registration after four years of review by E.P.A. After having examined all the data for Sevin, E.P.A., has concluded that Sevin is of

low risk to human health when applied in accordance with the label of use. There cannot be a guarantee of no risk. If such were the case, we would not be able to use any pesticide or drug including food products.

STATE OF NEW JERSEY
DEPARTMENT OF AGRICULTURE
DIVISION OF PLANT INDUSTRY

Imported Enemies of the Gypsy Moth Established in New Jersey

Egg Parasite

Ooencyrtus kuwanae is a multibrooded parasite which attacks the egg stage of the gypsy moth. This parasite is a tiny encyrtid wasp which is able to produce five or six generations a year. O. kuwanae attacks the gypsy moth eggs from late July until late December; it then drops to the duff where it overwinters. It is particularly effective in host populations which have small egg masses.

Larval Parasites

Apanteles melanoscelus is a multibrooded braconid wasp which attacks the early instar gypsy moth larvae. Females have been known to lay about 1,000 eggs. This parasite produces two generations a year and overwinters as full grown larva within a cocoon, usually yellow in color, and shaped like a grain of rice.

Phobocampe disparis is a ichneumonid wasp having one generation a year. The winter is spent as a gray and black banded cocoon on the forest floor. The adult parasite attacks first and second instar gypsy moth larvae. Mature parasite larvae emerge from fourth instar caterpillars and drop to the ground to spin cocoons.

Compsilura concinnata is a tachnid fly which parasitizes gypsy moth larvae. An interesting fact about C. concinnata is that when parasitizing, it actually lays a living maggot inside the body wall of the host, whereas many of the other gypsy moth parasites lay eggs on the body wall of the host. C. concinnata females lay from 90 to 119 maggots in their lifetime. This parasite has over 200 alternate hosts and is well established in the State.

Parasetigena silvestris is another tachinid fly which attacks gypsy moth caterpillars. Unlike C. concinnata, P. silvestris is an egg layer with a laying capacity of over 200 eggs. This fly has a limited host range but has only one generation a year. It is the most important parasite of gypsy moth in New Jersey. It can be found in populations of gypsy moth at various density levels, but is most effective in post culmination host populations.

Blepharipa pratensis is similar to P. silvestris in that it has only one generation a year, but its habits are unique. B. pratensis is a tachinid fly which lays its egg on the leaf of the tree or host plant. The gypsy moth larva, usually a late instar, eats the leaf and also consumes the fly egg. As with many other tachinid flies, the egg develops into a maggot, feeds within the host caterpillar, emerges from the host and drops to the duff to form the brown overwintering puparium. One female fly may deposit as many as 5,000 eggs. This parasite is most frequently observed in heavy gypsy moth populations.

Pupal Parasite

Brachymeria intermedia is a chalcid wasp which attacks the gypsy moth pupae. B. intermedia is a multibrooded parasite with one complete generation and a partial second generation. This parasite overwinters as an adult on the forest floor and other protected places. This parasite is also reported to attack other oak defoliating insects.

Predaceous Beetle

The genus Calosoma has many species which attack gypsy moth larvae and pupae. There are three important native species and one imported species. The native species have a wide host range, but the imported species, Calosoma sycophanta, is more specific to the gypsy moth. Predation is carried on by both the carabid beetle larva and adult. The adults often live four or more years. A pair of adult beetles consume an average of 272 large gypsy moth caterpillars in a season.

History of Gypsy Moth Parasite Releases

The attached table shows the various species of gypsy moth parasites released in New Jersey since 1963. Both established and non-established species are included.

A3179

HISTORY OF GYPSY MOTH PARASITE RELEASES
IN NEW JERSEY 1963-1978

Parasite Species	Origin	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977	1978	Total (16 Yrs.)
Apanteles liparidis	Central Europe-Japan	--	--	--	--	--	--	--	--	--	3,985	27,950	381,250	643,800	281,010	175,325	135,285	1,651,605
Apanteles melanoscelus	Central Europe	--	--	--	0	--	400	1,836	24,144	25,613	49,407	27,322	3,600	--	5,600	5,940	300	144,162
Apanteles porthetriae	France	--	36	--	137	--	--	178	8,000	--	--	26,615	56,660	83,008	21,350	--	--	195,984
Blepharipa pratensis	Europe	--	181	220	2,360	--	1,620	--	14,184	--	--	201	--	189	--	--	--	18,955
Blondelia nigripes	Poland	--	--	--	--	--	--	--	--	--	--	--	--	--	22,800	74,640	27,145	124,585
Brachymeria intermedia	Central Europe	300	4,955	--	1,763	31,915	162,705	138,380	258,253	373,529	368,295	255,650	14,527	36,598	43,800	65,500	--	1,756,170
Brachymeria lasus	Japan	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	89,600	89,600
Calosoma sycophanta	Switzerland-Italy	--	370	1,304	6	--	--	247	--	487	134	--	--	--	--	--	--	2,548
Coccygomimus disparis	India-Japan	--	--	--	--	--	--	--	--	--	600	73,795	43,413	48,982	4,619	33,980	48,120	253,509
Coccygomimus instigator	Yugoslavia	--	--	--	--	--	--	--	--	--	--	--	46,492	49,420	1,180	--	--	97,092
Coccygomimus turionellae morawitzi	Morocco	--	--	--	--	--	--	--	--	--	--	--	--	63,100	39,000	--	--	102,100
Coccygomimus turionellae turionellae	India	--	--	--	--	--	--	--	--	--	2,200	122,558	220,026	104,050	3,430	--	--	452,264
Compsilura concinnata	Central Europe	150	--	--	427	--	--	--	--	--	--	--	--	--	26,459	4,745	8,430	40,211
Exorista japonica	Japan	--	--	--	--	--	--	--	--	--	--	--	--	--	--	642	89,645	90,287
Exorista larvarum	Italy-Yugoslavia	--	--	--	--	--	--	--	3,042	3,798	46,360	73,870	--	--	--	14,999	150	142,201
Exorista roseica	India	--	--	--	--	--	--	17,512	60,928	9,710	32,976	--	--	--	--	--	--	121,126
Exorista segregata	Spain	--	5,780	--	--	--	5,465	39,673	72,725	9,875	33,464	--	--	--	--	--	--	166,982
Hexamermis albicans	Russia	--	--	--	--	--	--	--	--	--	--	--	17	--	--	--	--	17
Lespesia aletiae	U.S.A.-North Carolina	--	--	--	--	--	--	--	--	--	--	--	--	--	--	357	--	357
Meteorus pulchricornis	Italy-France	--	--	--	--	--	--	--	--	--	3,416	41,886	23,247	17,358	30,262	--	--	116,169
Opencyrtus kuwanae	Japan	770,500	3,655,000	5,235,000	1,507,120	2,930,000	15,455,800	18,664,500	37,271,000	1,567,872	--	--	--	--	--	--	--	87,056,792
Palexorista disparis	India	--	--	--	--	--	--	--	--	--	17,887	32,879	112,950	--	--	--	--	163,716
Palexorista inconspicua	France	--	--	--	--	--	--	--	--	--	--	--	23,550	31,684	175,266	--	--	230,500
Parasetigena silvestris	Central Europe	--	--	--	--	--	--	3,397	18,010	18,000	--	--	--	--	--	--	--	39,407
Phobocampe disparis	Italy	--	--	--	--	--	--	--	--	136	--	--	--	--	--	--	--	136
Rogas indiscretus	India	--	--	--	--	--	--	--	1,127	295	1,796	2,523	8,133	10,227	--	--	--	24,101
Rogas lymantriae	Japan	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	3,372	3,372
(27 species)		770,950	3,666,322	5,236,524	1,511,513	2,961,915	15,625,990	18,865,723	37,731,413	2,009,297	560,520	685,249	933,865	1,088,416	654,776	379,128	402,047	93,083,948

A3197

NEW JERSEY DEPARTMENT OF AGRICULTURE

The gypsy moth, in its caterpillar stage, is the most destructive hardwood defoliator in New Jersey. In 1980, varying degrees of defoliation (loss of leaves) occurred on 411,975 acres. Repeated defoliation can kill 15-64 percent of the oaks. The spray program is designed to prevent this kind of tree loss in residential and recreational forests by suppressing the population of the insect.

COOPERATIVE GYPSY MOTH SUPPRESSION PROGRAM - The combined use of chemical and biological controls - the use of Sevin and B.t., a bacterial agent, - is recognized as the most effective method available for controlling this pest. Were Sevin eliminated from the program, uninfested areas both here in New Jersey and in neighboring state would be seriously threatened, and the State could be taken to task for failing to implement adequate controls

BACILLUS THURINGIENSIS - If B.t. alone were used in the program, operational costs would more than double, due to the greater complexities involved in the application of this material. In addition, a significantly fewer number of acres would be sprayed, as many municipalities with a large number of infested acres would simply be unable to spray them all, due to time limitations and economic constraints. (B.t. costs twice as much as Sevin and usually requires a second application to be effective, which quadruples the cost.) Widespread defoliation would result, certain wildlife habitats would be lost, and the aesthetics as well as the property value of the affected acres would decline.

ALTERNATIVES - Efforts are being made to develop methods of pest control using predatory insects, but such controls are presently unable to cope with the epidemic number of the pest. Similiarly unsuitable are sex attractant and radiation sterilization methods. These are best utilized in states with isolated infestations that are still small enough to be eliminated.

Alternative chemicals include Dimilin, Dylox and Orthene. The EPA does not permit the use of Dimilin in populated areas. Dylox and Orthene are not as effective as Sevin and are used mainly in other states where stronger controls are not warranted.

SAFETY FACTORS - The program is presently run in accordance with State and federal laws, and utilizes licensed aerial applicators who must also adhere to State and federal regulations. In the absence of these professionals, many homeowners would buy Sevin (available at any retail garden store) and apply it themselves, in unregulated quantities.

The gypsy moth spray program is a voluntary program. NO municipality is forced to participate. Each municipality that elects to participate has a choice of control agents - either Sevin or B.t. Changes in this procedure would be unfounded in light of the following:

* A New Jersey Department of Health study conducted for the EPA shows the amounts of Sevin used in the spray program pose no measurable threat to human health

* The most recent New Jersey Department Health study on Sevin shows no connection can be made between the spray program and birth defects, with the birth defects occurring LESS frequently in areas that were sprayed

* The EPA has classified Sevin as a "general use" pesticide which can be purchased by the general public. It is registered for use on 67 food, feed and forage crops as well as in dusts for control of lice on humans and fleas on dogs and cats

* The EPA Office of Pesticides and Toxic Substances has recently stated that "...There is more data on carbaryl (Sevin) in this area (its effect on human reproduction) than for most other chemicals ... we do not find any evidence that carbaryl poses an adverse risk to humans..."

* Human volunteers have orally injested Sevin and helped establish a level at which no effects were observed of 2mg/kg of body weight. Exposure during the spray program is 20,000 times less than that dosage.

9/29/80

STOCKTON STATE COLLEGE
POMONA, NEW JERSEY 08240 (609) 652-1776

CENTER FOR ENVIRONMENTAL RESEARCH

October 14, 1980

The Honorable Barbara McConnell
N.J. State Assembly
Committee on Agriculture and Environment
Trenton, NJ 08625

Dear Ms. McConnell:

Please enter into the record of the hearing on A.R. 51, chaired by you on 2 October 1980, the attatched comments supplemental to my testimony. These are recommendations developed at a conference, Aerial Spraying for Gypsy Moth Control, held at Stockton State College on 11 October 1980. Several state officials as well as representatives of local municipal councils and environmental commissions were present. A full report of this meeting will be published this month; the attatched report is my own summary of what we agreed upon.

Sincerely,

William J. Cromartie, Director

Recommendations Concerning the N.J. Department of Agriculture Cooperative Gypsy Moth Suppression Program.

A summary of suggestions made at a conference, Aerial Spraying for Gypsy Moth Control, 11 October 1980, Stockton Center for Environmental Research, Pomona, N.J.

Prepared by William J. Cromartie, Director.

1. Carefully supervised spraying under the state program is preferable to poorly supervised spraying done by private contractors or homeowners, and

2. Effective public participation is essential to the cooperative program. Opportunity for public discussion prior to municipal decisions whether to participate and what material to spray would do much to avoid misunderstanding and controversy which has caused some towns to abandon the program entirely, at the price of unneccessary devastation by gypsy moths; therefore,

3. The Department of Agriculture should notify each municipality which has requested a gypsy moth survey as early as possible which areas are candidates for the spray program, what the total area needing spraying within the municipality is, and what the costs per acre to be treated are likely to be for each material, (sevin, B.T., etc.), and

4. The Department of Agriculture should modify its procedural rules to require each municipality to notify all residents of the potential spray areas, by first-class mail, that they are in an area that may qualify for aerial spraying, and that a public meeting to decide whether to spray and with what material will be held on a specified date. This can be done no later than February and possibly as early as December, if surveys have been completed.

[Under the present system residents of spray areas receive notice by mail only in May, after the critical decisions have been taken.] In addition,

5. Under the present regulations, public input at the municipal level usually occurs after the town budget has been set, making it difficult to expand participation or to change from the cheaper, but environmentally more harmful material, (sevin), to the more expensive but less harmful one, (Bacillus Thuringiensis), if the public demands it. Therefore,

6. The Department of Agriculture should find a way to eliminate the requirement that municipalities appropriate the full cost of the spray program at the time the decision is made to participate. The department and the municipalities should hold the public meetings described in (3), above, early enough to permit changes in the municipal budget for spraying. This is further reason to hold the meeting in December or January, when municipal budgets are still open to amendment.

7. The Department of Agriculture and local environmental commissions should see that a full range of information on gypsy moths, on pest control methods, and on the specific materials available is provided to town councils and citizens prior to the public meetings, and

8. The Department of Agriculture should make water-based formulations of Bacillus Thuringiensis, which do not use xylene or other suspected carcinogens as spreaders, emulsifiers or stickers, available as quickly as possible when suitable formulations come on the market.

FROM THE DESK OF... 10/29/80

DR. PHILIP M. TIERNO, JR.

39 Carter St., Norwood, N.J. 07648

TO WHOM IT MAY CONCERN:

Thank you for extending to me an invitation to participate in your conference on aerial spraying for Gypsy Moth control. I am sorry that I will be unable to attend your program. Nevertheless I wish to make a statement:

I strongly oppose the use of "Sevin" in any mass spraying program. This substance is a proven teratogenic agent and becomes carcinogenic in human stomach forming N-nitrosocarbaryl when mixed with any nitrite containing food such as bacon, baloney, frankfurters, salami and hundreds of other prepared foods. The human studies on Sevin are a laugh - they are incomplete and lack objectivity. There are so many garing omissions that one wonders how anyone except the manufacturers ($$$) of this product can be in favor of its use at all. For example, it is assumed that all normal healthy humans metabolize Sevin via the liver to 1-napthol which can be excreted in the urine. In all human studies this was the only metabolic byproduct of Sevin tested for! Why not test for other closely related compounds such as beta and alpha naphthylomines or aminoacid-beta naphthylamides (all carcinogens) or others? In addition there are many people with compromized liver function (such as geriactric and young populations, people on poor nutrional diets, people who imbile alcohol excessively, people with overt hepatitis or other liver diseases, etc.) who may not completely metabolize seven to 1-naphthol but to other products. These studies haven't been done and must be done in order to better understand the human biochemistry of this product.

When Sevin is aerially sprayed it drops not only on trees but rooftops, street pavements, autos, house and literally everything. No one ever addressed themselves to this important question: What happens when Sevin interacts with any other organic material present in the environment such as oil and acrylic paints, motor and transmission oils, asphalt, roof tiles, petroleum products, auto and truck

emissions, industrial emissions, other pesticides and herbicides, and an endless variety of other organic matter? Reactions may occur when Sevin combines with these organic materials to form new potentially dangerous compounds hitherto unknown and untested. These products along with Sevin can find their way into the water table and eventually into the human water supply.

The teratogenicity of Sevin to vertebrates has been clearly shown by Dr. Judith Weiss of Rutgers University. Are other animal forms including humans susceptible to the same type of damage? And is there any reason to think that they would not be? Of course not!

Sevin has been shown to be mutagenic to many types of bacteria. This mutagenicity can alter the bacterial antibiotic susceptibility patterns and therefore under certain antibiotics useless against the mutated bacteria. This can have a profound effect on man.

The foundation of the argument which favors the use of Sevin relies strongly on the absence of concrete evidence implicating Sevin as a toxic agent. Since the absence of evidence is not evidence of absence only more careful and complete investigations will vindicate Sevin as a potential environmental and health hazard. To date these have not been done. However the small amount of evidence that is valid only incriminates Sevin as an agent whose potential dangers far outweigh the potential benefits.

These are but a few brief "uncommon" contrary arguments against the use of Sevin. There are many, many others but space forbids elaboration.

Norwood Board of Health held a similar meeting on Sevin on May 5th, 1980 which I attended. We had representatives from Union Carbide and the Department of Agriculture at that meeting. The arguments presented by these representatives were S.O.S. (same old song) about how innocuous and safe the product Sevin is. The outcome of that meeting was that the Board of Health recommended that the borough of Norwood not spray with Sevin. Afterwards I was asked by

the Mayor's Council to present a report on the pros and cons of using BT for the borough's spray program. I did this study and recommended that BT also not be used for the reasons below:

- because more research is needed using BT under more varied experimental conditions;
- because additional earthworm studies should be performed to fully define the toxicity of BT to this organism;
- because there is evidence that the early 80's will be a "crash" or "collapse" period for the gypsy moth;
- because defoliation may actually be important and helpful in the maintenance of ecological stability of forest areas;
- because xylene is used as the solvent in most BT preparations and is tekatogenic and possibly carcinogenic;
- because most strains of BT have proteolytic and nonproteolytic enzymes which give these organisms a potential for pathogenicity;
- because there is a possibility that hypersensitivity (allergic) reactions may occur in susceptible persons;
- because the importance and position of the gypsy moth in the food web is not yet clear;
- because the potential risks (all of which may not be immediately apparent) outweighs the potential benefits intervention in any natural defoliation (especially in forested areas) is not recommended.

These represent but a few reasons for not spraying with BT. There are many others.

In attempting to alleviate any "critical" environmental condition scientists must carefully evaluate the benefit/risk ratio of all applicable methods - be they chemical or biological. Any approaches may be extremely hazardous if action is taken without a clear and acute awareness of its short and long range ecological impact. In

nature, animals and plants interact with each other and their environment in ways which are often subtle, complex and impossible to isolate. Failure to recognize the essential aspects of such relationships may eventually cause the remedy to create much more mayhem than that which was initially targeted for cure.

In conclusion the municipality of Norwood chose to spray with NOTHING and this is what I heartily recommend be done by your association. If I can be of any further assistance, please advise,

I remain,

Sincerely yours,

P.S. I would appreciate it if this letter could be read at your conference in lieu of my appearance.

Thank you

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, D.C. 20460

Mr. Philip Alampi
Secretary of Agriculture
New Jersey Department
of Agriculture
P.O. Box 1888
Trenton, New Jersey 08625

Dear Mr. Alampi:

This is a follow-up to a telephone conversation I had with William Metterhouse on September 26 concerning the upcoming New Jersey legislative hearings on the continued use of Carbaryl in the state gypsy moth control program. Unfortunately, the EPA's decision document on Carbaryl is still undergoing final editing and is not yet releasable. However, since I wrote to you on May 7, 1980, the Agency has held a public meeting on the risks of Carbaryl. I would lime to take this opportunity to summarize that meeting for you and to send you a copy of the official transcript in the hope that the information will helpful to you in the New Jersey hearings.

EPA requested that a subcommittee of the FIFRA Science Advisory Panel consider the Agency's position on carbaryl due to the large amount of public interest on that chemical. Such a public meeting was held on July 23, 1980 and it was attended by EPA scientists, Union Carbide scientists, other current researchers, and the interested public.

EPA's position in that meeting was to present available data in the areas of mutagenicity, oncogenicity, teratogenicity, viral enhancement, and exposure. Our current position on Carbaryl can be summarized as follows:

> "We believe it is useful to share with the SAP this morning our reasons for why we are not proposing to RPAR*Carbaryl. We believe that this can be an example for us to share with the SAP** on how we do draw that line between when to RPAR and when not to RPAR, when we know that the basic information base one risk is a continuum.
>
> I'd like to summarize quickly EPA's position on Carbaryl at the moment. First of all, there is very little disagreement that the usage and the benefits of Carbaryl are very, very large. On the risk side there is also very little disagreement that the available data base is

* Rebuttable Presumption Against Registration

** Science Advisory Panel

probably one of the largest that we have on any chemical. In fact, certainly on the chemicals I've seen in the EPAR process, it is the largest data base.

Historically, the first concern that was raised on Carbaryl was with the teratogenic and the fetotoxic effects, and in this area we definitely have the largest data base in terms of covering various species.

The second major concern is with mutagenicity and that also has another very large data base.

In looking at the risk data, where we come out is that the data are very equivocal. The study results have been difficult to replicate, and any informal kind of a weight of an evidence argument that we try and go through would suggest to us that first the human teratogenicity risk and mutagenicity risk from proper Carbaryl use are expected to be low, and the existence of a trigger is very uncertain because of the large amount of uncertainty in our assessment of a low risk. We believe in this case the responsible call is not to begin an RPAR.

Also, we feel that were we to go ahead with a full RPAR and do a complete risk-benefit analysis on each use of Carbaryl it is not likely that the end result of that would significantly change the use patterns. In other words, we don't think that we would get a lot of output, in terms of risk reduction, for going through an RPAR right now because of the largeness of the benefits, the lowness of the risk and the large uncertainty around the risk.

Finally, because we think the data base is so large and larger than most others, and because our assessment has been so thorough in trying to make sure we have looked at all the information, we do not believe that a lot of new information would result from an RPAR. And we suspect that what would happen is we would spend quite a large amount of time and resources going through the information that the Agency has already reviewed and spent a number of years looking at already."

The position document which we expect to issue in the very near furutre will reflect the scientific and regulatory position which EPA presented in our public meeting. Although the SAP requested that the Agency consider the appropriateness of additional label warnings, they did not disagree with the Agency's scientific

assessment of the risk data. Moreover, the SAP recommendation on labeling was not unanimous but was approved on a 3-2 vote, as shown in the meeting transcripts. I have enclosed a copy of the SAP report to EPA on Carbaryl. While the Agency will pursue the need to develop additional label restrictions, the Agency does not believe that any adverse action against the continued registration of Carbaryl is warranted at this time.

Sincerely yours,

Marcia E. Williams
Director
Special Pesticide Review Division

Enclosures

COMMENTS ON NEW JERSEY'S INVOLVEMENT IN THE USDA COOPERATIVE GYPSY MOTH SUPPRESSION AND REGULATORY PROGRAM

Submitted by Dr. William J. Cromartie, Director Center
for Environmental Research and Associate Professor of Entomology
Stockton State College

The following comments are based on a review of the 1980 Final Environmental Impact Statement by the USDA Forest Service and on presentations by Mr. ~~John~~ Kegg and Mr. ~~John~~ Koeck at the scoping session for the 1981 program held 25 September 1980 at the N. J. Health and Agriculture Building.

I agree with the choice of integrated pest management as the alternative for gypsy moth control. Integrated pest management, however, refers to a general approach, not to a specific strategy for dealing with a pest. Integrated pest management is difficult because it requires a comprehensive view of the pest's environment including social, economic, and other "human" factors as well as physical and biological ones. To view the pest in such a broad context, it is essential to avoid prejudices concerning both the organism and the system of which it is part. Moreover, one must be able to take a long-term view, even when under pressure to act immediately to relieve a nuisance.

The goal of the Cooperative Suppression Project is to effectively manage the gypsy moth while minimizing the impacts of insecticides on the environment and human health. To carry this out, the integrated control program provides financial support for aerial application of chemical and biological insecticides, management of parasite and predator populations, application of mating disrupting pheromones and homeowner self-help and forest stand manipulation. This is commendable, but it should be pointed out that is also the only approach that is reasonable, given our present understanding of pest control. The important question is whether the programs developed by the state of New Jersey to implement this approach represent the best integrated pest management scheme that can be developed for the gypsy moth, given current knowledge and available materials. I shall consider the plans of the two state departments, Agriculture and Environmental Protection, separately.

Department of Agriculture Gypsy Moth Program

According to the Environmental Impact Statement filed in 1980, the Agriculture Department's program is primarily concerned with helping owners of small woodlots cope with the gypsy moth and with protecting forested recreation areas, residential areas and high value timber stands from defoliation leading to mortality and lost growth. The principal objective to implement this goal is to reduce high larval populations by 85% and keep defoliation levels under 30%. The main control strategies are 1) primary reliance on predators and parasites to keep populations at low levels and 2) aerial

application of pesticides (Sevin or Bacillus thuringiensis) to control high populations. Aerial application is carried out on a few tens of thousands of acres, under a priority system which takes into account the value of the forest to be treated and the past and probable future history of defoliation. Forested residential areas receive top priority.

This two-pronged approach, reliance on predators to keep low level populations down and aerial spraying to control high populations, represents a very crude strategy of integrated control, still heavily reliant on pesticides. Except that less toxic, less persistent materials are used and areas to be treated are chosen somewhat carefully, little has changed from the early 1960's, back before integrated pest management was the accepted method.

Several components of a broad-based integrated control strategy are missing, at least so far as can be seen from the plan described in the environmental impact statement, and the presentations given by the state officials at the scoping session on 25 September:

1) Despite the federal program specifically including it, there is no provision for use of pheromone to disrupt mating. This can be an effective method to hold low density populations in check, and might also be used following aerial spraying to prevent rebound of the population. The treatment seems cost effective, and could be part of a program of self-help for owners of small properties.

2) Other forms of homeowner self-help are neglected as well. Burlap bands, sticky traps, and various methods of destroying egg masses should be more widely encouraged, or better yet, required in treated areas.

3) Stand manipulation needs to be explicitly encouraged, so that homeowners and small park and woodlot managers will utilize non-preferred trees, rather than susceptible hosts.

These three elements should be implemented as part of the public participation program.

More effort should be made to reduce the impact of defoliation on valuable trees through improved forestry and horticulture practices. As the U. S. Department of Agriculture pamphlet "The Homeowner and the Gypsy Moth", notes, maintaining good growth conditions for trees can reduce both the likelyhood of defoliation and the impact of the stress which results from it. Many shade trees are in poor condition to begin with, and so are more apt to die if attacked by gypsy moths. Programs to encourage better care of trees should be part of the overall control plan, and research should be conducted on specific ways homeowners can help their trees recover from defoliation once it has occurred.

The objectives of the program need to be reconsidered to determine whether the target percentages for larval control and foliage

protection are correct. Is such a high degree of control (85% larval control, 30% defoliation)[a] reasonable objective? No data are given to support these numbers. My guess is that the reason for these targets is more nuisance abatement than protection of trees, which could be achieved with more modest levels of control. Nuisance abatement is not a stated goal in the environmental impact assessment prepared by the state, although the federal portion does discuss it [it is one thing that Sevin does better than any other control method]. The importance of nuisance abatement needs to be clarified. I am of the opinion that in the long run the public interest is better served by learning to accept the occasional presence of fairly large numbers of gypsy moth larvae. The key goal should be to prevent excessive tree mortality. Entomophobia (fear of insects) is deeply entrenched in our society, but I do not think its effects constitute enough of a harm to health and welfare to justify drastic control measures.

The extent to which aerial spraying, and indeed any other artificial control measures are used should be limited to what can be demonstrated to be necessary to prevent excessive losses (i.e., some predetermined percentage excess over natural mortality of valuable shade and woodlot trees). In woodlots used to produce fuel, allowance should be made for some gypsy moth killed trees as part of the expected harvest; woodlots need not be as strenuously protected as shade trees. The calculated levels of protection need to be based on studies in each different forest region of the state. Data from North Jersey are currently being used to justify programs in South Jersey. This is scientifically unacceptable. Data from forests should be applied only to similar forests, not to suburban areas.

Every effort should be made to set levels of acceptable control that minimize the use of artificial controls, especially pesticides. In the short run, this will insure minimum impact on beneficial insects, including natural enemies of the gypsy moth. In the long run, it will help delay the inevitable appearance of resistance to the artificial controls employed. Moreover, it may prevent the emergence of secondary pests, a phenomenon all too familiar in crop protection programs that rely heavily on pesticides, particularly broad-spectrum types. Finally, concern for public health dictates that we minimize people's exposure to toxic materials, even in minute doses. I do not believe anything that will kill a caterpillar by poisoning can be unequivocally stated to be safe for humans.

Reducing the current reliance on pesticides to suppress high populations may also help break down the current animosity between the officials responsible for the program and certain segments of the public. At present, public participation in the program is hampered by the climate of mutual suspicion and intolerance. Of course, no program can hope to satisfy both those people who think the only good insect is a dead insect and those people who want no chemicals of any sort introduced into their surroundings. Still, a fresh analysis and review of the problem could help at least some

people on both sides of the spraying question to come to a consensus on the most acceptable way to deal with the gypsy moth.

Bureau of Forest Management Program

Many of my comments on the Agriculture Department's program apply here. This program's target figures for 1980 were even more stringent: 95-99% larval control and 90% foliage protection. Do these levels really reflect the long term damage gypsy moths do to forests, or is this an unnecessary attempt aimed at nuisance abatement? Estimates of economic damage to forests need to be expressed more realistically in terms of loss of expected revenues based on actual management and harvest plans. Mortality should be expressed in terms of losses in excess of natural mortality in the long run, not for single years. The noted entomologist Dr. Vincent Dethier, in his book Man's Plague, cites evidence that over the long run, gypsy moth damage does not cause more than a small percentage increase in mortality, because the moths tend to kill trees that would probably have died within a few years in any case. Careful analyses of mortality patterns in a variety of stands on different sites are needed to determine the amount of gypsy moth loss that can be tolerated within the context of predetermined goals for timber and fuel yield. Again I repeat my view that nuisance effects alone do not justify spraying.

I believe that the supposed loss of recreation value and tourist revenue needs to be more carefully evaluated. What is the actual duration of the period during an outbreak when a site is unacceptable for various uses? Can alternate sites be used during high population levels?

Finally, I would suggest that the impact on non-target organisms may be too lightly dismissed. New England has suffered a serious decline, and even local extinction, of many of its native large moths and other attractive and useful insects. At Stockton's Symposium on Endangered and Threatened Plants and Animals of New Jersey in 1979, Dr. Dale Schweitzer, a lepidopterist from Yale University, and other entomologists familiar with our state indicated that similar declines may be occurring here. Insects are accorded no protection by the non-game and endangered species laws of New Jersey, so they are often neglected in environmental assessments. The loss is nonetheless serious, and the impact of gypsy moth controls on these members of our natural heritage needs to be evaluated.

STOCKTON STATE COLLEGE
POMONA, NEW JERSEY 08240 (609) 652-1776

OCT. 14 RECD

Assemblywoman Barbara McConnell
New Jersey state Assembly
State Capitol Building
Trenton, N.J.
08625

October 8, 1980

Dear Assemblywoman McConnell:

Enclosed please find a copy of the statement that I read before you last Thursday. This may be included in the final report. If there is any other information you need from me or if there is any way I might assist you in this matter, do not hesitate to contact me.

Sincerely,

Michael D. Geller

Dr. Michael D. Geller
Assistant Professor of Ecology

STOCKTON STATE COLLEGE
POMONA, NEW JERSEY 08240 (609) 652-1776

FACULTY OF NATURAL SCIENCES AND MATHEMATICS

October 7, 1980

Ladies and Gentlemen:

I appreciate the opportunity to comment on the State of New Jersey's plan to surpress the gypsy moth (Porthetria dispar) in selected areas of the state. It can be stated without fear of contradiction that we share a common goal in that we are all concerned about the actual and potential loss of forest resources. Similarly, we share common concerns that any method of protection is consistant with human and environmental health. Beyond these common grounds, many of us part company for we cannot agree 1) on how our resources may be best protected and 2) on what methods of protection are most consistant with environmental and human health.

Let me briefly review the implications of one alternative available for controlling the gypsy moth. This alternative is the application of chemical insecticides in this case Sevin (carbaryl). Broadly speaking, this technique for controlling insect pests has a remarkable list of credits especially in controlling insects that transmit human diseases. However, the widespread use of chemical toxins has fallen from grace for the following reasons:

1. Many of the toxins, which were first used, persisted in the environment causing adverse effects on plants, wildlife, and people.
2. A large number of pests have developed resistance or immunity to toxins while benign or helpful organisms have continued to be susceptible. This has necessitated the development of newer, often more powerful toxins.
3. The breakdown products and chemical wastes generated by a number of companies engaged in the manufacture of these and similar materials have been improperly disposed of, creating an understandable chemophobia on the part of the populace.

Rightly or wrongly, this chemophobia has created in some people a certain reluctance to tolerate the widespread use of chemicals in the environment.

I must admit to a certain chemophobia myself. None of us is completely objective before this issue. If you are looking for my bias, this is it. However, I sympathize with those in the audience who have the task of dealing with the gypsy moth problem. I do not envy your dilemma. While reading the Environmental Impact Statement (EIS) and related documents, I found myself wondering what solutions I would espouse if I had to deal with the pressures of being trapped between the gypsy moth and various interest groups. Nevertheless, this is how I see the problem.

We are in this difficulty because we are dealing with an imported pest. In the jargon of ecology, "an exotic species". Imported organisms usually have one of two fates: 1) They cannot adapt to a strange environment and they die. Unfortunately, this has been the case for many species imported to control the gypsy moth. 2) They find the new environment lacking the natural controls of their native habitat, having more food, and having less competition. In this case, they survive often too well, and unfortunately, this has been the case for the gypsy moth.

Given this problem of exotic pests, what are the solutions? One approach, which seems appropriate, is to kill the offending organisms. The wisdom of this approach is more illusory than real because in the long run this rarely works in practice. By the time populations have become established, reproductive rates are too high, the organisms are too hard to find and destroy, and the environmental costs are too great for this to be a viable strategy.

At best, the pest is only temporarily reduced in numbers. Pests reinvade from outside the controlled area, and the population increases often with more devasting results than if the population had not been temporarily reduced.

It is axiomatic in ecology that the most effective way to manage a population of organisms is to manage the environment in which the organism is found. This means reducing the food supply, changing the cover, or decreasing the availability of nest sites so that the environment will not support as high a population of pests. This does not appear to be a serious strategy for managing the gypsy moth because it would be impossible to substantially alter the forests of New Jersey without doing more ecological harm than occurs with the aerial spraying of carbaryl or some similar toxin. In fact, the gypsy moth is altering its own environment by selecting against those species that provide food while selecting for species that are less palatable. In other words, the high mortality in oak trees may do more in the long run to control population peaks of the gypsy moth than any management technique we might dream up. By spraying state parks, residential areas, and other areas with chemical or biological toxins, we may be doing nothing more than creating islands of prime habitat for the gypsy moth, thus postponing the return to conditions resembling equilibrium. Realistically, this "bite the bullet" approach of not heating the area with insecticide has political drawbacks,to put it mildly.

Chemical control to suppress the gypsy moth has the advantages of having at least a 90% "knockdown" of caterpillar within a short time after treatment, thus affording maximum visable impact and maximum protection of foliage compared to other methods. It has the additional advantage of being easy to apply for, unlike the biological insecticides, the application of carbaryl need not be timed to a specific, vulnerable portion of the insect's life cycle. Carbaryl is toxic throughout the life cycle of the gypsy moth. Unfortunately, it is also toxic to other organisms, and this provides a substancial concern to those of us who would like to see aerial spraying of chemical insecticides reconsidered.

The Environmental Impact Statement (EIS) is disturbingly vague about the acute and chronic effects of carbaryl and other chemical insecticides on many nontarget organisms. For example, the EIS states that carbaryl will produce only a "temporary" reduction in populations of beneficial insects. This analysis is based on the information contained in one letter and one scientific paper, which focused on the gypsy moth, the elm spanworm, and "related species". The gypsy moth and the elm spanworm are hardly beneficial species. Carbaryl can decrease populations of insects and other organisms that may act to moderate irruptions of the gypsy moth. It also has a profound effect on wild populations of bees and other insects, and since these species are important pollinators of many species of flowering plants, the long-term use of this insecticide may have important ecological ramifications on plants.

Similarly, the EIS dismisses the effects of carbaryl of populations of birds even though Table Six in that document shows that carbaryl causes birds to leave their territory temporarily. Since carbaryl typically is used in May in New Jersey, any bird that leaves its territory would be leaving its young. The effects of this are not mentioned in the report, and are not likely to be temporary. Instead, the report cites a paper by Barrett (1968) to support the notion that carbaryl has a minimal effect on bird populations. Barrett had only periferal references to birds in his paper. What he did show was that spraying carbaryl at 2 pounds per acre suppressed reproduction in populations of small mammals. In New Jersey, many species of small mammals are predators of gypsy moths.

The long term, repeated use of carbaryl and its effects on populations of vertebrates, insects, and plants is at best poorly understood. Furthermore, the Environment Impact Statement for 1980 does not speak to these issues in an adequate manner, although it does admit that the use of chemical insecticides has the greatest environmental harm. Given the importance and the desirability of biological controls, given the necessity of repeated use of carbaryl, and given the uncertainty surrounding the long-term effects of this use, I cannot recommend the use of carbaryl for the control of the gypsy moth at this time.

Respectfully,

Michael D Geller

Dr. Michael D. Geller
Assistant Professor of Ecology

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243 Intervale Road
Mountain Lakes, N. J. 07046
October 8, 1980

New Jersey State Assembly
Agricultural and Environmental Committee
c/o Norm Miller
Room 302
State House
Trenton, N. J. 08625

Sirs:

We have seen various newspaper articles concerning your hearings on the use of pesticides. We understand that you are still taking testimony about this serious matter. We have a story to tell which we would like included in your transcript.

It happened this past spring at the "proper time" for spraying, be it Sevin or B. T., for the gypsy moth. The day that we were sprayed in Parsippany-Troy Hills Township (despite our mailing address, we are residents of PTH), we were not notified; this section of town was not scheduled to be sprayed, we were not affected by the gypsy moth. But we were sprayed not only by the Tamke Tree Contractors sub-contractor for Parsippany-Troy Hills, but also by the sprayer for Mountain Lakes!

My husband was leaving for work; he had crossed our large yard to get his car which was about 40 feet from our house in the carport. While walking to the car, the helicopter came over our property, very close to the ground (see attached photo), and buzzed him with spray. He got into the car and drove it over to the house and then ran into the bathroom. He had been doused with something; his eyes were burning as well as his skin. He washed himself thoroughly, so he thought. He left the house for a twenty-five mile drive to work. By the time he got there, he could hardly see. He douched his eyes many times over and also got out of his clothes in order to wash them. Fortunately, he had other clothes to change into. This incident was certainly an invasion of privacy!!! We reported the spraying to our local township officials, much to their chagrin. We did not need to be sprayed; we had no infestation of the moths nor the egg masses. A few we had found on our property we had destroyed by hand. But after the helicopters left, we found caterpillars all over the place, evidently from the helicopter's kindness in creating downdraft which carried the caterpillars, tiny as they were, from somewhere else, to our place.

We resent being told we had to do something that we knew in our gut was not safe. There was no need to go the route that both Parsippany-Troy Hills and Mountain Lakes went. We are creating a monstrous situation by pesticide spraying. How right Rachel Carson was, how perceptive, how courageous!

more

Our feeling is that there are other alternative ways that society can go; the time is ripe to go those routes. We can't wait any longer for a safe formula of pesticide for whatever insect--be it the boll weevil, the tobacco leaf worm or the gypsy moth. There are natural ways to go that in the long run will make life safer for all of us. We have been inundated with "chemicals," we don't have to cite chapter and verse; you should know the story all too well by this time.

We urge you to reset your priorities, to have a safe conservation ethic, for a better life for all of us in the State of New Jersey, and in the nation.

Your interest is appreciated and we, in turn, will watch and listen with interest what your decisions in this important matter will be.

Yours very truly,

Stanley and Muriel Berson

attach.

Assembly for Agriculture & Environmental Commission
c/o Norm Miller
Room 302, State House
Trenton, NJ 08625

Dear Sir:

Relative to the resolution for investigating the use of Carbaryl Insecticides, I wish to protest the use of these programs and strongly urge the Committee to discontinue and forbid the use of any such chemicals in a State sponsored program.

There still has been no study to guarantee that use of such Insecticides has no impact on birth defects, nor the environment.

Please, please urge the Committee members to help protect those of us who feel strongly against using anything other than pure and natural controls, as they can work without having to stronger and stronger chemical mixtures every few years.

Thank you.

Ardis J. Browne

(Mrs.) Ardis J. Browne
94 Rogers Drive
Landing, NJ 07850

October 8, 1980

STATE OF NEW JERSEY
Executive Department

SENATE BILL NO. 1309

To the Senate: June 30, 1980

Pursuant to Article V, Section 1, Paragraph 15 of the Constitution, I am appending to Senate Bill No. 1309 at the time of signing it, this statement of the items, or parts thereof, to which I object so that each item, or part thereof, so objected to shall not take effect.

"DIRECT STATE SERVICES"
"EXECUTIVE BRANCH"
"DEPARTMENT OF AGRICULTURE"

On Page 11: Line 3, "03-3330. Resource Development Services....$ 836,754."
This item is reduced to $ 723,707.

On Page 11: Lines 4-5, "Total Appropriation, Natural Resource Management..... $ 2,599,757."
This item is reduced to $ 2,486,710.

On Page 11: Line 7, "Salaries and wages.....($ 1,802,741)"
This item is reduced to $ 1,757,011.

CF. P. 11

On Page 12: Line 9a, "New positions (18).....($ 67,317)"
This item is deleted in its entirety.

On Page 12: Lines 23-25, "No funds provided hereinabove for Gypsy Moth Control shall be used for spraying using the chemical SEVIN."
The quoted language is deleted in its entirety.

On Page 14: Lines 18-19, "Total Appropriation, Department of Agriculture.....$ 5,068,647."
This item is reduced to $ 4,955,600.

"DEPARTMENT OF CIVIL SERVICE"

On Pages 15-16: Lines 37-48, "The Director of the Division of Budget and Accounting shall establish a Residential Property Management Revolving Fund in the Department of Civil Service to which the receipts for rent and other charges as determined by the Department of Civil Service shall be transferred or credited by the Director of Budget and Accounting. A sum not less than $925,000 shall be transferred from the Residential Property Management Revolving Fund to the General State Fund. A sum not to exceed $75,000 is appropriated from the fund for administrative costs."
The quoted language is deleted in its entirety.

"DEPARTMENT OF COMMUNITY AFFAIRS"

On Page 16: Line "03-8040, State and Regional Planning.....$ 2,194,282."
This item is reduced to $ 2,159,282.

On Page 16: Lines 6-7 "Total Appropriation, Community Development Management.....$ 8,414,517."
This item is reduced to $ 8,379,517.

On Page 16: Lines 24a-24b "Hackensack Meadowlands Municipal Committee.....($ 50,000)"
This item is reduced to $ 15,000.

The sum of $100,000 is vetoed from the appropriation [illegible] Commission. It was added to perform a study related to federal funding and to comply with the requirement of Senate Bill No. 1164. Such monies, if necessary, should be considerably less and included in the enabling legislation.

Funds in the amount of $175,000 for "Expansion Grants" for vocational Rehabilitation, $98,000 to expand the geographical operations of the Public Advocate, and $75,000 to expand coverage of public affairs events by the Public Broadcasting Authority are vetoed either because of their low priority within the agency's responsibilities or because existing resources are sufficient to perform the function adequately.

I have vetoed $1,100,000 in Educational State Aid for pilot projects for the pre-school handicapped. Considerable federal funds are available for handicapped projects and any expansions of state funds should be the subject of enabling legislation.

I have vetoed $250,000 from the Revolving Housing Demonstration and Grant Fund. Fund balances, expected to approximate $2 million, are more than sufficient for demonstration programs in fiscal year 1981.

Other items in the State Aid section totaling $490,000 are vetoed but none of the items impact upon local government budgets. They relate to non-profit agencies or other non-taxing jurisdictions. For example, $50,000 is vetoed from the Economic Opportunity Program, leaving $800,000 available; $25,000 is vetoed from the Special Olympics, leaving a total of $100,000; and $150,000 for Cultural Development for Ethnic Groups.

I have deleted language which would require or prohibit the construction of certain portions of highways. The Department of Transportation is in a better position to determine the priority of its highway construction projects.

I have deleted language which bans the use of SEVIN to control Gypsy Moths. This is a complex, environmental health issue and should be resolved in a deliberative hearing process, not the appropriation process.

I have also deleted language which requires that certain grantees receive specific sums of money or special consideration. Such agencies should compete with others for availa state resources.

Likewise, I have deleted language where I believe substantive legislation is preferred where the issues should be dealt with in the context of the specific regulatory power (the executive agency.

Finally, I have deleted language imposing "legislative oversight" of the actions of an executive agency. The requirement of such approval infringes on my constitutional dut to exercise the executive power of State government (Article V, Section 1, Paragraph 1).

I have left untouched a $750,000 item of appropriation for a Capitol Trade and Civic Center in Trenton. This is done, however, on the condition that other elements of th financing plan be obtained from other sources before the funds are disbursed. The Ma has acted vigorously for this project which could be an interesting concept and furth contribute to the continued revitalization of Trenton; but the State should only be o participant in the financing of the Center, and financing from municipal, county, and other sources must also be obtained.

I have let stand the $1.5 million appropriation added by the Joint Appropriations Committee for space planning, historical restoration, and renovations to the State H and State House Annex; however, more detailed planning must precede the expenditure c the funds.

I have determined to let stand the language concerning the appropriation to the Jers City Medical Center as a one time payment without regard to the provisions of the Pu General Hospital Assistance Act, P.L. 1977, c.289 the same to be applied for prior d

Highlands WATERSHED ASSOCIATION

P.O. Box 4
Newfoundland, N.J. 07435

October 12, 1980

Assembly Agriculture and Environment Committee
C/o Norm Miller
Room 302
State House
Trenton, N.J. 08625

Enclosed is the statement we presented to the U.S.D.A. gypsy moth scoping session on September 25, 1980. In that statement we endorsed the use of Integrated Pest Management to deal with the gypsy moth problem. However, there seems to be some confusion about the definition of IPM. We have used the definition given by Dr. Samuel Epstein in the "Politics of Cancer" as a general description. "...integrated use of biological control, pest-resistant crop varieties, crop rotation, insect predators, insect hormones, viruses, and sterilizing agents, either alone or in combination with minimal application of highly selective, "narrow spectrum" pesticides." This of course precludes the use of carbaryl(wide spectrum) and limits the use of any pesticides to minimal applications.

As noted in our position paper we attempted to obtain all of the information available on carbaryl and the gypsy moth supression program. We recieved cooperation from all but the state agencies involved in implementing the program. The Departments of Health, Environmental Protection, and Agriculture all refused to send a representative or statement to our non-partisan, public fact finding forum. (At that time we had taken no position on the use of Sevin or the gypsy moth suppression program). This we discovered to be not an isolated problem, but rather was symptomatic of the entire administration of the suppression program. During the months preceding this years' spray program, increasing public concern about the safety of Sevin and BT was voiced. Rather than answer the public's concerns we found government agencies stonewalling or giving conflicting information. The town council in West Milford indicated that switching from Sevin to BT would require an emergency appropriation of $17,000 costing a total of $23,660. The Department of Agriculture indicated this was not true. The cost would be $6760, only $560 more than Sevin. There was no delineation of citizens rights. Oakland allowed the use of balloons to indicate houses where people did not want to be sprayed. Bloomingdale accepted neighborhood petitions to stop spraying in those areas. West Milford denied that balloons were possible (calling it a joke) and refused to acknowledge an 860 name petition opposing the use of Sevin. When West Milford officials were finally convinced that spraying while

children were outside waiting for school buses was not in the publics' best interest the state and town could not work out a plan to spray at other times. (A complete description of the problems on the day of spraying is contained in the enclosed newspaper article). These examples are all from West Milford because I can give an accurate, first-hand account. However, the problems and misinformation were not limited to this township. They were encountered statewide.

We have also noted the publics' opposition to being sprayed without their permission. Many people question the safety of carbaryl and BT and do not understand the abrogation of private property rights through aerial spraying of these pesticides.

Another problem with aerial spraying is the drift of sprayed pesticides. The Department of Agricultures' 50' buffer zones hardly account for spray drift. A 1975 study for the E.P.A. (Contract No. 68-01-2608, MRI Project No. 3949-c) found a 10-60% chance of aerial sprayed pesticide traveling more than 1,000' from the target. This is a problem in both government and private spraying. This very problem was encountered in the Crescent Park section of West Milford. Without warning the residents found themselves being sprayed with Sevin from a privately contracted plane in the process of spraying an adjacent property. There are not adequate regulations covering aerial or ground spray operations.

Although we have found many problems with the gypsy moth suppression program we would like to emphasize our support for the natural predator and biological control programs of the Department of Agriculture. We would like to see those programs expanded. We also think it's time to recognize the need for a forest management program to deal effectively with this and other forest problems.

Sincerely,

Paul Twerdowsky

Paul Twerdowsky
Highlands Watershed Association

Highlands WATERSHED ASSOCIATION

P.O. Box 4
Newfoundland, New Jersey 07435

September 25, 1980

Position Paper: Gypsy Moth Problem

The Highlands Watershed Association is a non-profit, non-political group established to study the drainage basin of the Pequannock and Wanaque watersheds. It derives its membership and support from the thirteen towns located in these watersheds. Included are the towns of Ringwood, West Milford, Vernon, Jefferson, Bloomingdale, Butler, Hareyston, Kinnelon, Riverdale, Rockaway, Wanaque, Village of Greenwood Lake, and Warwick.

We have made extensive studies of the gypsy moth problem. Also, in an effort to give all sides of the controversy a fair public hearing, we held a forum on this topic on June 19, 1980. The participants were Dr. Quattlebaum from Union Carbide (manufacturer of Sevin), William Winbrow from Health-Chem Corp. (manufacturer of gypsy moth sex-attractant traps), Richard Schneider from Landoz, Inc. (manufacturer of Bacillus Thuringiensis), Lorraine Caruso (President of the Association of New Jersey Environmental Commissions), Joan Ehrenfeld (Assistant Research Professor of Ecology at Rutgers University), Paul Twerdowsky (citizen spokesman), and Charles Zaforte (Passaic County Assistant Agricultural Agent). There were also letters read into the record from Marcia Williams (Director, E.P.A. Special Pesticide Review Division, and Dr. Philip Tierno (bio-chemist at New York University Medical Center). Invited, but choosing not to participate or attend were the N.J. Department of Agriculture, the N.J. Department of Health, and the N.J. Department of Environmental Protection. In attendance were officials from ten watershed towns as well as citizens from fifteen towns. As a result of our own research and the information presented at the forum we have concluded that Integrated Pest Management (IPM) is the most effective and safest method of dealing with the gypsy moth problem.

Serious questions have been raised about the health and environmental problems associated with the use of Sevin (carbaryl). Its long-term effectiveness in controlling the gypsy moth population is also questionable. There is even some evidence that prolonged use of Sevin may increase and/or spread the moth population. We have also noted the widespread public opposition to aerial spraying of pesticides; including both Sevin and D.T. Last year in a period of just one month public opposition built to the point of forcing

Highlands WATERSHED ASSOCIATION

some towns to stop all aerial spraying. This year with a better informed public and more than seven months organizing time it is likely that many more towns will choose not to enroll in a cooperative control program that includes aerial spraying of pesticides.

In light of these facts and in an effort to deal effectively with the gypsy moth problem we urge you to adopt an Integrated Pest Management program.

Paul Twerdowsky

Paul Twerdowsky
Highlands Watershed
Association

STATE OF CONNECTICUT
DEPARTMENT OF ENVIRONMENTAL PROTECTION
STATE OFFICE BUILDING HARTFORD, CONNECTICUT 06115

Section 22a-54-1. Application of pesticides from the air.

No permit for the application of broad spectrum chemical pesticides from the air for non-agricultural purposes shall be issued by the commissioner of the department of environmental protection.

Permits for agricultural purposes, such as, but not limited to, those activities set forth in the definitions of "agriculture" and "farming" in section 1-1 of the general statutes, shall be issued by the commissioner of the department of environmental protection only after the applicant has produced evidence satisfactory to the commissioner that the proposed material and its method of application shall not be injurious to the public health, aquatic and animal life, including pollinating insects, or property not owned or leased by the applicant or those on whose behalf the application is made.

Section 22a-66-7. Aircraft Application. (New)

(a) Application for a permit to apply pesticides or fertilizers from the air shall be made on forms furnished by the commissioner and the applicant shall furnish all information required by the commissioner.

(b) No pesticide may be applied from the air to a tract of land less than 10 acres in size unless the tract of land to be treated is part of a larger parcel of land that is at least 10 acres in size. All aerial applications must have the prior inspection and approval required by Section 22a-54(e) of the General Statutes.

(c) No pesticidal dust may be applied within 100 feet of a public highway.

(d) A written release is necessary from any landowner or resident whose property is under the spray pattern of the airplane application or subject to drift from an aerial application. The area subject to drift will be considered to be a minimum from the flight path of the plane of 200 feet (helicopter) or 300 feet (fixed wing aircraft).

(e) No pesticide shall be applied from the air for agricultural purposes within 200 feet of a watercourse, pond or lake.

(f) Congested areas shall be considered those areas zoned ½ acre or less, or municipally or privately owned public parks, public playgrounds, and public swimming areas.

NO. 5

Revised December, 1978
Replaces F-44681

UNION CARBIDE

SEVIN®

CARBARYL INSECTICIDE

SPRAYABLE

Active Ingredient: Carbaryl (1-naphthyl methylcarbamate)	80% by wt.
Inert Ingredients:	20% by wt.

E.P.A. Reg. No. 264-316

CAUTION: KEEP OUT OF REACH OF CHILDREN.

HARMFUL IF INHALED OR SWALLOWED. Avoid Breathing of Dust or Spray. Do Not Take Internally. Avoid Contact with Skin and Eyes.
Wear regular long-sleeved work clothing. Change to clean clothing daily. Wash hands and face before eating. Wash thoroughly after handling.

NOTE FOR PHYSICIAN: Carbaryl is a moderate, reversible, cholinesterase inhibitor. Atropine is antidotal. Do Not Use 2-PAM, opiates, or cholinesterase inhibiting drugs.

AVOID CONTAMINATION OF FOOD, FEED, WATER SUPPLIES, STREAMS AND PONDS DURING APPLICATION OR WHEN CLEANING EQUIPMENT.

WARRANTY

1. The manufacturer guarantees and warrants (a) that the active ingredient content and the total net weight are as stated within lawful limits and (b) that the directions, warnings and other statements on this label are based upon responsible experts' evaluation of reasonable tests of (1) effectiveness, (2) toxicity to laboratory animals and to plants, and (3) residues on food crops, and upon reports of field experience. Tests have not been made on all varieties or in all states.

2. The manufacturer further warrants that the material herein is reasonably fit for use under normal conditions as directed herein. The manufacturer neither makes nor authorizes any agent or representative to make any other warranties of FITNESS OR OF MERCHANTABILITY, guarantee or representation, express or implied, concerning this material. This product is sold only on the basis that buyer assumes all risks of use or handling which result in loss or damage and which are beyond manufacturer's control. No claim of any kind, and whether or not based on negligence, shall be greater in amount than the purchase price of the material in respect of which such claim is made. In no event shall manufacturer or seller be liable for special, indirect or consequential damages resulting from the use or handling of this material.

3. No modification of this warranty and disclaimer is authorized, except by specific reference to them in writing by an employee of the manufacturer.

UNION CARBIDE AGRICULTURAL PRODUCTS COMPANY, INC.
7825 BAYMEADOWS WAY, JACKSONVILLE, FLORIDA 32216

F-47036
UCC-0500909
Made in U.S.A.

ayable is a dry powder for dispersion in water and application as an insecticidal spray in hydraulic sprayers, mist blowers, low gallonage ground equipment aft. READ GENERAL DIRECTIONS AND CAUTIONS ON FRONT AND BACK OF BAG. READ SPECIFIC DIRECTIONS FOR INDIVIDUAL CROPS ON BACK OR SIDE. USE IN ACCORDANCE WITH LABEL DIRECTIONS AND CAUTIONS.

CIAL DIRECTIONS FOR PREPARING LOW GALLONAGE ... RAYS

...w-gallonage ground equipment: Use 50 mesh or coarser screen in entire system. Nozzles ...uld be cone type, number 3 or larger. Use clean equipment. Put abt. ¼ of the required water ...ume in the spray tank. Close off booms, start pump and maintain moderate by-pass agitation ...hile slowly adding the proper amount of SEVIN Sprayable. Add remaining water and continue to ...ecirculate until suspension is uniform, then apply using at least 3 gallons per acre of the prepared spray. After spraying, flush tank and lines with clear water.

For aircraft application: For preparing spray in mixing or storage tank, follow above directions. To maintain uniform suspension, recirculate at intervals and before pumping into aircraft tank. For best results, use clean equipment and apply at least 1 gallon per acre of the prepared spray. After spraying, flush tanks and lines with clear water.

Combination spray mixtures in low-gallonage equipment and aircraft: Physical compatibility of SEVIN Sprayable with other pesticides in low-gallonage mixtures is not fully known. Before preparing large amounts, combinations should be tested by fully dispersing SEVIN Sprayable, then adding the other pesticide and the remaining portion of water. DO NOT USE MIXTURES THAT CURDLE OR PRECIPITATE. Incompatibility will reduce insect control and may cause mechanical difficulties or plant injury. Use caution when applying concentrate spray mixtures. Under adverse growing conditions, combinations of SEVIN with some phosphate pesticides may cause foliar injury.

COMPATIBILITY

1. SEVIN Sprayable has been effectively used without plant injury with most common insecticides, miticides, fungicides, nutrients, adjuvants and with petroleum oil as used on citrus.
2. Compatibility can be affected by water in your locality, various surfactants and other formulation ingredients. Possible plant injury may occur under adverse conditions such as high humidity, drought, improper fertilization, etc.
3. Do not mix SEVIN Sprayable with nutrients, adjuvants and other pesticides unless your experience indicates that the mixture is effective and will not result in plant injury. If uncertain, prepare a small amount of the mixture and test on a representative portion of the crop.
4. Unstable under highly alkaline conditions. Not effective if used with alkaline materials such as Bordeaux, lime, lime sulfur and casein lime spreaders.

GENERAL CAUTION

1. To avoid possible injury on **tender foliage,** do not apply when foliage is wet or when rain or excessive humidity is expected during the next 2 days.
2. Does not control **spider mites** but is compatible with most common miticides.

BEE CAUTION
MAY KILL HONEYBEES IN SUBSTANTIAL NUMBERS

This product is Highly Toxic to Bees Exposed to Direct Treatment or Residues on Crops. Protective Information May Be Obtained from Your Cooperative Agricultural Extension Service.

Do Not Use When Value of Bees as Pollinators is More Important than Insect Control. Before Applying, Warn Beekeepers to Locate Hives Beyond Bee Flight Range Until 1 Week After Application or to Take Other Equally Effective Precautions.

IMPORTANT PRE-HARVEST AND GRAZING USE INFORMATION AND LIMITATIONS

Tolerances established under the Federal Food, Drug and Cosmetic Act permit the sale of crops bearing probable SEVIN residues when SEVIN is used in accordance with label directions. Pre-harvest and grazing use limitations are listed at the end of the directions for each crop use. **Where no pre-harvest or grazing time limitations are stated, application can be made to the day of harvest and crops can be grazed without time delay if directions for use on the crop are followed.**

If SEVIN Insecticide is used in accordance with label directions, forage and feed crops, including almond hulls, bean vines, carrot tops, citrus pulp, cotton forage, cowpea hay, peanut hay, pea vines, rice straw, soybean hay and sugar beet tops, may be grazed or harvested for use as feed for dairy and meat animals without resulting in residues in milk or meat.

DIRECTIONS FOR USE

IMPORTANT: The directions on this label are based on tests and field experience relating to (a) effectiveness; and (b) possible injury to plants and animals; and (c) residues in food, feed, meat and milk. Follow directions for most effective use.

FORAGE, FIELD AND VEGETABLE CROP INSECT CONTROL

Recommended dosages refer to pounds of SEVIN Sprayable per acre. Where a dosage range is indicated, use lower rate on young plants, higher rate on mature plants. Use sufficient spray gallonage to obtain full coverage. This will usually vary from 3 to 40 gallons per acre depending on equipment, degree of insect infestation, and stage of crop growth. Keep spray mixtures well agitated. Apply when insects or their damage appear and repeat at 7 to 14 day intervals or as necessary unless shorter intervals are specified below. See specific directions below for grasshopper control.

ALFALFA AND CLOVERS
Use ⅔ to 1¼ pounds for blister beetles and Mexican bean beetle.
Use 1¼ pounds for alfalfa caterpillar, bean leaf beetle, cucumber beetles, green cloverworm, Japanese beetle, leafhoppers, threecornered alfalfa hopper, thrips and velvetbean caterpillar.
Use 1¼ to 1⅞ pounds for armyworm, corn earworm, stink bugs and webworms.
Use 1¼ pounds (Western United States) and 2 pounds (Eastern United States) for control of alfalfa weevil larvae in the spring. If pre-treatment damage is extensive, cut the alfalfa and make the application to the stubble.
Use 1⅞ pounds for cutworm control. On clovers in Texas use 2 pounds for clover head weevil.
To avoid possible injury on tender foliage, do not apply when foliage is wet or when rain or excessive humidity is expected during the next 2 days.

ASPARAGUS
Use 1¼ to 2½ pounds for asparagus beetle on seedlings or spears.
Use 2½ to 5 pounds for asparagus beetle and Apache cicada on ferns or brush growth in the post-harvest period. Do not apply more often than once every 3 days.
Do not apply within 1 day of harvest.

BEANS (such as dry beans, green beans, lima beans, navy beans, snap beans, southern peas including crowder and black-eyed peas)
Use ⅔ pounds for Mexican bean beetle; 1¼ pounds for bean leaf beetle, cucumber beetles, flea beetles, Japanese beetle, leafhoppers, velvetbean caterpillar and western bean cutworm.
Use 1¼ to 1⅞ pounds for armyworm, cutworms, corn earworm, stink bugs and tarnished plant bug. In California, use 2½ pounds for corn earworm, limabean pod borer, lygus and stink bugs.

CABBAGE, BROCCOLI, BRUSSELS SPROUTS, CAULIFLOWER AND KOHLRABI
Use ⅔ to 1¼ pounds for flea beetles and harlequin bug.
Use 1¼ to 2½ pounds for armyworm, imported cabbageworm and corn earworm.
Do not apply within 3 days of harvest.

CHINESE CABBAGE, COLLARDS, HANOVER SALAD, HORSERADISH, KALE, MUSTARD GREENS, RADISHES, RUTABAGAS AND TURNIPS
Use ⅔ to 1¼ pounds for flea beetles, harlequin bug and leafhoppers.
Use 1¼ to 1⅞ pounds in a 5 to 7 day schedule for aster leafhopper.
Use 1¼ to 2½ pounds for armyworm, imported cabbageworm, corn earworm, tarnished plant bug and stink bugs.
Do not apply within 3 days of harvest of horseradish, radishes, rutabagas and turnips (roots).
Do not apply within 14 days of harvest of Chinese cabbage, collards, Hanover salad, kale, mustard greens and turnips (tops).

CARROTS, PARSNIPS AND PARSLEY
Use ⅔ to 1¼ pounds for flea beetles and leafhoppers.
Use 1¼ to 1⅞ pounds in a 5 to 7 day schedule for aster leafhopper.
Use 1¼ to 2½ pounds for armyworm, corn earworm, tarnished plant bug, and stink bugs.
No time limitation on carrots.
Do not apply within 3 days of harvest of parsnips.
Do not apply within 14 days of harvest of parsley.

CORN (field, sweet and pop)
Use 1¼ to 2½ pounds for corn earworm, corn rootworm adults, European corn borer, fall armyworm, flea beetles, Japanese beetle, sap beetles and leafhoppers. For larvae in whorl (budworm damage) and foliage feeders, apply to entire plant. Repeat as necessary. For insects attacking silks and ears, apply at 1 to 6 day intervals starting when first silks appear and continuing until silks begin to dry. Three or more applications may be necessary depending on severity of infestation. Timing and good coverage are absolutely essential for effective control.
Use 2½ pounds in at least 15 gallons of water for cutworm control. Direct spray in a band over the corn row to insure adequate stalk coverage. Use proportionate amounts for narrower bands or broadcast.
Application of SEVIN Sprayable to the tassel region of corn during the pollen shed period will seriously reduce bee populations.

COTTON
Use ⅔ to 1¼ pounds for early-season thrips, flea beetles, cotton fleahopper, striped blister beetle and cotton leafworm.
Use 1¼ to 2½ pounds, depending on the size of the cotton and insect population level, for mid- and late season boll weevil, bollworms, fall armyworm, cotton leafperforator, leafrollers, leafhoppers and tarnished plant bug, and for light to moderate infestations of lygus bugs in Western irrigated cotton. Applications should be made every 5 to 7 days as long as control is necessary. For improved bollworm control, add 1 gallon of blackstrap molasses (feed grade) per acre in a spray volume not to exceed 20 gallons per acre. To avoid staining lint, do not use molasses after bolls open.
Use 1⅞ to 3⅛ pounds for pink bollworm on a 5 to 7 day schedule depending on the size of the cotton and degree of infestation.
Use 2½ pounds for stink bugs and saltmarsh caterpillar.
Aphid populations will be suppressed by repeated applications of this insecticide. May be applied after bolls open.

COWPEAS
Use ⅔ to 1¼ pounds for blister beetles and Mexican bean beetle.
Use 1¼ pounds for alfalfa caterpillar, bean leaf beetle, cucumber beetles, flea beetles, green cloverworm, Japanese beetle, leafhoppers, threecornered alfalfa hopper, thrips and velvetbean caterpillar.
Use 1¼ to 1⅞ pounds for armyworm, corn earworm, cutworms, stink bugs and webworms.
Use 2½ pounds for cowpea curculio. Apply 4 applications beginning at first bloom and at 5 day intervals thereafter.
In California, use 2½ pounds for corn earworm, limabean pod borer, lygus and stink bugs.
To avoid possible injury on tender foliage, do not apply when foliage is wet or when rain or excessive humidity is expected during the next 2 days.

CUCUMBER, MELONS, PUMPKIN AND SQUASH
Use ⅔ to 1¼ pounds for pickleworm and melonworm; 1¼ pounds for cucumber beetles, flea beetles, leafhoppers and squash bug. Avoid excessive applications. To avoid possible injury on tender foliage, do not apply when foliage is wet or when rain or excessive humidity is expected during the next 2 days.

DANDELION, ENDIVE (ESCAROLE), LETTUCE AND SALSIFY
Use ⅔ to 1¼ pounds for flea beetles, harlequin bug and leafhoppers.
Use 1¼ to 1⅞ pounds in a 5 to 7 day schedule for aster leafhopper.
Use 1¼ to 2½ pounds for armyworm, imported cabbageworm, corn earworm, tarnished plant bug and stink bugs. For optimum control of corn earworm after lettuce heads begin to form, use 2½ pounds in a 5 to 7 day schedule. To avoid possible injury on lettuce, do not apply when foliage is wet or when rain or excessive humidity is expected during the next 2 days.
Do not apply within 3 days of harvest of head lettuce and salsify (roots).
Do not apply within 14 days of harvest of dandelion, endive (escarole), leaf lettuce and salsify (tops).

FORAGE GRASSES AND PASTURE
Use 1¼ to 1⅞ pounds for armyworm and thrips. For thrips control in grasses grown for seed, high spray pressure may help penetration into boot. Use 2 to 2½ pounds for white grubs (green June beetle).

GARDEN BEET, SPINACH AND SWISS CHARD
Use ⅔ to 1¼ pounds for flea beetles, harlequin bug and leafhoppers.
Use 1¼ to 1⅞ pounds in a 5 to 7 day schedule for aster leafhopper.
Use 1¼ to 2½ pounds for armyworm, corn earworm, tarnished plant bug and stink bugs.
Do not apply within 3 days of harvest of garden beets (roots).
Do not apply within 14 days of harvest of garden beets (tops), spinach and Swiss chard.

OKRA
Use 1¼ to 2½ pounds for corn earworm and stink bugs. Repeat at 5 to 7 day intervals or as necessary.

PEANUTS
Use ⅔ to 1¼ pounds for blister beetles and Mexican bean beetle.
Use 1¼ pounds for alfalfa caterpillar, bean leaf beetle, cucumber beetles, green cloverworm, Japanese beetle, leafhoppers, threecornered alfalfa hopper, thrips and velvetbean caterpillar.
Use 1¼ to 1⅞ pounds for armyworm, corn earworm, stink bugs and webworms.
To avoid possible injury on tender foliage, do not apply when foliage is wet or when rain or excessive humidity is expected during the next 2 days.

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PEAS
Use 1¼ pounds for leafhoppers and Colorado potato beetle.
Use 1¼ to 1⅞ pounds for armyworm.
Use 3 pounds for alfalfa looper in Washington State only. Repeat as necessary.

POTATO, TOMATO, EGGPLANT AND PEPPER
Use ⅔ to 1¼ pounds for Colorado potato beetle, flea beetles and leafhoppers.
Use 1¼ to 2½ pounds for European corn borer, fall armyworm, lace bugs, tomato fruitworm, tomato hornworm, tarnished plant bug and stink bugs.
Use 2½ pounds for cutworm control on potato, tomato and eggplant.

RICE
In the Mississippi Delta and Texas use 1¼ to 1⅞ pounds for armyworm and stink bugs.
In California use 2½ pounds for armyworm, leafhoppers and tadpole shrimp. For optimum tadpole shrimp control apply to the water when the pest first appears.
WARNING! To avoid injury to rice, do not apply propanil (such as "Stam" F 34 or "Rogue") within **15 days before or after SEVIN application.**

Do not apply within 14 days of harvest.

SORGHUMS (such as milo, grain sorghum, sweet sorghum and hybrids)
Use 1¼ to 2½ pounds for armyworm, corn earworm, stink bugs and webworms.
Use 1⅞ pounds for sorghum midge.
Use 2½ pounds for cutworms. For optimum insect control on grain sorghum, direct spray into the forming heads. Treat for sorghum midge 3 to 4 days after heads have emerged from boot.

Do not apply within 21 days of harvest of grain.
No time limitation on sorghums used for forage.

SOYBEANS
For light to moderate populations in Southeastern states only:
Use ⅔ pound for velvetbean caterpillar, green cloverworm, bean leaf beetle, cucumber beetles and Mexican bean beetle.
Use ⅔ to 1 pound for corn earworm.
For clean-up of existing populations:
Use ⅔ to 1¼ pounds for blister beetles and Mexican bean beetle.
Use 1¼ pounds for alfalfa caterpillar, bean leaf beetle, cucumber beetles, green cloverworm, Japanese beetle, leafhoppers, threecornered alfalfa hopper, thrips and velvetbean caterpillar.
Use 1¼ to 1⅞ pounds for armyworm, corn earworm, webworms and stink bugs.
WARNING! Do not apply a combination of **SEVIN Sprayable and 2,4-DB herbicide (such as "Butyrac" 175 or "Butoxone" SB) to soybeans.**

SUGAR BEETS
Use 1¼ to 2½ pounds for armyworm, flea beetles, leafhoppers and webworms.

Do not apply within 14 days of harvest.

TOBACCO
IN PLANT BEDS:
For tobacco flea beetle, use 2½ level tablespoons per gallon or 1¼ pounds per 50 gallons, and apply 6 gallons per 100 square yards.
For green June beetle grubs, use ⅔ pound per 100 gallons of water, when insects or their damage appear. Apply only to areas that larvae have uprooted by sprinkling as a drench with 50 to 100 gallons per 100 square yards. May be applied before or after seeding. Avoid excessive application as plant injury may result.

IN FIELDS:
For budworms, flea beetles, Japanese beetle, June beetles and hornworms, use 1¼ to 2½ pounds per acre in sufficient water for full coverage of plants. Use lower rate on young plants up to knee high, higher rate on mature plants. Use at least 10 gallons per acre of the prepared spray. Begin treatments when worms are small. Avoid excessive application in bud of plant as injury may result.

Treated fields may be entered immediately after foliage has dried.
If late applications are necessary, allow 3 days before priming or cutting.

GRASSHOPPERS

Apply ⅔ to 1⅞ pounds as often as necessary TO CONTROL GRASSHOPPERS ON THE ABOVE FORAGE, FIELD AND VEGETABLE CROPS. FOLLOW PRE-HARVEST AND GRAZING USE LIMITATIONS LISTED FOR EACH OF THE ABOVE CROPS. A ⅔ to 1¼ pounds rate is suggested for nymphs on small plants or sparse vegetation in wasteland, rangeland, ditchbanks and borders. A 1¼ to 1⅞ pounds dosage should be used when grasshoppers are mature or material is applied to crops requiring greater coverage.

TREE FRUIT AND NUT INSECT CONTROL

Recommended dosages refer to pounds of SEVIN Sprayable per 100 gallons of dilute spray in conventional hydraulic type sprayers. Apply dilute sprays for full coverage. Spray gallonage will vary according to tree size, density, planting distance and stage of growth. With concentrate and aerial sprays, where lower volumes of spray are applied per acre, the concentration of SEVIN should be increased in the spray mixture so that the amount of SEVIN applied per acre is equivalent to a full coverage dilute spray. Keep spray mixtures well agitated.

ALMOND
Use 1¼ pounds for peach twig borer, San Jose scale and fruittree leafroller. Apply in "popcorn" or petal fall stages and again when the May brood of the peach twig borer begins to hatch or thereafter as needed.

APPLES AND PEARS
Application of SEVIN within 30 days after full bloom may provide apple thinning. To avoid this, delay use until at least 30 days after bloom. Foliar injury may result from combination with summer oils west of the Rocky Mountains or when used before second cover on York and McIntosh apples east of the Rocky Mountains.
West of the Rocky Mountains: Use 1 to 1¼ pounds for apple sucker, apple aphid, woolly apple aphid, bagworms, California pearslug (pear sawfly), codling moth, apple rust mite, pearleaf blister mite, pear rust mite, eyespotted bud moth, green fruitworm, lygus bugs, orange tortrix, pear psylla, tentiform leafminers, lecanium scales, oystershell scale, and San Jose scale. For optimum scale control, apply when crawlers are present. For psylla control, apply when eggs hatch or when young nymphs are present. When heavy aphid infestations are present, repeated applications may be necessary for optimum control.
East of the Rocky Mountains: Use ⅔ pound for apple mealybug, apple aphid, codling moth and white apple leafhopper. When heavy aphid infestations are present, repeated applications may be necessary for optimum control.
Use 1⅓ pounds for apple maggot, bagworms, eastern tent caterpillar, European apple sawfly, eyespotted bud moth, fruittree leafroller, green fruitworm, Japanese beetle, pear psylla, periodical cicada, plum curculio, red-banded leafroller, rosy apple aphid, woolly apple aphid, apple rust mite, pearleaf blister mite, pear rust mite, tarnished plant bug, tentiform leafminers, Forbes scale, lecanium scales, oystershell scale and San Jose scale. For optimum scale control, apply when crawlers are present. To control rosy apple aphids, apply before leaves are curled.

Do not apply within 1 day of harvest of apples and pears.

APPLE THINNING
Many factors influence the degree of apple thinning obtained with SEVIN. These include tree age, variety, nutrition, previous crop, pruning, degree of set, bloom, weather and use of other chemical thinners. When any of these favor reduced fruit set, caution should be observed in applying SEVIN so that excessive thinning and possible yield reduction will not occur. Recommended dosages refer to pounds of SEVIN Sprayable per 100 gallons dilute spray.
Concentration: Use ⅓ to ⅔ pound on easily thinned varieties. Apply for full coverage. On hard to thin varieties use ⅔ to 1¼ pounds.
Timing: Apply in one spray timed between 10 and 25 days after full bloom.
Varietal response: Easily thinned varieties [illegible] McIntosh, Orleans, Rome Beauty, Puritan, Red Delicious, Winesap and Yellow Newtown. Difficult to thin varieties include Baldwin, Ben Davis, Duchess, Early McIntosh, Golden Delicious, Lady Apple, Northern Spy, Rhode Island Greening, Stecle Red, Turley, Wealthy, Yellow Transparent and York Imperial.

CITRUS FRUITS (such as grapefruit, lemons, limes, oranges, tangelos, tangerines, citrus citron, kumquats and hybrids)
Use 1¼ pounds for California orangedog, citrus cutworm, fruittree leafroller, orange tortrix and western tussock moth.
Use 1 to 1¼ pounds for black scale, brown soft scale, California red scale, citricola scale, citrus snow scale and yellow scale. Apply lower dosage early in the season or against light infestation and the higher dosage rate in the season or against heavy infestation and situations involving infested fruit. May be used with petroleum oil as used in common practice on citrus.

Do not apply more than 25 pounds of SEVIN Sprayable per acre per application.
Do not apply less than 10 gallons of dilute spray mixture per mature tree.
Do not apply within 5 days of harvest of these crops.

FILBERT
Use 1¼ pounds for filbert aphid, filbert leafroller and filbertworm. Apply when leafroller eggs are hatching. Repeat on first appearance of adult filbert moths and again 3 to 4 weeks later. With dilute sprays, 400 gallons per acre is suggested.

OLIVES
Use 1 to 1¼ pounds with 1½ gallons of summer oil in sprays for olive scale control. For optimum scale control, apply when crawlers are present. A maximum of 2 applications is permitted.

Do not apply more than 18¾ pounds of SEVIN Sprayable per acre per application.

PEACHES, APRICOTS AND NECTARINES
Use 1¼ pounds for codling moth, cucumber beetles, European earwig, Japanese beetle, apple pandemis, June beetles, lesser peachtree borer, orange tortrix, oriental fruit moth, peach twig borer, periodical cicada, plum curculio, fruittree leafroller, redbanded leafroller, variegated leafroller, tarnished plant bug, tussock moths, lecanium scale, San Jose scale and olive scale. For optimum scale control, apply when crawlers are present. For lesser peach tree borer control, spray limbs and trunk thoroughly, weekly during moth flight.

Do not apply more than 7½ pounds of SEVIN Sprayable per acre per application on apricots.
Do not apply within 1 day of harvest of peaches.
Do not apply within 3 days of harvest of apricots and nectarines.

PECANS
Use 1½ to 3 pounds for pecan weevil and pecan nut casebearer.

Do not apply more than 9 pounds of SEVIN Sprayable per acre per application.

PLUMS, PRUNES AND CHERRIES
Use 1¼ pounds for black cherry aphid, mealy plum aphid, cherry maggot, cherry fruitworm, eyespotted bud moth, fruittree leafroller, redbanded leafroller, Japanese beetle, lesser peachtree borer, peach twig borer, plum curculio, prune leafhopper, brown soft scale, Forbes scale, lecanium scales, oystershell scale and San Jose scale. For optimum scale control apply when crawlers are present. For lesser peach tree borer control, spray limbs and trunk thoroughly, weekly during moth flight.
Use 1 pound for eastern tent caterpillar, codling moth, orange tortrix and tussock moths.

Do not apply more than 7½ pounds of SEVIN Sprayable per acre per application.
Do not apply within 1 day of harvest of these crops.

WALNUT
Use ⅔ pound for codling moth, frosted scale, European fruit lecanium, calico scale, filbertworm and fruittree leafroller. Apply 1000 gallons of dilute spray per acre for complete coverage. In concentrate spray, use 5 pounds in at least 200 gallons per acre. For codling moth apply first spray when average cross sectional diameters of developing nuts reach ½ to ¾ inch. Repeat during middle or late June as needed.
Use 2½ pounds for European earwig. Spray tree trunks to point of run off.

SMALL FRUIT INSECT CONTROL

Recommended dosages refer to pounds of SEVIN Sprayable per acre. Keep spray mixtures well agitated. Apply when insects or their damage appear. Repeat at 7 to 10 day intervals or as necessary.

BLUEBERRIES
Use 1⅞ to 2½ pounds for blueberry maggot, cherry and cranberry fruitworms, European fruit lecanium and Japanese beetle. Apply 3 weeks before harvest and repeat 10 days later or as necessary. With dilute sprays, 125 to 150 gallons per acre is suggested.

CRANBERRIES
Use 1⅞ to 3¼ pounds for cutworms, cranberry fireworms, fruitworms, Japanese beetle and leafhoppers. Apply in late bloom and as needed at 7 to 10 day intervals. With dilute sprays, 300 gallons per acre is suggested.

Do not apply within 1 day of harvest.

GRAPES
Use 1¼ to 2½ pounds for European fruit lecanium, grape leaffolder, grape leafhoppers and western grapeleaf skeletonizer. Apply just before first brood leaffolder larvae emerge from rolls and as needed for leafhoppers. Use 2½ pounds for cutworms, grape berry moth, Japanese beetle, June beetles, orange tortrix, omnivorous leafroller and redbanded leafroller. With dilute sprays, 200 gallons per acre is suggested.

STRAWBERRIES
Use 1¼ to 2½ pounds for meadow spittlebug, strawberry leafroller and strawberry weevil. SEVIN may injure Early Dawn and Sunrise varieties on the Delmarva Peninsula. With dilute sprays, 100 to 200 gallons per acre is suggested.

Do not apply within 1 day of harvest.

BLACKBERRIES, RASPBERRIES AND DEWBERRIES (including Boysenberries and Loganberries)
Use 2½ pounds for Japanese beetle, leafrollers, leafhoppers and European raspberry aphid.
In California use 2½ pounds for omnivorous leafroller and raspberry sawfly. With dilute spray, 100 to 200 gallons per acre is suggested.

Do not apply within 7 days of harvest of these crops.

SHADE TREE AND ORNAMENTAL INSECT CONTROL

Use 1¼ pounds per 100 gallons of water (1¼ tablespoonfuls per gallon) when insects or their damage appear. Repeat weekly or as needed. SEVIN injures Boston ivy, Virginia creeper and maidenhair fern.
Use on herbaceous annual, biennial and perennial plants (such as carnation, chrysanthemum, gladioli and zinnia) to control:

blister beetles	June beetles	leafrollers	psyllids
flea beetles	lace bugs	mealybugs	rose aphid
boxelder bug	leafhoppers	plant bugs	thrips (exposed)
Japanese beetle			

Use on shrubs, trees and woody plants (such as arborvitae, azalea, birch, dogwood, elm, hydrangea, juniper, lilac, maple, pine, oak and roses) to control:

apple aphid	elm leaf aphid	leafrollers	rose aphid
bagworms	elm leaf beetle	mealybugs	roseslug
birch leafminer	eriophyid mites	mimosa webworm	sawflies (exposed)
boxelder bug	gypsy moth	oak leafminers	scale insects
boxwood leafminer	Japanese beetle	orange tortrix	tent caterpillars
cankerworms	June beetles	periodical cicada	thorn bug
Cooley spruce gall aphid	lace bugs	plant bugs	thrips (exposed)
eastern spruce gall aphid	leafhoppers	puss caterpillar	willow leaf beetles

SEVIN does not control spider mites but is compatible with most common miticides.

LAWN AND AREA INSECT CONTROL

Use 1¼ pounds SEVIN Sprayable in 150 to 200 gallons of water for each 5000 square feet (2½ tablespoonfuls in 3 to 4 gallons of water for each 100 square feet) of established lawn area for the control of:

ants	earwigs	fleas	millipedes
bluegrass billbug	European chafer	green June beetle	mosquitoes
chinch bugs	fall armyworm	leafhoppers	sod webworm (lawn moths)
cutworms			

In Florida use 1½ pounds for chinch bug control.
Use garden hose sprayers or pressure type equipment.
Insure good penetration of turf. For best results, mow lawn and apply immediately after rain or watering. Repeat 2 to 3 weeks later if necessary.

FOREST INSECT CONTROL

Use 1 to 1¼ pounds of SEVIN Sprayable per acre by aircraft or hydraulic mistblower for gypsy moth, elm spanworm, saddled prominent, spring and fall cankerworms, forest tent caterpillar and Great Basin tent caterpillar. Apply when larvae are in early instars. Keep spray mixtures well agitated. Addition of a sticker may improve residual control.

ADULT MOSQUITOES

On pasture and rangelands and non-agricultural lands such as yards, parks, recreation areas, logging camps, military posts and adjacent forested lands or wastelands.

Use ⅓ to ⅔ pound per acre in mistblowers, ¾ to 1 pound per acre in aerial sprays, or 1¼ pounds per acre in suitable low pressure ground equipment. Apply in sufficient spray gallonage to effectively cover areas to be treated. For optimum control apply in early morning or evening when air is calm and adult mosquitoes are active.

Use 1¼ pounds per 100 gallons in hydraulic sprayers or 2 tablespoonfuls per gallon in hand sprayers for treating backyards or other limited areas. Thoroughly cover lower shade tree foliage, shrubbery, flower beds, grass and shaded areas around buildings where adult mosquitoes congregate. Repeat at 7 to 10 day intervals or as necessary. SEVIN injures Boston ivy, virginia creeper and maidenhair fern.

CAUTION: May kill shrimp and crabs. Do not use in areas where shrimp and crabs are important resources.

PEST CONTROL IN AND AROUND BUILDINGS
(For Use by Pest Control Operators Only)

IN AND AROUND BUILDINGS (such as homes, apartments, warehouses, barns, and municipal and recreation areas)

For cockroaches and ants, use 1 pound SEVIN Sprayable per 4 gallons of water. For brown dog tick, earwigs and millipedes, use 1 pound SEVIN Sprayable per 1½ gallons of water.

Apply as a coarse wet spray or with a paint brush and thoroughly treat cracks and crevices, baseboards, corners, walls, door sills and window frames, sleeping quarters of household pets, ant trails, outside perimeter of dwellings and other areas where insects tend to congregate.

Do not use as a space spray. Repeat when necessary but not more often than twice per week.

ON INTERIOR AND EXTERIOR WALL SURFACES, CEILINGS, EAVES AND ROOFS OF DWELLINGS CONSTRUCTED OF WOOD, BAMBOO, METAL, CEMENT, BRICK, THATCH OR WHITEWASHED CLAY

For residual control of adult mosquitoes in subtropical and tropical regions, use 1 pound SEVIN Sprayable per 4 gallons of water and apply the prepared spray per 2000 square feet of surface area. Repeat in 3 to 6 months or when necessary.

NOTE: Do not use in the edible products areas of food processing plants, restaurants or other areas where food is commercially prepared or processed. Do not use in serving areas while food is exposed.

Fresh bedding should be placed in animal quarters following treatment. **Do not spray animals. Do not spray kennels or other animal areas until animals have been removed. See caution.**

Do not treat rugs, carpets, drapes and other fabrics as staining may result. Avoid application to structural surfaces where visible spray residue and water stains are objectionable.

POULTRY INSECT CONTROL

CHICKENS, DUCKS, GEESE, GAMEBIRDS, PIGEONS AND TURKEYS

Direct Mist Spray on Birds. Control northern fowl mite, chicken mite, lice and fleas by:

1. Misting with Electric Fog Machine. Mix ¼ pound (6 ounces) of SEVIN Sprayable in 1 gallon of spray. Use 1½ gallons per 1000 hens in cages, on litter or on slatted floor. Repeat in 4 weeks if necessary, or
2. Spraying with Knapsack or Cylinder Type Compressed Air Sprayers. Mix ¼ pound (4 ounces) of SEVIN Sprayable in 5 gallons of spray. Use 1 gallon per 100 hens in cages, on litter or on slatted floor. Repeat in 4 weeks if necessary.

Direct mist spraying for chicken mite and fleas is a supplement to spraying roosts and buildings for control of these pests.

Spray Roosts and Buildings with conventional power spray or knapsack equipment. Control chicken mite, fleas and bed bugs by mixing 1½ pounds per 25 gallons and applying at 1 to 2 gallons per 1000 square feet of wall, litter or roost surface. Increase dosage to 5 pounds per 25 gallons for fowl tick control. Force spray into cracks. Repeat as needed.

Ventilate while spraying. Avoid contamination of nests, eggs and feeding and watering troughs.

Do not apply to poultry and game birds or to their premises within 7 days of slaughter.

STORAGE AND DISPOSAL

Do not contaminate water, food or feed by storage or disposal.

Unused pesticide, spray mixture or rinse should be disposed of in a landfill approved for pesticides or buried in a safe place away from water supplies. Open dumping is prohibited.

Do not reuse empty containers. Destroy by burying in landfill approved for pesticide containers or other safe place, or by incineration. Stay away from smoke or fumes.

Consult Federal, State or Local disposal authorities for approved alternative procedures such as limited open burning.

THIS SPECIMEN LABEL IS INTENDED TO BE USED AS A GUIDE IN PROVIDING INFORMATION ON THE GENERAL DIRECTIONS AND CAUTIONS ON THE USE OF "SEVIN" CARBARYL INSECTICIDE. ALWAYS READ THE LABEL ON THE PACKAGE BEFORE USING THE PRODUCT.

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NEW JERSEY DEPARTMENT OF AGRICULTURE

The gypsy moth, in its caterpillar stage, is the most destructive hardwood defoliator in New Jersey. In 1980, varying degrees of defoliation (loss of leaves) occurred on 411,975 acres. Repeated defoliation can kill 15-64 percent of the oaks. The spray program is designed to prevent this kind of tree loss in residential and recreational forests by suppressing the population of the insect.

COOPERATIVE GYPSY MOTH SUPPRESSION PROGRAM - The combined use of chemical and biological controls - the use of Sevin and B.t., a bacterial agent, - is recognized as the most effective method available for controlling this pest. Were Sevin eliminated from the program, uninfested areas both here in New Jersey and in neighboring state would be seriously threatened, and the State could be taken to task for failing to implement adequate controls

BACILLUS THURINGIENSIS - If B.t. alone were used in the program, operational costs would more than double, due to the greater complexities involved in the application of this material. In addition, a significantly fewer number of acres would be sprayed, as many municipalities with a large number of infested acres would simply be unable to spray them all, due to time limitations and economic constraints. (B.t. costs twice as much as Sevin and usually requires a second application to be effective, which quadruples the cost.) Widespread defoliation would result, certain wildlife habitats would be lost, and the aesthetics as well as the property value of the affected acres would decline.

ALTERNATIVES - Efforts are being made to develop methods of pest control using predatory insects, but such controls are presently unable to cope with the epidemic number of the pest. Similiarly unsuitable are sex attractant and radiation sterilization methods. These are best utilized in states with isolated infestations that are still small enough to be eliminated.

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Alternative chemicals include Dimilin, Dylox and Orthene. The EPA does not permit the use of Dimilin in populated areas. Dylox and Orthene are not as effective as Sevin and are used mainly in other states where stronger controls are not warranted.

SAFETY FACTORS - The program is presently run in accordance with State and federal laws, and utilizes licensed aerial applicators who must also adhere to State and federal regulations. In the absence of these professionals, many homeowners would buy Sevin (available at any retail garden store) and apply it themselves, in unregulated quantities.

The gypsy moth spray program is a voluntary program. NO municipality is forced to participate. Each municipality that elects to participate has a choice of control agents - either Sevin or B.t. Changes in this procedure would be unfounded in light of the following:

* A New Jersey Department of Health study conducted for the EPA shows the amounts of Sevin used in the spray program pose no measurable threat to human health

* The most recent New Jersey Department Health study on Sevin shows no connection can be made between the spray program and birth defects, with the birth defects occurring LESS frequently in areas that were sprayed

* The EPA has classified Sevin as a "general use" pesticide which can be purchased by the general public. It is registered for use on 67 food, feed and forage crops as well as in dusts for control of lice on humans and fleas on dogs and cats

* The EPA Office of Pesticides and Toxic Substances has recently stated that "...There is more data on carbaryl (Sevin) in this area (its effect on human reproduction) than for most other chemicals ... we do not find any evidence that carbaryl poses an adverse risk to humans..."

* Human volunteers have orally injested Sevin and helped establish a level at which no effects were observed of 2mg/kg of body weight. Exposure during the spray program is 20,000 times less than that dosage.

9/29/80

Q: Why is the Department of Agriculture involved in gypsy moth control programs?

A: The gypsy moth, in its caterpillar stage, is the most destructive hardwood defoliator in New Jersey. In 1979, varying degrees of defoliation (loss of leaves) occurred on 193,700 acres. Studies in New Jersey show that repeated defoliation can kill 15-64% of the oak trees. The purpose of conducting spray programs is to prevent tree losses from occurring in residential and recreational forests.

Q: How does the control program work?

A: Towns with severe infestations of gypsy moths, delineated during aerial surveys, are asked if they wish to participate in egg mass surveys to determine problem areas. If a town says "yes," surveys are conducted and if necessary, spray areas are proposed. If the town wishes to participate in spraying, they do so voluntarily. The Department provides cost sharing funds to towns from state and federal sources and helps supervise the actual aerial spray operation. The recommended sprays are either B.t., a biological insecticide, or carbaryl (Sevin), a chemical insecticide. Each town has a choice of insecticide.

Q: What is Sevin, and is it harmful?

A: Sevin is classified as a "general use" pesticide and can be purchased by the general public. It is registered for use on 67 feed, food, and forage crops as well as in dusts for control of lice on humans, and fleas on dogs and cats. At the amounts used in aerial spray programs (24 ounces/acre), it poses no measurable threat to human health, according to recent New Jersey Department of Health studies. One spray application will control the pest for the season.

Q: What is B.t.?

A: B.t. is short for the bacterium called Bacillus thuringiensis. The B.t., when eaten by the gypsy moth larvae, enters the stomach and paralizes the stomach walls preventing the larvae from feeding. Death usually occurs within 3-5 days. In heavily moth infested areas, two applications are usually needed.

Q: When does spraying take place?

A: Spraying usually begins in south and central New Jersey about the second week in May and ends about the second week of June in the northern hilly sections.

Q: Are there any alternatives to spraying?

A: The New Jersey Department of Agriculture is recognized as a leader in integrated pest management - the use of both chemical and biological means of controlling destructive insects. The Department is currently involved in the mass production of gypsy moth parasites and predators. These natural enemies are given every opportunity to inhibit the growth of gypsy moth populations, but if these agents cannot cope with the epidemic numbers of the pest, aerial control sprays are then employed on a selective basis in residential and recreational areas.

Q: Can gypsy moths be controlled by scraping egg masses off the trees?

A: No! When heavy populations of the pest are present, nearly 80% of the eggs are deposited high in the trees, well out of reach. Eggs scraped off trees will hatch on the ground. Even if all eggs are removed from a property, young larvae can still be "blown in" from adjacent areas.

Q: What is the forecast for 1980?

A: The gypsy moth populations are presently on an upsurge, and major defoliation and damage can be expected in Bergen, Passaic, Somerset, Sussex and Morris counties in northern New Jersey, in Hunterdon, Middlesex and Monmouth counties in central New Jersey, and in Cape May County in southern New Jersey.

Prepared by the New Jersey Department of Agriculture
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4/1/80

NEWS
RELEASE

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GYPSY MOTH DAMAGE
HITS RECORD HIGH

Release: Sept. 12, 1980

TRENTON, N.J.---Damage by the leaf-eating gypsy moth caterpillars this summer was the greatest ever, according to a recently completed aerial survey conducted by the New Jersey Department of Agriculture.

A total of 411,975 acres of trees sustained varying degrees of defoliation, more than twice the 193,700 acres defoliated last year. The previous record was set in 1973 when 258,425 acres were damaged by the insects.

According to John D. Kegg, supervising entomologist in the agriculture department's Division of Plant Industry, who compiled the survey results, 20 of the state's 21 counties were hit by the pest.

As in 1979, Morris County was hit the hardest with 98,375 acres defoliated. Bergen, Cape May, Hunterdon, Monmouth, Passaic, Somerset, Sussex and Warren counties all suffered more than 15,000 acres of gypsy moth defoliation.

Kegg said that while many of the trees have grown new leaves, they are presently under considerable stress due to the summer drought conditions. Many trees, especially oaks, could die this winter if further weakened by root rots and boring insects, he said.

Last spring, the agriculture department notified 90 municipalities that substantial infestations of the gypsy moth were found in valuable residential and recreational forested areas. In all, 57 municipalities and cooperating agencies participated in the voluntary, Cooperative Gypsy Moth Suppression Program.

A total of 41 towns involving 18,517 acres chose the organic insecticide carbaryl, and 16 towns involving 16,963 acres chose the biological insecticide Bacillus thuringiensis, B.t.

(more)

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The gypsy moth was first introduced into the United States in 1869 from France when a scientist in Medford, Mass. attempted to cross it with a silk worm in hopes of establishing a silk industry here. The moths escaped from his lab, multiplied, and 11 years later infested the Massachusetts town and countryside.

Residents' descriptions of the problem matched those of Pemberton, N.J. residents who were plagued by the bugs this summer: people slipped on the bugs on the sidewalks, they listened to it "rain" all day as the bugs eliminated, and the bugs ate almost everything in site and stained home exteriors.

Ten years later, the Massachusetts legislature finally took action to exterminate the gypsy moths. Unfortunately, after a few years, the legislature ended its control program, and since then, the gypsy moths have eaten their way through much of the Northeast and have been transported to parts of the West and Mid-West by unsuspecting vacationers. Gypsy moths first began defoliating N.J. forests in 1966 when 5 acres were stripped near Morristown.

In addition to the cooperative spray program, the New Jersey Department of Agriculture conducts a successful biological program, systematically releasing gypsy moth parasites on permanent sites throughout the state. Under a U.S. Department of Agriculture contract, the New Jersey department mass produces the beneficial parasites in its labs in Trenton, and also distributes them to other states for use in biological control programs there.

Department of Agriculture personnel have already begun gypsy moth egg mass surveys to determine next year's problem areas in response to written requests. Additional municipalities where severe infestations are expected will be contacted in the near future.

A break-down of the acreage defoliated this summer follows.

ATLANTIC COUNTY: Buena Vista, 25; Egg Harbor, 185; Estell Manor, 1,580; Greenwich, 5; Hamilton, 200; Hopewell, 195; Weymouth, 1. County total: 2,300 acres.

BERGEN COUNTY: Allendale, 740; Alpine, 3,390; Closter, 30; Cresskill, 130; Demarest, 165; Emerson, 230; Englewood, 30; Englewood Cliffs, 25; Franklin Lakes, 3170; Glen Rock, 90; Haworth, 355; Hillsdale, 290; Hohokus, 335; Midland Park, 640; Montvale, 410; Mahwah, 11,660; Worthvale, 290; Norwood, 190; Oakland, 4,080; Old Tappan, 195; Oradell, 210; Paramus, 170; Park Ridge, 505; Ramsey, 1,050; Ridgewood, 805; River Vale, 670; Rockleigh, 45; Saddle River, 1,580; Tenafly, 680; Upper Saddle River, 50; Waldwick, 315; Washington, 900; Washington Boro, 70; Westwood, 405; Woodcliff Lake, 775; Wyckoff, 1,510. County total: 36,185 acres.

BURLINGTON COUNTY: Bass River, 115; Bordentown, 85; Burlington City, 10; Burlington Twp., 290; Chesterfield, 660; Eastampton, 90; Evesham, 1,040; Florence, 465; Lumberton, 20; Mansfield, 525; Medford, 795; Medford Lakes Boro, 10; Mt. Laurel, 180; New Hanover, 1,505; North Hanover, 1,195; Pemberton, 1,390; Shamong, 345; Southampton, 665; Springfield, 855; Tabernacle, 395; Westampton, 585. County total: 11,220 acres.

CAMDEN COUNTY: Berlin, 20; Gloucester, 235; Pine Hill, 255; Pine Valley, 270; Waterford, 68; Winslow, 60. County total: 905 acres.

CAPE MAY COUNTY: Dennis, 8,770; Lower, 1,975; Middle, 6,445; Upper, 1,095; Woodbine, 785. County total: 19,070 acres.

CUMBERLAND COUNTY: Downe, 415; Maurice River, 5,065. County total: 5,480 acres.

ESSEX COUNTY: Caldwell, 480; Cedar Grove, 840; Essex Falls, 30; Livingston, 1,220; Maplewood, 540; Millburn, 1,040; Montclair, 190; North Caldwell, 690; Roseland, 240; Verona, 200; West Orange, 2,350. County total: 7,820 acres.

GLOUCESTER COUNTY: Glassboro, 170; Monroe, 100; South Harrison, 75. County total: 345 acres.

HUNTERDON COUNTY: Alexandria, 15; Bethlehem, 1,060; Califon, 20; Clinton, 970; Delaware, 2,210; East Amwell, 2,970; Franklin, 1,825; Glen Gardner, 170; High Bridge, 100; Holland, 855; Kingwood, 2,460; Lebanon Twp., 2,105; Raritan, 600; Readington, 1,530; Stockton, 5; Tewksbury Twp., 1,690; Union, 1,010; West Amwell, 1,190. County total: 20,785 acres.

MERCER COUNTY: East Windsor, 485; Hamilton, 840; Hopewell, 1,715; Lawrence, 345; Princeton Twp., 635; Washington, 1,240; West Windsor, 1,660. County total: 6,920 acres.

MIDDLESEX COUNTY: Cranbury, 250; East Brunswick, 1,410; Madison, 1,850; Marlboro, 390; Monroe, 1,650; North Brunswick, 170; Plainsboro, 350; South Brunswick, 3,255. County total: 9,325 acres.

MONMOUTH COUNTY: Atlantic, 470; Brielle, 40; Eatontown, 170; Farmingdale Boro, 20; Freehold Twp., 1,580; Holmdel, 685; Howell, 2,485; Manalapan, 1,070; Marlboro, 1,650; Matawan, 75; Middletown, 515; Millstone, 4,075; New Shrewsbury, 80; Ocean, 120; Roosevelt, 180; Rumson, 25; Upper Freehold, 1,030; Wall, 1,085. County total: 15,355 acres.

(over)

MORRIS COUNTY: Butler, 210; Boonton, 190; Boontown Twp., 2,310; Chatham, 965; Chatham Boro, 270; Chester Boro, 5; Chester Twp., 5,425; Denville, 3,665; Dover, 275; East Hanover, 35; Florham Park, 45; Hanover, 590; Harding, 2,760; Jefferson, 15,070; Kinnelon, 9,205; Lincoln Park, 605; Mendham Boro, 425; Mendham Twp., 5,515; Mine Hill, 665; Montville, 4,630; Morris, 2,645; Morris Plains, 220; Morristown, 50; Mt. Olive, 5,935; Mt. Arlington, 510; Mountain Lakes, 290; Netcong Boro, 40; Parsippany-Troy Hills, 1,640; Passaic, 1,095; Pequannock, 570; Randolf, 4,810; Riverdale, 585; Rockaway, 13,990; Rockaway Boro, 315; Roxbury, 4,505; Washington, 8,055; Wharton, 260. County total: 98,375 acres.

OCEAN COUNTY: Dover, 100; Jackson, 1,010; Lakewood, 80; Little Egg Harbor, 765; Plumsted, 770; Stafford, 20. County total: 2,745 acres.

PASSAIC COUNTY: Bloomingdale, 4,500; Clifton, 10; Haledon, 80; Hawthorne, 205; Little Falls, 240; North Haledon, 760; Pompton Lakes, 490; Ringwood Boro, 14,285; Wanaque Boro, 7,575; Wayne, 4,065; West Milford, 33,450; West Paterson, 130. County total: 65,790 acres.

SALEM COUNTY: Alloway, 820; Mannington, 95; Oldman, 380; Pilesgrove, 225; Pittsgrove, 230; Quinton, 480; Upper Penns Neck, 60; Upper Pittsgrove, 335. County total: 2,625 acres.

SOMERSET COUNTY: Bedminister, 1,050; Bernards, 3,695; Bernardsville, 2,445; Branchburg, 175; Bridgewater, 4,705; Far Hills, 815; Franklin, 700; Green Brook, 1,320; Hillsborough, 4,745; Montgomery, 895; Warren, 5,000; Watchung, 1,810. County total: 27,355 acres.

SUSSEX COUNTY: Andover Boro, 90; Andover Twp., 1,670; Byram,10,340; Frankford, 235; Franklin Boro, 125; Fredon, 310; Green, 945; Hampton, 45; Hardyston, 11,295; Hopatcong, 4,700; Lafayette, 1,055; Ogdensburg Boro, 315; Stanhope Boro, 315; Stillwater, 250; Vernon, 24,310; Walpack, 920; Wantage, 820. County total: 57,740 acres.

UNION COUNTY: Berkeley Heights, 880; Mountainside, 545; Scotch Plains, 470; Springfield, 500; Summit, 210. County total: 2,605 acres.

WARREN COUNTY: Allamuchy, 1,230; Blairstown, 1,775; Franklin, 65; Frelinghuysen, 415; Hardwick, 85; Harmony, 225; Hope, 690; Independence, 2,735; Knowlton, 2,350; Liberty, 1,380; Mansfield, 775; Oxford, 80; Pahaquarry, 6,750; Washington, 20; White, 455. County total: 19,030 acres.

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Revised December, 1978
Replaces F-43425C

UNION CARBIDE SEVIN 4 OIL

Active Ingredients	
Carbaryl (1-naphthyl methylcarbamate)	49.0 % by wt.
Petroleum oils	46.3 % by wt.
Inert Ingredients	4.7 % by wt.
TOTAL	100.0 %

E.P.A. Reg. No. 1016-70

CAUTION

KEEP OUT OF REACH OF CHILDREN.

HARMFUL IF INHALED OR SWALLOWED. Avoid Breathing of Spray.
Do Not Take Internally. Avoid Contact with Skin and Eyes.
Wear regular long-sleeved work clothing. Change to clean clothing daily.
Wash Hands and Face before eating. Wash thoroughly after handling.
NOTE FOR PHYSICIAN: Carbaryl is a moderate, reversible, cholinesterase inhibitor.
Atropine is antidotal. Do not use 2-PAM, opiates, or cholinesterase-inhibiting drugs.
AVOID CONTAMINATION OF FOOD, FEED, WATER SUPPLIES, STREAMS AND PONDS DURING APPLICATION OR WHEN CLEANING EQUIPMENT.

WARRANTY

1. The manufacturer guarantees and warrants (a) that the active ingredient content and the total net weight are as stated within lawful limits and (b) that the directions, warnings and other statements on this label are based upon responsible experts' evaluation of reasonable tests of effectiveness, of toxicity to laboratory animals and to plants, and of residues on food crops, and upon reports of field experience. Tests have not been made on all varieties or in all States.
2. The manufacturer further warrants that the material herein is reasonably fit for use under normal conditions as directed hereon. The manufacturer neither makes nor authorizes any agent or representative to make any other warranties of FITNESS OR OF MERCHANTABILITY, guarantee or representation, express or implied, concerning this material. This product is sold only on the basis that buyer assumes all risks of use or handling which result in loss or damage and which are beyond manufacturer's control. No claim of any kind, and whether or not based on negligence, shall be greater in amount than the purchase price of the material in respect of which such claim is made. In no event shall manufacturer or seller be liable for special, indirect or consequential damages resulting from the use or handling of this material.
3. No modification of this warranty and disclaimer is authorized, except by specific reference to them in writing by an employee of the manufacturer.

UNION CARBIDE CORPORATION • AGRICULTURAL PRODUCTS DIVISION
7825 BAYMEADOWS WAY, JACKSONVILLE, FLORIDA 32216

F-47040
UCC-1900908
Made in U.S.A.

GENERAL INFORMATION

SEVIN 4 OIL carbaryl insecticide is a dispersion of finely ground technical carbaryl in a non-aromatic, low volatile oil. It is designed for air application as a low volume or ultra low volume spray. It may also be applied by ground mist blower or cold fogging, if diluted with diesel fuel, kerosene or #2 fuel oil. READ THIS LABEL BEFORE USE. USE IN STRICT ACCORDANCE WITH DIRECTIONS AND CAUTIONS.

PREHARVEST AND GRAZING USE INFORMATION AND LIMITATIONS

Tolerances established under the Federal Food, Drug and Cosmetic Act permit the sale of crops bearing probable carbaryl residues when this product is used in accordance with label directions. If used as directed, treated forage may be grazed or used as feed for dairy and meat animals without causing illegal residues in meat or milk. This product may be applied up to and including the day of harvest or grazing of forage crops.

BEE CAUTION. MAY KILL HONEYBEES IN SUBSTANTIAL NUMBERS

This product is highly toxic to bees exposed to direct treatment or residues on crops. Protective information may be obtained from your Cooperative Agricultural Extension Service.

Do not use when value of honeybees as pollinators is more important than insect control. Before applying, warn beekeepers to locate hives beyond bee flight range until 1 week after application or to take other equally effective precautions.

STORAGE AND DISPOSAL

Do not contaminate water, food or feed by storage or disposal.

Unused pesticide, spray mixture or rinse should be disposed of in a landfill approved for pesticides or buried in a safe place away from water supplies. Open dumping is prohibited.

Decontaminate empty bulk tanks and drums by rinsing with kerosene or #2 fuel oil. Rinses may be drained into a mixing or spray tank. Bulk tanks should be washed with a detergent and hot water. Recondition drums before reuse, or destroy by burying in approved landfill or other safe place.

Consult Federal, State or Local disposal authorities for approved alternative procedures.

DIRECTIONS FOR USE/MIXING AND APPLICATION

1. SEVIN 4 OIL thickens during storage. Roll or agitate drums or recirculate product in bulk tanks before use to reduce viscosity and restore homogeneity. SEVIN 4 OIL may be held prior to use and transferred in any materials of construction suitable for use with fuel oil, kerosene or diesel oil. Protect from water.
2. Before and after use, flush nurse tanks, pumps, lines, hoses and entire spray systems with diesel fuel, kerosene or #2 fuel oil until clean. Water, scale, rust and other residue must be removed from pumps, mixing and spray systems before use.

3. SEVIN 4 OIL IS NOT COMPATIBLE WITH AND SHOULD NOT BE MIXED WITH WATER, ALCOHOL OR AROMATIC SOLVENTS, but can be diluted with aliphatic oils (diesel fuel, kerosene or #2 fuel oil). Compatibility with other pesticides has not been thoroughly tested. DO NOT USE IN TANK MIX COMBINATIONS UNLESS YOUR EXPERIENCE INDICATES THAT THE MIXTURE IS EFFECTIVE AND WILL NOT RESULT IN PLANT INJURY OR MECHANICAL DIFFICULTY.
4. For best mixing when preparing diluted SEVIN 4 OIL, add diluent oil to mix tank before adding proper volume of SEVIN 4 OIL. Provide periodic circulation to maintain uniform suspension if diluted.
5. Calibrate equipment to deliver the desired spray volume. Flat fan nozzles may be used to apply both undiluted and diluted SEVIN 4 OIL. Rotary atomizing and hollow cone nozzles are not recommended for applying undiluted SEVIN 4 OIL but can be used if 1 to 1 dilution is made. Use of a high-volume 50-mesh in-line strainer is suggested. Use of screens behind nozzles is not recommended.
6. Apply by air undiluted, or diluted with kerosene, diesel fuel or #2 fuel oil. At temperatures below 50°F (10°C) dilution of 4 volumes of SEVIN 4 OIL with 1 volume of diluent oil is recommended to assure uniform flow and spray distribution. Dilutions greater than 1 to 1 by volume are not recommended; higher dilutions will reduce residual properties. Dilute 1 to 1 by volume when applying with ground equipment.
7. Apply only when weather conditions are favorable. Wind and rising air currents may cause undesirable spray drift and reduce insect control.

INSECT CONTROL

The directions on this label are based on tests and field experience relating to (a) effectiveness; (b) possible injury to plants and animals; and (c) residues in food, feed, meat and milk. Follow directions for most effective use. DOSAGES LISTED REFER TO QUARTS OF SEVIN 4 OIL PER ACRE, NOT TO VOLUME OF FINISHED SPRAY PER ACRE. Refer to Steps 4 and 6 under STORAGE AND APPLICATION for instructions on dilution.

CORN (field, pop) INSECT CONTROL

For corn rootworm beetles: Apply 1 quart of SEVIN 4 OIL per acre as needed at first silking if populations are at economic levels and/or apply later when needed to control adult population buildup to reduce larval damage to next year's crop. Do not make more than two applications.

For western bean cutworm: Apply a single application of 2 quarts of SEVIN 4 OIL plus 2 quarts diesel fuel, kerosene or #2 fuel oil per acre when an average of 1 in 7 plants have western bean cutworm egg masses or newly hatched larvae and 90 to 100% of the tassels have emerged. Application after 100% of the silks have emerged will reduce effectiveness.

For Japanese beetle: Apply 1 quart of SEVIN 4 OIL per acre when adult beetles are present.

For grasshoppers: Apply ½ to 1½ quarts SEVIN 4 OIL per acre. Lower rate is suggested for nymphs on small plants. Use 1.0 or 1.5 quarts when grasshoppers or foliage are mature and greater coverage is required.

(continued)

FOREST INSECT CONTROL

For control of gypsy moth, fall and spring cankerworms, saddled prominent, forest tent caterpillar, elm spanworm, oak leafroller complex and Japanese beetle: Apply 1 quart SEVIN 4 OIL per acre when larvae are in early instars and leaves are at least ⅓ grown, or when adult Japanese beetles are present.

For spruce budworm and western spruce budworm: Apply 1 quart SEVIN 4 OIL per acre for foliage protection. East of the Rocky Mountains apply when larvae are in third and fourth instars. In the Rocky Mountains and West of the Rocky Mountains apply when larvae are in third through fifth instars.

For population control and foliage protection of high value trees using ground mist blower application, apply 0.8 pint of a spray mixture containing equal volumes of SEVIN 4 OIL and diesel fuel, kerosene or #2 fuel oil per 20 to 30 foot tree (0.2 lb. ai/tree) when larvae are in early instars. Cover foliage thoroughly, but avoid runoff.

PASTURE, RANGELAND AND WASTELAND INSECT CONTROL

For grasshoppers: Apply ½ to 1½ quarts of SEVIN 4 OIL per acre. Lower rate is suggested for nymphs on small plants or sparse vegetation. Use higher rate when grasshoppers are mature or vegetation is thick.

For range caterpillar: Apply ½ to 1 quart of SEVIN 4 OIL, per acre. Use the lower rate when larvae are in early instars and the higher rate for later instars.

For Japanese beetle: Apply 1 quart of SEVIN 4 OIL per acre when adult beetles are present.

THIS SPECIMEN LABEL IS INTENDED TO BE USED AS A GUIDE IN PROVIDING INFORMATION ON THE GENERAL DIRECTIONS AND CAUTIONS ON THE USE OF "SEVIN" 4 OIL CARBARYL INSECTICIDE. ALWAYS READ THE LABEL ON THE PACKAGE BEFORE USING THE PRODUCT.

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GUIDELINES FOR PARTICIPATION IN NEW JERSEY'S VOLUNTARY GYPSY MOTH SUPPRESSION PROGRAM

Recognizing the serious threat of the gypsy moth to New Jersey woodland and shade tree resources, the New Jersey Department of Agriculture has developed a pest management program which is directed at preventing tree mortality within the residential and high-use recreational areas of the State. This program employs both chemical and biological agents to reduce gypsy moth feeding. The biologicals (parasites and predators) are our first line of defense but, when the natural enemies cannot cope with high gypsy moth infestations, a carefully supervised aerial spray program using only federal E.P.A. approved materials is used.

If it becomes necessary to treat to protect trees in residential and recreational areas, the following set of priorities have been established by the Department of Agriculture:-

1. Forested communities with at least ten (10) homes per 50 acres, defoliated once and expecting heavy defoliation next spring.

2. Municipal and County recreational areas defoliated once and expecting heavy defoliation next spring.

3. Forested communities with five (5) homes per 50 acres defoliated once and expecting heavy defoliation next spring.

4. Forested communities with at least ten (10) homes per 50 acres, or recreational areas not defoliated yet but expecting heavy defoliation next spring.

5. Watershed areas defoliated once and expecting heavy defoliation next spring.

6. Uninhabited-high value timber forests, defoliated once and expecting heavy defoliation next spring.

In any event, spraying will only be done on a voluntary basis with local governments that are willing to fully accept the following responsibilities for participation in the aerial spray program:-

The local government will:-

1. Request in writing an egg mass survey to determine the status of the gypsy moth infestations in residential and recreational forests.

2. Arrange for financing the total cost of any treatments recommended and make contractual agreement with spray vendor, either provided by State or obtained by local bidding.

3. Assist in the administration and coordination of the spray program, providing labor to assist in marking spray block boundaries.

4. Adopt a resolution declaring the gypsy moth a "Public Nuisance" at a legally advertised municipal meeting.

5. Notify the occupants by a properly served notification of the intent of the spray program.

6. Certify to the Department that these notices have been served as outlined in the guidelines. No work will begin until this certification is filed with the Department of Agriculture.

If any one of the above steps are not adhered to by the local government, the Department of Agriculture will not participate.

The New Jersey Department of Agriculture will:-

1. Conduct surveys to determine the size and location of areas requiring treatment. Biological evaluation of all proposed treatment areas will be performed before chemical application is initiated.

2. Develop spray contracts and contact reputable chemical applicators for competitive bidding.

3. Recommend the insecticide, method of application and proper application timing, depending on entomological and climatic conditions.

4. Give financial assistance to local governments to reduce treatment costs.

5. Assist in the administration and coordination of the program.

6. Assist in the application of the recommended pesticide at the proper dosage rate with the appropriate application equipment.

The U. S. Forest Service will assist financially up to 1/2 of the application and material costs for the treatment of residential lands and 1/4 for the treatment of public lands. The New Jersey Department of Agriculture will also assist the local communities by applying for federal cost sharing funds and distributing them to participating municipalities.

At present, the Department recommends that short residual pesticides currently approved by the U. S. Environmental Protection Agency be used for control of the gypsy moth. The materials, when used at the approved dosage rates, are relatively harmless to fish, birds and mammals. The total cost of treatment is between $8.00 and $18.00 per acre. This cost variation is due to the location and size of the areas selected for treatment, the insecticide and the type of aircraft.

In order to meet the State Statutes, several guidelines have been established in regard to proper notification of all occupants who reside on the lands selected for treatment. These guidelines have been reviewed by our Department's Deputy Attorney General. They are as follows:-

a. By two separate insertions in a newspaper qualified to accept legal notices published in the county of the proposed treatment or other action and circulating in the affected areas. The two insertions shall appear at least seven (7) days apart, the first of which shall be not earlier then 21 days prior to the proposed date of treatment or other action and the second of which shall be not later than seven (7) days prior to the proposed date thereof; and

b. By mailing a notice by regular first class mail to the occupant of each affected parcel of property no later than ten (10) days prior to the proposed date of treatment, or other action.

(Source. L. 1921, c.8, §.4, p.28, 1924 Suppl. § 4-1151, as revised in Assembly Bill No. 1380.)

Moderate to heavy losses of honey bees have sometimes been experienced with the use of Sevin. Field tests conducted in recent years indicate that these losses can be reduced significantly by the use of pollen traps. The Department can supply a diagram and directions for use to those beekeepers who wish to use the pollen traps. It is the township's responsibility to notify each beekeeper at least 20 days before proposed application time, as to the availability of the pollen trap information, the areas selected for treatment and the time of application.

If additional questions on the gypsy moth program arise, please do not hesitate to contact our office. The following persons should be able to assist you:

William W. Metterhouse,
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N. J. Dept. of Agriculture
P. O. Box 1888
Trenton, New Jersey 08625

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