

GYPSY MOTH INVASION RUNS ARBORIST RAGGED

by Gil Troy, editorial assistant

It's 4:30 a.m. The arborist wearily hops into his truck to start yet another day of non-stop spraying against the gypsy moth. He may work as late as 10 or 11 this night. Some of his fellow arborists start spraying college campuses, industrial parks and normally bustling city streets at that hour. Our hero works through the Memorial Day weekend. He works over the Fourth. Hopefully, he'll be able to take some time off soon. But it's not up to him—he's held captive by the whims of the dreaded gypsy moth.

This spring and early summer, throughout the Northeast and scattered parts of the rest of the country, arborists took up the herculean task of controlling the gypsy moth. By many accounts, this year's infestation was the worst ever. Experts estimate that between 10 and 15 million acres were defoliated this year, surpassing the record five million acres defoliated in 1980. The area from Maine through Wilmington, DE, extending as far west as Pennsylvania Dutch Country, was blanketed by the ravenous insects. Isolated infestations were reported in California, Oregon, Nebraska, Michigan, Ohio, Florida and Vancouver, British Columbia.

"I've been spraying since 1955, and this is the worst year I've ever seen," says Robert Mullane, president of Alpine Tree Care, Inc., in White Plains, NY, confirming most arborists' observations. Erik Haupt, president of Haupt Tree Company in southwestern Massachusetts, contends that this year "had the greatest variety in the stages and life cycle of the moth I've ever seen in 25 years. The gypsy moths started laying eggs in late April, early May, and they were still hatching the end of May into June. There were all stages of instar at the same time. This was more from lack of food rather than pronounced, staggered hatching."

Arborists Inundated

The intensity and the expanse of the infestation caused widespread public distress. Arborists were inundated with calls. "You couldn't reach any tree company," says Walt Dages, public relations manager of the F. A. Bartlett Tree Company in Stamford, CT. "A lot of people complained that our phone was off the hook." The firms weren't refusing to answer calls; they were constantly on the phone. Alpine Tree Company didn't take any orders after April 1. Other companies were also unable to satisfy all of the customers in need.

Carl Bosenberg, president of H.F. Bosenberg and Son Corporation in North Brunswick, NJ,

didn't take over half the calls that came in. "It's very unfair to customers to say 'yes, we'll be there to spray,' when you know in your heart that you'll never be able to make it. It's like a guy with a doctor's appointment at two who sits around until four, and then is rushed through by the doctor who's in a hurry to get home."

Bosenberg is not willing to sacrifice the quality of his service in order to satisfy the increased demand. "We could have done a lot more if we had been willing to cut corners. We don't try to produce volume. Doing fewer jobs and doing them well is more important. Others' business more than doubled. They'd work until 10 and wake up at five. It's fine if you do it for a couple of days. But after a while, you become so bleary eyed you're just going through the motions."

Business Booms

Despite all the unanswered calls, business increased dramatically. Bosenberg's company had at least a 30-40 percent increase in spraying jobs over the previous year. Estimates by other arborists ranged from a 20 percent increase to 100 percent. Robert Mullane says that established companies would tend to have a less dramatic rise. "When you've been in business a long time you get a lot of regular customers. Ninety to ninety-five percent of our business is from return customers."

The increase experienced by both new and old firms strained supplies of chemicals, labor and equipment. Eric Haupt says that even though his company was braced for an increase in demand, they still ran out of spray on occasions. "When you're involved in a major increase of that type, no matter how carefully you plan it's difficult to set up."

"It was impossible to foresee," Haupt explains. "We ran through three, four, five times the amount of spray material expected. The gypsy moth respects no calendar, it respects no weather forecast. You're vulnerable to weather and to other factors. But you have to move quickly, a tree has leaves one day and is defoliated the next."

Walt Dages estimates that business at the Bartlett Company is "almost double. We could have done a lot more but we lacked equipment and trained manpower." Bartlett and other firms updated, reequipped, and purchased new machines.

Supply and Demand

The Agriculture Machine Division of FMC

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Corporation, Jonesboro, AR, is the largest manufacturer of sprayers in the United States. "We tried to foresee demand, but we still didn't have enough. We sold out earlier than we ever had," exclaimed Marion Meredith, advertising manager at FMC. "Our 600 and 1000 gallon sprayers ran out in early spring. We ran out of our smaller units in early summer." Although FMC hasn't started building new sprayers yet, dealers are already ordering sprayers for next spring.

Not all equipment companies were overwhelmed by the gypsy moth infestation. A spokesman for Broyhill Company in Dakota City, NB, says the gypsy moth infestation in the Northeast "hasn't changed a thing. The Mediterranean fruit flies had more of an impact on our sales."

Chemical companies that supply Sevin, methoxychlor and other weapons for use against the pest experienced sales increases, but did not run out of material. Roy Lockett, communications manager of Union Carbide Agricultural Products Division in Raleigh, NC, estimates that even though less than 10 percent of their sales of Sevin are used against the gypsy moth, the fight against the moth helped make 1981 "the best year we've had in sales for our program. The supply fluctuated, but we had anticipated heavy use because of the gypsy moth."

Miller Chemical and Fertilizer Corporation had also anticipated an increase in demand. Charlie Svec, executive vice president of the Hanover, PA firm, said the gypsy moth "very definitely had an impact" on the Sevin and methoxychlor his company sells. "A pretty substantial volume of product was sold. There might have been some delays in getting the product out, but we were consolidating two plants during the year. I wouldn't expect a recurrence of the minimal delays next year."

Arborist's Arsenal: Results

The arborist has a variety of weapons in his arsenal against the gypsy moth. Most agree that a well-timed, well-planned, integrated pest management program (IPM) is necessary. "The gypsy moth should be dealt with as part of an overall biological problem and not as if there is one solution to stamp them out in one fell swoop," says Charles Roth, chief educator and naturalist of the Massachusetts Audubon Society.

Nevertheless, different arborists rely on different weapons as their mainstay in the fight against the gypsy moth.

The most popular method still remains spraying, with arborists mentioning Sevin as the pesticide used most often. Bruce Walgren, Jr., director of operations for Walgren Tree Experts in West Hartford, CT, says that his firm uses a two spray approach. They spray early with Sevimol, a Sevin with an additional "sticky" substance to

keep the chemical on the tree. They then do a second application of malathion and Sevin for good knockdown. "Sevin did a super job," says Walgren. "We achieved very good control. Approximately 97 percent of our customers were satisfied. There were not many complaints, especially for the volume of business we did." Robert Mullane of Alpine Tree Care prefers a combination of Sevin, malathion and methoxychlor. Others, like Carl Bosenberg, used Sevin by itself.

Sevin was neither universally used nor was it universally acclaimed. Eric Haupt uses methoxychlor "almost exclusively. It's very effective from a money standpoint and a control standpoint."

Okay to Spray?

Some ecologists object to the use of Sevin because it is "broad spectrum like so many of our pesticides," according to Dr. Dick Plunkett, a staff ecologist with the National Audubon Society in New York. "A broad spectrum pesticide affects the natural controls—parasites and predators. Whatever controls we destroy increases the intensity of the next outburst."

Plunkett points to the adverse effect of Sevin on honeybees as but one example. "Natural pollination is of great importance to fruit crops. The commercial beekeeper is warned to keep away for a week after Sevin is sprayed."

Others maintain that Sevin is less than beneficial to humans and animals in the area being sprayed. Sufficient doubts exist, they claim, but the pesticide still remains on the list of accepted chemicals.

Roy Lockett of Union Carbide is unconvinced. The Environmental Protection Agency just completed a four year investigation of Sevin. "They went through all our files, and through information from outside laboratories," Lockett explains. "They found that Sevin poses no threat to humans or animals—they gave it a clean bill of health."

Few people on either side insist on taking their case to its extreme. Plunkett says the Audubon Society approves of the United States Department of Agriculture's program which advocates an IPM scheme to combat the gypsy moth. Plunkett also says that he would not object to the "use of chemical insecticides for extreme conditions. What I do object to is aerial spraying near people."

Many arborists who are confident that Sevin and other pesticides are not harmful to humans, are still wary of spraying wantonly. Carl Bosenberg "firmly believes that the fewer chemicals we have in use, the better off we are in the long run. If we could control the gypsy moths without chemicals we would be very happy. It's not that Sevin is harmful, but we would do any-

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thing to avoid spraying into the atmosphere. We like to soft pedal the use of chemicals."

Eric Haupt agrees. "We view spraying as a necessary evil. We won't take advantage of the concern of the public to scare them into additional spraying. We won't sign them up for 30 years. There's too much indiscriminate use of pesticides."

Charles Roth was particularly disturbed about indiscriminate spraying in reaction to the gypsy moth attack. "There's an awful lot of garbage being sprayed around. People are spraying chlorox, kerosene, anything, into the atmosphere."

The attitude of the general public toward spraying was, as usual, mixed. Bosenberg found that this year "people were so glad to see us, it was fun to spray. Last year we had lots of hassles; this year anybody who could spray was accepted. People's trees were being chewed up, they were willing to accept anything. If your neighbor's tree is chewed up you feel sorry; if yours is chewed up you get excited."

Walt Dages of Bartlett Tree Expert Company says that when the company's helicopter landed for a break or to check an address "people started running up to the helicopter and asking to be sprayed."

Attitudes toward spraying seem to be determined by how desperate the individual is for relief. Tom Wolf, a forester with the New York State Department of Environmental Conservation, discovered that in New York City. The DEC was going to spray 800 acres in the Bronx and Staten Island with Dylox. In Staten Island, where homeowners were suffering, a public protest was made and the environmentalists were "hooted down." In the Bronx, the outbreak was localized in Van Cortland Park. DEC officials were besieged with protests and petitions from community groups, assemblymen and state senators. The city was forced to drop the program.

Wolf discovered that you can't please everybody. "Before the gypsy moths start chewing, people yell 'don't spray, you'll poison children and dogs.' After they start chewing, people yell, 'how come they didn't do anything?'"

Alternatives: Bt and NPV

Given the widespread discomfort with spraying, other alternatives were examined. Many people advocate *Bacillus thuringiensis* (Bt), a spore-forming bacteria, as a safer, but equally effective, alternative. Charles Roth recommends Bt. "There's less of a biological impact, it's better in the long run" and knocks out the gypsy moth, according to Roth.

Last year, Alpine Tree Care used a considerable amount of Bt. "This year, says Robert Mullane, "we used it on a limited scale. We got terrible results. The gypsy moth lays eggs over a six week period, from May 1 to June 20. It takes Bt

a week to become effective. It works for the next week, but it couldn't control them the next month."

Roth grants that Bt "is more expensive and needs to be applied at proper times." However, its major advantage, "that it is only effective with caterpillars of the lepidoptera family," outweighs its additional cost and inconvenience.

Another highly touted alternative that only affects the gypsy moth is a gypsy moth virus, nucleopolyhedrosis (NPV), trade named Gypchek. It is also known as "wilt disease" because when killed by the disease, the gypsy moth hangs in an inverted "v." The advantages of the virus, which occurs naturally in high gypsy moth populations, is that it is specific to gypsy moth larvae and has "no effect whatever on anything else in the environment," according to Tom Wolf.

The disadvantage of the virus, Wolf notes, is that two applications, between five and ten days apart during the early instars, are required in order to be effective. Also, it takes one to two weeks to start killing the moth. Once the disease starts, if it has been properly applied, Wolf says you can expect a 75 percent mortality rate.

"Wilt disease" has been synthetically reproduced, but it is not yet commercially available. One of the reasons is that the virus is specific to the gypsy moth. The episodic nature of the gypsy moth makes the synthetic virus a less than profitable investment.

Stuart Aimsforth of Abbot Laboratories in North Chicago says that NPV is a "dead issue. Its control is as good as Bt, rarely if ever better than Bt. Bt has certain advantages over the gypsy moth virus and has some safety profits as well."

Injections and Pheromones

For one who does not wish to use biological agents or resort to spraying, injections are also possible. Injections of Bidrin, made at the base of the tree, become effective within 24 hours and sometimes as early as six hours, according to Dr. Arthur Costonis, president of Systemics Inc., in Massachusetts. Injections to the root flare send the poison throughout the tree. Only insects which eat the leaves are affected. "The poison stays six times as long as a spray—30 days conservatively, and up to 60 days. A minimal amount is used, only target trees are treated, it's non-blowing and the concentration found in gypsy moth larvae is almost non-detectable. If you compare it cost-wise, biologically-wise, efficacy-wise, as far as I'm concerned there are no disadvantages," says Costonis.

Costonis injected the street trees in Babylon, Long Island. "We did 30-40 trees at a time," says Costonis. Costonis estimates that it takes approximately 20 minutes, from the time you leave the truck until you pick up the last capsule, to inject

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If policed properly, no danger to humans or animals exists. Costonis warns that if not policed properly, that is, if the capsules are not supervised while they are in the ground and removed before the applicators leave, you're "asking for a hell of a problem." Once the chemical with a concentration of 80 percent is in the tree, the danger of poisoning is minimal. "When seven or eight milliliters are put into trees which flush through 150-200 gallons a day, you get a dilution factor. An insignificant amount remains in the trees. You'd have to eat an awful lot of leaves to become ill," Costonis claims. "If the rules are followed, you can get 75-80 percent foliage protection."

Some experts fear that the injury the tree sustains during the injection may make the cure worse than the disease. Dr. Alex Shigo, chief scientist of the USDA's Forest Service Northeastern Forest Experiment Station in Durham, NH, states that "injections properly done can be beneficial; injections improperly done can be harmful." Shigo says that often holes are too deep, too wide and too far from the base of the tree. Too much pressure is also applied. "Don't go beyond the current growth ring," Shigo warns. "We have to trade off the injury to the tree with the benefits it gets. The process of injection will be with us; it's our responsibility to find ways to inject for the benefit of the tree and not to the detriment of the tree."

Costonis concurs and draws an analogy with a human doctor. "If you shoot yourself up with a compound, you get hurt. If a doctor does it the risk is minimal."

Arborists throughout the Northeast had positive results with their sporadic usage of injections. Ellis Allen of Allen Tree Experts, Inc., in Medfield, MA, summed up the feelings of many when he said although injections are effective they "won't take the place of sprays. They're too slow. Two men can't inject as quickly as they can spray. It's good for use on isolated trees or for people leery about spraying."

Sex pheromones were also used with mixed results. The scent given off confuses the male gypsy moth in order to decrease mating. It can also lure gypsies into traps. The expense, the incredible number of eggs spawned from one successful male and the fact that the traps draw the moths onto your property before they are caught prove that pheromones, like most weapons against the gypsy moth, are not a panacea.

Moth is a Nuisance

In late June, the gypsy moth stops chomping on trees and starts to pupate. From then on, the gypsy moths are more of a nuisance than any-

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thing else. "The moth's sole purpose in life is to mate," Walt Dages explains. Pesticides to stop the moths are not in use because they are either too expensive, or, like DDT, have been outlawed.

Consumer Reaction

Given that all the weapons against the gypsy moth have their advantages and their disadvantages, consumers beleaguered by the insatiable insects were bound to be frustrated. Some firms realized that during a crisis such as this one, education has to supplement insect control. "There was more education and a lot of media coverage this year. The crisis was more fully understood in 1981," according to Walt Dages. Dages's firm, the Bartlett Tree Expert Company, sponsored public meetings to further educate the public.

"From midwinter on, even before the season began, we had educational meetings to teach about the gypsy moth," says Dages. "They were extremely well attended. We held them in town halls and school auditoriums, people spilled out into the hallways. Very intelligent questions were asked. We always made sure there was a scientist, usually an entomologist, on hand. The meetings were very effective—you learn what to expect and what not to expect."

The Haupt Tree Company sent letters out to its clients at the end of the season. The letters were a "recapitulation of the season. We want people to be prepared for more," says Eric Haupt.

Even with the education and publicity, all was not quiet on the public relations front. People who had been sprayed but were unaware of the effective date of application, complained when they were revisited by the gypsy moth. People who were unable to get through to any tree companies and helplessly watched their trees lose their leaves, complained. People who feared the side effects of aerial spraying also complained.

Some arborists complained about inaccurate media coverage and emotionalism emanating from environmentalists. Old allegations that Sevin produces birth defects were resurrected and vehemently denied.

"By and large," according to Haupt, "the people we serve were very understanding. There was relative calm. A majority of our existing and new clientele had an understanding of the nearly crisis nature of the infiltration."

Refoliation Debate

The issue of refoliation surfaced and divided environmentalists and arborists. Dr. Dick Plunkett pointed to the Taconic State Parkway in New York as a good example. "Three weeks ago," Plunkett said in mid-July, "hundreds of thousands of acres were defoliated. The Taconic was

completely bare with nothing in sight; it looked like the landscape of the moon. It's now refoliated—you can't say you have a denuded landscape anymore."

"That doesn't mean there weren't trees that died," Plunkett continued. "Defoliation does accelerate tree mortality. In one or two years the number who would have died in eight or ten years, die. But those are the diseased and damaged trees, it will even out in the long run."

Some arborists contend that statements made by Plunkett and others foster a false sense of complacency. Plunkett and his compatriots maintain that they are trying to calm the hysteria and place the "crisis" in proper perspective.

All agree that "defoliation certainly doesn't help the tree." Dr. William Wallner, Forest Service research project leader for the ecology and management of northeastern forest insect pests, explains that after a "defoliation of one or two years, the tree is susceptible to invasions by secondary organisms, which are attracted to a weakened or declined tree. Whether a tree will die or not depends on other factors as well. After a complete defoliation in forest areas, it takes up to ten years to get back to what is considered normal growth."

Refoliation depletes the starch reserve of the tree, thus reducing the amount of food energy reserves that the tree needs to maintain itself during the winter months and to bud in the early spring.

This year, some trees that refoliated still had larvae on them and were defoliated for a second time around.

Better Luck Next Year?

While the various controversies and debates about the 1981 gypsy moth infestation have yet to die down, arborists are digging in for the 1982 infestation. Preliminary reports based on the number of egg masses laid seem to point to another busy year for arborists. "Unless we have a very cold winter or there's a great deal of disease, we could be due for even greater gypsy moth infestation and even greater defoliation," Plunkett warns.

This year's incredible infestation may have tipped the scales against the gypsy moth. Many larvae starved before they fully developed. The egg masses of females might be smaller and therefore more susceptible to egg parasites. The population of predators might increase.

Even if next year's infestation is worse than this year's, slightly different areas could be the hardest hit. Wallner compares it to an "old war movie with guns in the distance and big flashes at night. The pattern of movement is from the core area. They're blown out of the area, and they

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spread into another area." Mullane agrees: "They start in an area adjacent to what was worst."

Next year, arborists should be better able to handle the gypsy moth. Mullane observes that "each year some improvements are made over the previous year. We were more prepared this year than last. We had minimal equipment breakdown. This year we didn't have as many headaches with chemicals as we had the previous year. The pH of the water we were using would change and it would affect our spraying. This year we used litmus paper to test the water. We saw that it did change in some streams and became very alkaline."

Marilyn Mulhern of Woodwind Associates, Inc., Princeton, NJ, says that next year they'll have "more effective planning. This year we were running and putting out fires, we have to tighten up the planning."

Arborist's Windfall?

Was all this activity a windfall for the arborist? "It's an expensive proposition," says Walt Dages. "Everyone thinks the tree companies are cleaning up. We're doing an awful lot of billing, but the profit margin is not all that different. Infestation kills trees. Tree companies can't work on dead trees. It's not all favorable."

Richard E. Almstead, president of Almstead Tree Company, Inc., in Westchester, NY, says that the "picture everyone paints that we're all making a fortune is a lie. What with time-and-a-half for overtime, working Saturday and Sunday, and the prices that keep on going up, we're not making that much. For instance, chemicals keep on going up. You use a chemical at \$1.50 a pound, you have to reorder it at \$1.75 a pound. You price a job for \$40, it costs you \$38.50. We're doing a great volume, but at the bottom line, there's no great difference."

All the extra work and effort notwithstanding, doubts remain as to whether the gypsy moth has been conquered or if it will ever be conquered. Eric Haupt noticed that the Governor of North Carolina declared war on the gypsy moth. "I wish him luck. There were efforts in the '30s with the Civilian Conservation Corps to eradicate the gypsy moth. Thousands of men worked on a more limited infestation with literally no success."

Arborists will have to keep trying.

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