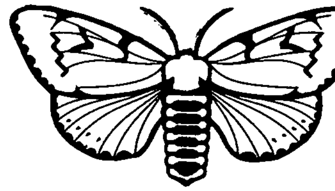


against barriers to trade—within the State, interstate, and in international markets—resulting from quarantines and embargoes.

Eradication programs may, of course, incur indirect costs in the form of undesirable environmental consequences. Information in the "Management options" section (page 9) supports the contention that existing methods can effect eradication of the gypsy moth in Oregon with minimal risk to human health and with acceptably low levels of disturbance of the natural environment.

It should also be noted that ODA, on the recommendation of its Gypsy Moth Steering Committee, has budgeted for and commissioned three research/monitoring studies in 1986-87 aimed at independent documentation of effects of current eradication efforts on "non-target organisms," including certain other insects, birds, and humans.

Suppression

Adopting control methods to hold the gypsy moth to "tolerable" or "minimally damaging" levels represents suppression. Such programs would certainly entail fewer direct and short-term costs than eradication efforts. Inspection and monitoring programs could be abandoned or cut back in favor of simply waiting for complaints from affected citizens, then proceeding to assess the severity of the problem and taking appropriate steps. A problem here, however, is determining to the general satisfaction what constitutes "tolerable" numbers of insects and "minimum levels" of damage. It is not hard to imagine considerable differences of opinion among neighbors on these definitions. Also of concern is the possibility that a suppression policy could, over several years, lead to widespread infestations of increasing intensity. This might require extensive and ongoing suppression programs that could cost more than the expenditures for a few intensive but localized eradication programs.

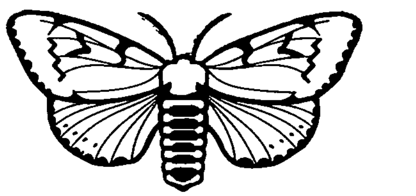
Putting speculation about moth behavior in Oregon aside, there is no doubt that adoption of suppression as the control mode would mean trade barriers for Oregon's agricultural and forest crops. California currently is watching the situation in Oregon carefully. If it worsens, we could see much more stringent barriers at the Oregon-California border. Federal quarantine officials could step in as well, barring exports to other States. And overseas buyers can be very uncompromising in such matters. Estimating these potential costs is difficult, but annually they could exceed the current year's budget for the ODA eradication program.

Inaction

Many Oregonians are students of ecology and appreciate concepts such as "the balance of nature." Hence, there is a tendency here to "let nature take its course" when pests become a problem. We'd also prefer to have our tax dollars spent on more appealing projects than insect control. So, many will ask, why bother about the gypsy moth at all?

The main reasons are that the gypsy moth is an exceptionally potent and adaptable pest and, perhaps more importantly, it is an *introduced* pest. The creatures that helped hold it in check in its homeland are not present here. Nor will they soon be successfully introduced. It is unlikely that "natural forces" will be able to hold the moth to innocuous levels here in Oregon. Hope was once common in the Northeast that the gypsy moth would eventually become simply a periodic annoyance. This has been dashed by the realities experienced there over the past decade.

Inaction against the gypsy moth will doubtless save dollars in the short run. And it will completely avoid the risks of various kinds associated with suppression and eradication programs. But it carries with it the near certainty of the continuing trade-barrier costs described under "Suppression" (above) *and* the prospect of massive suppression costs later if the "worst case scenario" of *broad-scale infestation* should materialize in Oregon.



Management options

Several techniques or products can be employed in management of gypsy moth populations. Choices are governed in part by the program goal(s); however, their effectiveness and acceptability are influenced by biological, economic, sociological, and political factors, as well. The following sections describe physical, biological, and chemical control measures. Benefits and limitations of these options for managing gypsy moth populations are summarized and compared in table 2 (page 12).

Transportation restrictions

Measures to protect Oregon from unintentional import were mentioned in the section on strategic options. In addition to those actions aimed at preventing life forms of the gypsy moth from entering with vehicles crossing Oregon's borders, ODA has imposed quarantines within the State.

The gypsy moth quarantine recognizes a potential threat of movement of the pest by human activity to areas where gypsy moth does not now exist. Areas protected by the quarantine include uninfested locations in Oregon and extend to other States and countries.

Provisions of the quarantine require that ODA be notified before any property is moved from a quarantined area. The quarantine includes objects on which egg masses or pupae are most likely to occur: wood and wood products, outdoor furniture, vehicles, and nursery stock.

In addition, it requires that Christmas trees grown within the quarantine area be sprayed in a prescribed time and manner with approved insecticides, and that sprayed trees and environs be inspected by ODA personnel. Gypsy-moth-free certificates are issued to persons or firms who comply with the requirements of the quarantine.

All wood products operations, loggers, truckers, mills, and byproduct handlers of bark and fuel woods who move their commercial products outside the Oregon (and USDA) quarantine areas of Lane and Douglas Counties must comply with ODA procedures. Much more restrictive measures are likely if the gypsy moth becomes permanently established in Lane County. Both intrastate and interstate product movements will become increasingly difficult as attempts are made to prevent spread within the State and across State lines. Additionally, should eradication efforts be discontinued in Oregon, USDA would be compelled to place the entire State under Federal quarantine restrictions.

Sterile release

In this population-control strategy, large quantities of gypsy moth eggs specially treated to produce sterile adults are released into the environment so they will hatch and develop at the same time as the gypsy moth population to be controlled. Fertile ("wild") females mate with sterile males and produce infertile eggs. The population typically declines markedly. Since both sterile and "wild" larvae feed on foliage before mating, some damage in the year of treatment will occur.

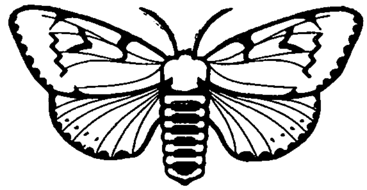
This is a new and experimental technique that has promise for gypsy moth suppression. It cannot be used effectively with insecticides, because sterile larvae would be killed. It might be used as a "mop-up" treatment a year after insecticides were applied. Not ready for general use, it will be tested in 1986 on a small infested area in Oregon, under the auspices of USDA's Animal and Plant Health Inspection Service (APHIS).

Pheromones

The female gypsy moth pheromone (sex attractant) is produced artificially in the laboratory and used to attract males in monitoring programs and for population reduction by trap-out or mating disruption programs.

Trap-out. This technique aims to attract males by pheromone and capture them in sticky traps. If all or most of the males in a given area are trapped, fewer females will be fertilized, and the population will decline. Used alone, this technique can achieve a measure of suppression, but it is not feasible for eradication except in situations of very low populations and easy access for trap placement.

Mating disruption. With this technique, larger amounts of pheromone are released into the atmosphere from specialized, slow-release carriers broadcast widely over the infested area. The pheromone confuses males, which then are unable to locate females. This has the same effects as trap-out of males, namely, reduced fertilization of females and subsequent population decline. The technique is most effective as a followup to direct control activities. Mating disruption treatment can be applied by aircraft and, therefore, is feasible over difficult terrain. Not so labor-intensive as trap-out, mating disruption techniques are usually less costly. Both trap-out and mating disruption are highly specific to the gypsy moth and have no undesirable environmental effects.



Predators

The gypsy moth may be attacked and killed by numerous predators. Among those that have been most studied are flies and wasps that place offspring in or on the eggs, larvae, or pupae of the insect. The immature stage of these specialized predators then consume the body contents of the gypsy moth. Insect predators from the native range of the gypsy moth (Europe and Asia) are the most effective and specialized.

Approximately 12 exotic species of natural enemies of the pest have become established in the Northeast. These predators have not alleviated the gypsy moth problem, but they have contributed to suppressing numbers of insects and their damage. Other predators of variable importance include certain beetles, rodents, and birds. While research is currently underway in Oregon on this technique, applications are several years away from effective implementation here.

Pathogens

In this approach, an artifically created disease outbreak is used to control a gypsy moth population. Naturally occurring pathogens are applied to foliage on which larvae are feeding. The pathogens are applied to the foliage in spray; often two or three applications are required. More applications and the treatment of larger buffer zones around infested areas are necessary where eradication is the goal.

Two organisms, a virus and a bacterium, are registered for use in controlling gypsy moth populations. The nucleopolyhedrosis virus (NPV) infests only the gypsy moth. It takes over the cell nuclei of late-instar larvae and directs the cells to produce only the virus. Eventually, the cells—and thus the larvae—die. The gypsy moth NPV is not yet commercially available.

The bacterium, *Bacillus thuringiensis* (Bt), infects larvae of the gypsy moth as well as those of most other *Lepidoptera* and some sawfly species. Bt insecticidal formulations are composed of bacteria spores and the endotoxin crystal produced by Bt bacteria. The crystals paralyze the insect's gut. The insect stops feeding within hours and dies within 1 to 2 days. Because it acts as a stomach poison, Bt must be ingested (eaten) by larvae to be effective. Bt kills a high percentage (70 to 90+) of gypsy moth larvae when applied properly; hence, it has been a popular and effective part of many suppression programs. Used alone, it is unlikely to achieve eradication quickly, except on small infestations.

Bt, while generally less effective than the best of the synthetic chemical insecticides, enjoys the advantage of being cleared for use in sprays applied over streams. Hence, it can be used to reach gypsy moth larvae that might escape treatment in stream buffers required for chemical sprays. Bt shows promise for use as a companion treatment with chemical insecticides for areas where surface water is common.

Although Bt belongs to a genus of bacteria that includes many human pathogens, there is little evidence that it has capacity to initiate infection in humans. Experiments in mammals show that after ingestion of very high doses, the organism can be recovered in the blood for up to 3 weeks without any indication of infection. There are two cases in which humans suffered infections associated with Bt, one in a skin wound and the other an eye infection, both after heavy acute exposure. Monitoring of Lane County, Oregon, after the use of Bt in 1985 showed that the organism was distributed throughout the area, even in locations not sprayed. Several cases of possible primary or secondary infection were investigated, but preliminary findings do not indicate that Bt use resulted in human health problems.

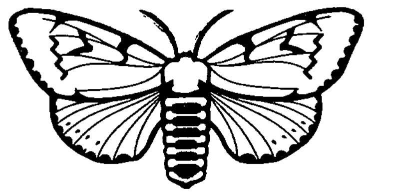
Chemicals

Several synthetic chemical insecticides are registered (approved) by the U.S. Environmental Protection Agency (EPA) for use against the gypsy moth. They may be applied as a spray either aerially, from helicopter or airplane, or from the ground. Spray programs are timed to kill the young larvae. Generally two applications are required. Three commonly used synthetic insecticides are carbaryl (Sevin), acephate (Orthene), and diflubenzuron (Dimilin).

Carbaryl (Sevin). Carbaryl is a carbamate insecticide that reversibly inhibits the enzyme acetylcholinesterase. This enzyme removes the substance that transmits nerve impulses from one nerve fiber to another or to an organ such as muscle. If the transmitter substance is removed, nerve pathways become hyperactive, the extent dependent on dosage.

Carbaryl has long been a preferred insecticide for controlling lepidopteran (mothlike) pests, including the gypsy moth. It has a longer effective life than Bt (up to 4 weeks) and also kills larvae on contact or by ingestion of sprayed foliage. Like most chemical insecticides, carbaryl is less specific than biological agents such as Bt, and its use represents a somewhat greater risk to nontarget organisms (bees are a particular concern).

Acephate (Orthene). Acephate is an irreversible cholinesterase inhibitor of the organophosphate class. It causes the same kind of effect as carbaryl, but remains active for a shorter period of time (about a week). As with carbaryl, the use of acephate carries increased risk to



nontarget organisms. Like carbaryl, it kills larvae by contact or stomach poisoning.

Diflubenzuron (Dimilin). Diflubenzuron is a halogenated diphenyl compound that inhibits an enzyme essential to forming the chitinous cuticle (outside skin) of insects. Affected insects die when they molt. Because this insecticide works on an enzyme system and life process (molting) that is limited to insects, crustaceans, and certain fungi, it carries a lower general risk to nontarget organisms. It is effective over a longer period than either acephate or carbaryl. Since becoming registered for use against gypsy moth, it has been generally favored for use alone and in combination with other nonchemical control methods.

These three synthetic chemical insecticides are effective when ingested. Carbaryl and acephate are also effective on contact; diflubenzuron may have some contact activity. Bt has none. If applied properly, the synthetic insecticides will eliminate up to 98 percent of a gypsy moth population.

Additional information. Readers interested in more detailed and definitive information on these and other synthetic chemical insecticides are referred to the *National Environmental Impact Statement* (EIS) for the Gypsy Moth Suppression and Eradication Project prepared in 1984 by the U.S. Department of Agriculture-Forest Service and the Animal and Plant Health Inspection Service (APHIS). Also of interest (and perhaps more intelligible to the general reader) is the 1985 draft addendum to the EIS. The latter, referred to as the "plain language version" of the EIS, is further described in "Control efforts in Oregon," page 14. The EIS documents are available at ODA, Salem; and at offices of the Regional Forester, U.S. Forest Service; and APHIS, Portland.

Combination treatments

Combinations of the control measures previously described can be used to secure higher levels of suppression or eradication and/or to suit particularly sensitive environments. Many such combinations have been proposed and utilized. The following have potential in Oregon.

Pathogens and pheromones. The effects of Bt can be enhanced by using pheromones to interfere with reproductive efforts of survivors of the Bt treatment. This combination minimizes hazards to nontarget components of the environment. Bt treatments combined with trapping-out of male moths has been a successful eradication strategy in some locations where traps are easily placed. Where extensive forested areas in difficult terrain are infested, trapping-out is not a feasible alternative.

We don't yet know how effective Bt treatments followed by pheromones for mating disruption would be in eradicating extensive infestations. However, the concept of using mating disruption to prevent reproduction of survivors of Bt sprays appears sound where eradication is the goal. Since neither Bt nor pheromone treatments limit the dispersal of ballooning larvae, fairly wide buffer zones are required around the margins of infested areas with Bt/pheromone control programs.

Chemicals and pathogens. This approach involves the application of a chemical insecticide during egg hatch, and just after, to minimize dispersal of young larvae from the treatment area. Because egg masses vary 1 to 4 weeks in timing of hatch, this approach may require more than one application of the chemical insecticide. Two or three applications of Bt are then used on feeding larvae that might have escaped the earlier chemical spray.

Chemicals and pheromones. This combination has the advantage of minimizing dispersal by young larvae through use of a chemical insecticide (such as carbaryl) that kills by contact. One or more applications may be necessary, depending on timing of egg hatch and the chemical used. Later, one or more additional sprays are used against the older larvae that escaped the early treatments. A likely chemical for the later spray is diflubenzuron, because of its better target specificity as compared to most other chemicals. The final blow to the insect would be pheromone treatment with trap-out or mating disruption, as appropriate to the area, to block reproduction among survivors of the spray treatments.

The chemicals plus pheromone approach could be especially effective for eradication of gypsy moth infestations. However, it calls for use of more chemicals than most other options, thus raising the question of increased risk to nontarget organisms. Of course, this approach would have to be modified in areas with streams or other sensitive sites where no chemicals can be applied. In such locations, buffer sprays with Bt would be substituted for the chemicals.

Chemicals, pathogens, and pheromones. This complex approach uses a toxic chemical to block or minimize small larvae dispersal, followed by multiple applications of Bt to kill larger (feeding) larvae, and broadcast application of the gypsy moth pheromone to block mating of any surviving adults. It combines the advantages of the integrated use of chemicals and pathogens (above) with the pheromone as an insurance factor. The latter could make the difference between achievement of a major population suppression and eradication.

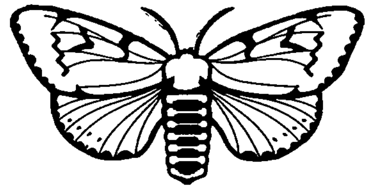
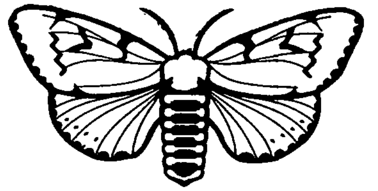


Table 2.—Benefits and limitations of selected gypsy moth management options

Options	Benefits	Limitations
Transportation restrictions	Prevents introduction of gypsy moth and other pests; nontoxic; use complementary with all control options.	Labor-intensive; time-consuming; not thorough.
Sterile release	Nontoxic to humans and other nontarget organisms; specific to gypsy moth; use complementary with pheromones and transportation restrictions.	Foliage damage could occur while sterile insects develop into adults; possibility of fertile individuals; experimentally used with localized infestations; may be more costly and less effective in high-density populations; use not complementary with control methods other than pheromone mating disruption. Complicates monitoring with pheromone-baited traps during years of sterile insect release.
Pheromones		
Trap-out	Nontoxic to humans and other nontarget organisms; specific to gypsy moth; use complementary with pathogens, predators, chemicals, and transportation restrictions.	Restricted effectiveness of range in individual traps; males may mate before they are trapped; eradication unlikely except in very low-density populations; use not complementary with sterile releases.
Mating disruption	Nontoxic to humans and other nontarget organisms; specific to gypsy moth; use complementary with pathogens, predators, sterile releases, chemicals, and transportation restrictions.	Untested for eradication of large populations; may complicate followup monitoring with pheromone-baited traps, particularly during year of treatment.
Predators	Relatively inexpensive; relatively specific to gypsy moth; self-perpetuating; use complementary with pheromones and physical measures.	Species may not establish; species may require years for establishment; unlikely to effect eradication; level of suppression could be ecologically or economically unsatisfactory; acquisition may be difficult; not fully complementary with pathogens, sterile releases, or chemicals.
Pathogens		
Bacillus thuringiensis (Bt)	Easily applied; available from numerous commercial sources; no residue problems in food chains; relatively nontoxic to humans and other nontarget organisms; reasonably priced; use complementary with pheromones, some predators, chemicals, and transportation restrictions.	Not a contact poison (small larvae may disperse before infection); may infect larvae of other lepidoptera and some sawfly species; requires multiple applications; timing and weather are critical; use not complementary with sterile releases or some predators.
Nucleopolyhedrosis virus (NPV)	Essentially same as for Bt except specific to gypsy moth.	Essentially same as Bt, except specific to gypsy moth; not yet commercially available.
Chemicals		
Carbaryl	Rapid kill of larvae; contact toxicity; easily applied; readily available; reasonably priced; use complementary with pheromones, pathogens, some predators, and transportation restrictions; foliage residue effective up to 4 weeks.	Toxic to nontarget organisms, particularly other insects that may be directly contacted (bees may be protected by confinement, removal, or timing); fish are sensitive at levels that might occur with oversprays; some bird toxicity may occur following scavenging of insects; may alter bird and fish food supply; multiple applications necessary for eradication (timing and weather are important); use not complementary with sterile release or predatory insects.
Acephate	Same as for carbaryl, except stronger contact poison.	Has similar disadvantages to those of carbaryl; less residual activity, so timing of spray more critical.
Diflubenzuron	Selective for chitin-synthesizing organisms; virtually nontoxic to adult insects and vertebrates, including fish; otherwise similar to carbaryl and acephate.	May cause decrease in populations of aquatic insects and arthropods, with recovery in several days. Use not complementary with sterile release.



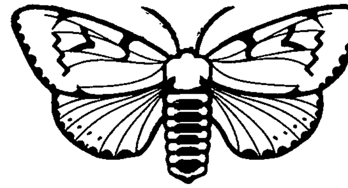
Where streams are present, combination spray programs are employed to avoid chemical spraying in buffer corridors along the streams. Bt is substituted in buffer strips to avoid having these excluded zones serve as refuges for larvae. Appropriate combinations of chemicals and pathogens reduce the total amount of chemical applied, thus reducing associated hazards and environmental concerns.

In general. All four combination treatments could be used to good effect in local suppression programs. Each of them has the capacity to achieve eradication, given proper execution and favorable weather conditions (no rain for several days) following spray applications. However, while the probability for eradication increases generally from pathogens and pheromones, to chemicals and pathogens, to chemicals and pathogens and pheromones (table 3), there is no certainty that even this last one will achieve eradication. It must be expected that in situations like the recent Lane County outbreak (where a population went undetected for several years and achieved large numbers over a wide and varied habitat), several years of concentrated effort will be required to achieve eradication.

Table 3.—Estimated costs and relative probability of success of gypsy moth management strategies (includes some techniques untested over large areas, but which hold particular promise for successful use in eradication efforts)

Strategy options	Estimated cost[1]	Probability of suppression[2]	Probability of eradication	Comments[3]
Transportation restrictions	See text, page 9.	0	0	Used to reduce introduction and spread.
Sterile releases	Insufficient data	Insufficient data	Insufficient data	Experimental use planned for 1986.
Pheromones	$20-30/acre	Low-med.	Low-med.	"Trap-out" used successfully against very low-density populations.
Pathogens (Bt)	$40-50/acre	Medium	Low-med.	Wide buffer zones recommended to control dispersing larvae.
Pathogens and pheromones	$60-70/acre	Med.-high	Medium	Wide Bt buffer zones to control dispersing larvae. Choice between trap-out or mating disruption with pheromones depends on area's accessibility.
Chemical insecticides	$40-50/acre	High	Med.-high	Compounds used depend on situation.
Chemicals and pathogens	$50-60/acre	High	Med.-high	Compounds used depend on situation.
Chemicals and pheromones	$60-70/acre	High	High	Compound(s) and pheromone approach depend on situation.
Chemicals, pathogens, and pheromones	$70-80/acre	High	High	Compound(s) and pheromone approach depend on situation.

[1] Per-acre cost for complete *eradication* package, including multiple applications as required for maximum efficacy. Costs will vary considerably with size of area, changes in costs of materials, and bargaining effectiveness of contracting agency.
[2] With suppression as the goal, fewer applications and/or lower rates may be feasible; hence, costs will be lower than estimates listed above for eradication.
[3] For additional detail, particularly on hazards and risks, see table 2 and the section on "Management Options," page 9.



Control efforts in Oregon

The history of ODA's attempts to exclude and to eradicate the gypsy moth is a fascinating story (see ODA's 1986 report, "References." page 16). The future of that program is clouded, however, by concerns and litigation over the use of chemical insecticides and, more recently, by threatened reductions in Federal assistance funds for pest management. What does it all mean? Where are we headed? What can we do? Let's review the situation.

Detection and monitoring

With the knowledge that the gypsy moth was spreading aggressively in the Eastern United States and that spot infestations were occuring in neighboring Western States, ODA began a limited detection program, using pheromone traps in the late 1970's. That program has grown each year as spot infestations were located and patterns of infestations in urban and rural areas were better understood. In 1985 ODA, the Oregon Department of Forestry, the U.S. Bureau of Land Management, and the USDA's Animal and Plant Health Inspection Service (APHIS) and Forest Service cooperatively placed 35,000 pheromone-baited traps throughout the State. Since trapping is essential to detection and to planning of control, these groups plan a similar effort in 1986.

Control measures

In 1981, ODA's trapping program showed that a breeding population was becoming established in the Salem area. ODA decided to attempt eradication of this and succeeding infestations. Following an extensive public education program in 1982, ODA contracted spraying of an area of 4,000 acres with the chemical insecticide carbaryl (Sevin). Precautions were taken to cover streams, and some ground spraying was done in sensitive areas.

A year later, only a few moths were trapped in the treated area, but more than 100 moths were caught south and southeast of the treated area. This was attributed to wind-blown dispersal of newly hatched larvae to areas outside the spray area before treatment. Subsequent (1984) low-level infestations in several communities were eradicated by three applications of Bt, followed by trap-out of remaining males—Salem (8,470 acres), Portland (2,32[illegible] acres), Gresham (320 acres), and Corvallis (960 acres).

In 1984, a major infestation was detected in Lane County. Federal and State quarantines were imposed on 768,000 acres suspected to be infested. In the spring of 1985, in a well-coordinated effort involving ODA, the Oregon Department of Forestry, and several allied Federal and State agencies, Bt was sprayed over 225,000 acres—including both Federal and private lands—within this zone. Three applications were made, with higher dosages applied to areas known to support heavier populations. Weather conditions were exceptionally favorable; rain did not substantially interfere with the planned program.

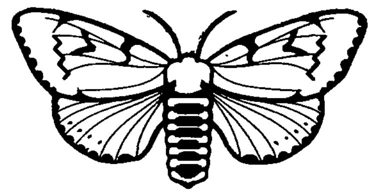
Posttreatment trapping surveys revealed very substantial reductions in moth populations in the treated area, but several new infestations were revealed in areas adjacent to the spray blocks. These are believed to have resulted from "gaps" in pretreatment trapping data that resulted in improperly drawn boundaries on the spray area in certain localities. Early aerial dispersal into these areas may also have been a factor. ODA plans a followup Bt spray program in the Lane County area in 1986. The nature and extent of this and other followup efforts will be influenced by legal and financial considerations (see the following section).

While the major battle was underway in Lane County in 1985, a new threat was identified near Glide in Douglas County. Here a highly localized infestation was located in a recreation area along the Umpqua River. At this writing, ODA and local citizens groups are interacting in development of plans deemed appropriate for an eradication effort for this particular locale.

Legal constraints

Currently, ODA's option to prescribe the use of chemical insecticides as an alternative or complement to Bt in its eradication programs is temporarily suspended by order of the Federal court having jurisdiction in Oregon.

Under Federal regulations governing use of insecticides, materials must first be authorized for use ("labeled"), a process involving lengthy and careful toxicological studies to determine whether a chemical can safely be used and prescribing conditions under which it may be used. The three chemicals described previously are all labeled by the EPA for use against the gypsy moth. Next, if a labeled insecticide is to be used in a "Federal program" (one including Federal lands or Federal funds), a detailed analysis of environmental hazards incident to its use in that



program must be prepared. Such a statement is called an Environmental Impact Statement (EIS).

The national EIS governing the gypsy moth program in Oregon is now under injunction: None of the candidate chemical insecticides can be used in Federal programs until "deficiencies" of the EIS are resolved. According to the presiding judge's statement, the EIS was defective because it was difficult to read and to understand. Corrections for this deficiency have been submitted to the court, and a decision on the EIS is expected soon. (See footnote.)

The biological insecticide Bt, which has been exempted from the strictures of the injuction, is thus the only insecticide currently available for gypsy moth suppression or eradication programs on Federal lands or in federally funded projects. Since all current ODA programs involve Federal funding, that agency's management of the gypsy moth in Oregon currently involves only the selective use of pheromone-baited traps to monitor the insect's activity, dispersal of sterilized eggs in a federally-funded experimental eradication attempt, elimination of small infestations by trap-out, eradication of localized infestations with Bt followed by trap-out of remaining males, and attempts to restrict the movement of gypsy moth into the State.

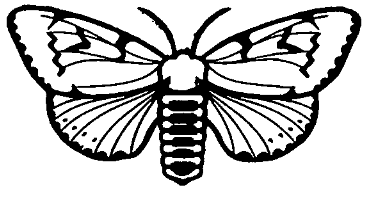
On private ownerships, particularly on Christmas tree farms, substantial use of chemical insecticides is expected to continue—ironically, because ODA's quarantine requires their use if trees are to be marketed outside the quarantined area.

On April 18, 1986, while this publication was being prepared for printing, Judge James A. Redden of the U.S. District Court, Portland, lifted his ban against use of synthetic chemical sprays in Federal cooperative programs for control of gypsy moth. His decision was based on his acceptance of the revised EIS described above. Judge Redden's decision means that state and Federal action agencies, such as ODA, may again consider chemical insecticides for use in their gypsy moth control programs.

Funding concerns

Costs of ODA's programs to minimize gypsy moth introductions into Oregon and to monitor and eradicate infestations continue to mount. These costs took a major leap with the discovery of the massive Lane County infestation. Costs of completing the eradication effort there and in the smaller outbreaks elsewhere around the State will continue to be significant. Of major concern is the threat of major reductions in Federal funding for this and subsequent insect eradication efforts.

For a time in 1986, it appeared that ODA would have to drastically reduce its Bt spray program in Lane County because Federal APHIS officials were unsure of availability of Federal matching funds. That scare has been averted with the emergency release by the USDA Forest Service of funds originally budgeted for other purposes. But prospects for Federal matching funds for gypsy moth programs in 1987 are not promising. It may well be that Oregonians will have to decide how much they are prepared to pay for gypsy moth "control" on their own, and how they want these resources invested.



Concluding statement

The gypsy moth has recently infested localized areas of western Oregon. Its capacity for defoliation of many of the trees and shrubs native to and commonly planted in Oregon poses a threat to forests, agricultural crops, and urban and rural landscapes, as well as to associated values and resources. Public decisionmakers and concerned citizens currently are grappling with questions over appropriate management goals (eradication, suppression) and management options (pheromones, pathogens, chemical sprays, etc).

The Oregon Department of Agriculture's present commitment to eradication of current and future infestations of the gypsy moth warrants thoughtful examination. If that commitment is abandoned or frustrated, and if strategies of localized suppression or "wait and see" are adopted instead (or accepted by default), Oregon will have to bear the very substantial costs associated with barriers to trade in agricultural and forest crops, and the stigma attached to "gypsy moth states." We will also have to live with the possibility that localized and low-intensity infestations could, as they have recently in the Northeast, become highly aggressive, with serious damage to commercial forests, wildland ecosystems, and ornamental plants; modification of fishery and wildlife habitats; increased use of insecticides; downgrading of property values; seasonal environmental degradation; and allergy-related health problems among segments of the population.

Decisions about the *methods* to be used to secure eradication or various levels of suppression of localized infestations (which we have described and evaluated) can and should continue to be examined on the basis of local conditions and considerations, and reexamined in the light of advancing technology and growing experience in Oregon. But it must be understood that the decision on the larger and central issue of immediate concern to Oregonians—i.e., whether to go for eradication or suppression within the State—cannot be deferred. If eradication is reaffirmed as the goal, that decision must have citizen support for the prompt, continuing, and costly program required for its achievement. For if the gypsy moth becomes firmly established in Oregon—and we are dangerously close to that situation now—no further reasonable opportunity for eradication will exist.

Readers who want further information are referred to the papers listed below, and to their local Extension agent or service forester.

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