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## MICHIGAN'S COOPERATIVE FOREST PEST MANAGEMENT PROGRAM, A TEAM APPROACH TO IMPROVING FOREST MANAGEMENT

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### ABSTRACT

A forest management team was organized in the late 1970's by cooperative efforts of Michigan's universities, the Michigan Department of Natural Resources, and the USDA Forest Service. The goals were to devise new technologies, transfer available technology, and provide service and management alternatives to forest land managers in Michigan. The program throughout has emphasized forest management rather than pest management for prevention and control of pests. Dissemination of pest management information has been of prime importance and new research results have gone directly to land managers for immediate use. The team participates in forest compartmental reviews and helps prescribe management plans for land parcels, thus providing for preventative pest management. Services and management recommendations are provided mostly through forest pest specialists located in the field. They feed back results and problems to researchers and extension specialists of the team for further input. Preventive management information used by local managers in recent years has nearly paid the cost of the program. Plans are to broaden the team effort by cooperating with organizations and agencies in adjacent states through a computer network system and by other means.

### NEED FOR A PROGRAM

Michigan is richly endowed with forest resources. Within its boundaries are 18.8 million acres of commercial forest land, and it ranks fifth among states in the amount of forest acreage. Michigan's 3.8 million-acre state forest system is the largest in the nation. The largest portion of Michigan's forest (54%), however, is owned by farmers and other private non-industrial individuals who collectively hold about 10 million acres of the commercial forest land. Michigan's remaining forests are held by federal and industrial agencies. Approximately 700 forestry professionals manage or assist in managing Michigan's public and private forest land.

In the past Michigan has had an excellent forest pest survey and information gathering program, particularly in the 1950's and 1960's. During this period about 20 people from several agencies cooperated to provide land managers with up-to-date pest information. But during the late 1960's the number of forest pest researchers and information specialists in the several public agencies declined substantially. By the early 1970's only eight forest insect and disease specialists were in Michigan, and they were located primarily in research units. Although research pertaining to current pest problems in the state continued, most of the results from this research were not transmitted to forest managers and others concerned with protection and use of the forest resource. Without an effective information delivery process the research and information transfer program became passive with little or no feedback between researchers and field managers regarding the need for solving pest problems. Consequently, new forest managers entered the field work force without pest management support, and little consideration was given to potential

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pest problems during regular forest management programs. Some management practices even encouraged or promoted rather than prevented pest problems. During this period there was a heavy emphasis on reforestation, which because of a high demand to plant trees, placed some plantings off site. For example, red and jack pines were planted on sites with high risk from Scleroderris canker (*Gremmeniella abietina* (Lagerberg) Morelet), Saratoga spittlebug (*Aphrophora saratogensis* (Fitch)), and eastern gall rust (*Cronartium quercuum* (Berk.) Miyabe ex. Shirai). Lacking pest management support, some forest managers began to adopt the attitude that "perhaps little could be done about most pests, so why worry?" This attitude prevailed in the late 1970's when we began to organize a new pest management program to help alleviate the pest problems facing Michigan's forest land managers.

THE PROGRAM, STRUCTURE AND FUNCTION

In 1978, three organizations: Michigan State University, Michigan Department of Natural Resources (DNR), and the USDA Forest Service, initially pooled personnel and resources to form the Michigan Cooperative Forest Pest Management Application Team. The University of Michigan and Michigan Technological University soon joined. The purpose of this cooperative effort was to devise new technology, transfer existing technology, and provide pest monitoring services and practical management alternatives to the forest manager.

The team has three directors, one from each of the founding organizations (Fig. 1). The three organizations represent three disciplines: research, extension, and application. For convenience all of the directors are located in the Lansing area. They cooperatively plan

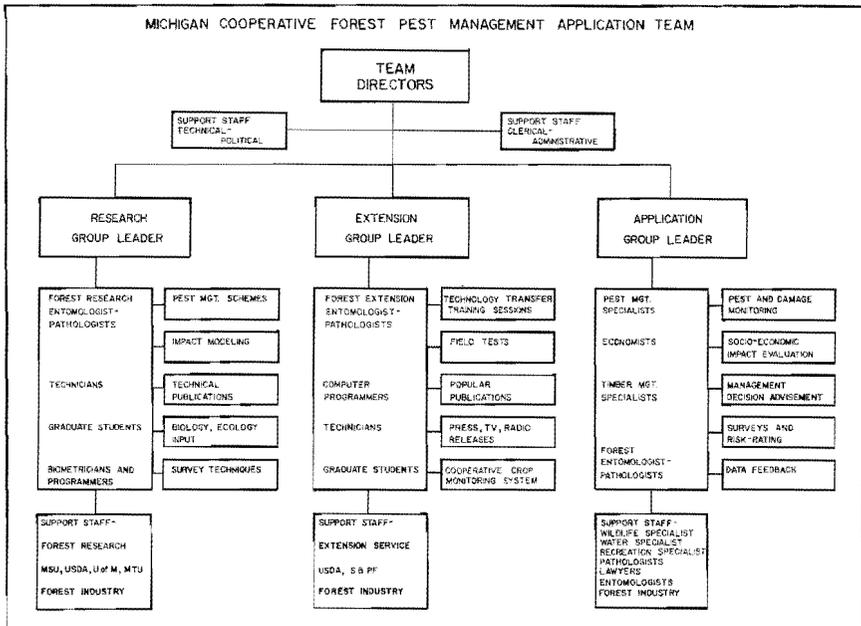


Fig. 1. Organizational chart of Michigan's Cooperative Forest Pest Management Application Team with functions and support staff.

programs and coordinate team efforts, and each director doubles as a group leader of specific programs within his area of specialization.

The Research Group Leader and research team members address forest managers' needs by studying specific forest pest problems. Other forestry research groups, universities, and industries are solicited for cooperative studies and other input into the research process. Research goals include developing pest management schemes, developing techniques for monitoring, and devising impact models. The research program is coordinated by the North Central Forest Experiment Station (USDA Forest Service) and the departments of Entomology, Forestry, and Botany and Plant Pathology at Michigan State University (Fig. 2). Group leaders and team members from the University of Michigan, Michigan Technological University, and other agencies are included in planning research.

The Extension Group Leader and extension team members field-test research results and communicate information to land managers and pest specialists. Research and application team members are an integral part of the extension effort and participate in activities such as directing training and writing articles. Information is disseminated through various media, how-to publications, pest management leaflets, and the Cooperative Crop Monitoring System (CCMS), a state-wide network that provides up-to-date pest and crop condition information for agriculture and forestry. Skills are imparted through technology training sessions. The extension program is conducted by the departments of Entomology, Botany and Plant Pathology, and Forestry at Michigan State University, and the Forest Management Division of the Michigan DNR. Extension specialists coordinate technology transfer programs with the user groups and other extension agencies, such as the Cooperative Extension Service at Michigan State University and State and Private Forestry, USDA (FPM). Close contact is maintained with the Extension Service network and forest industry.

The Application Group Leader and team members assist land managers in applying pest management technology. The group monitors pest populations, rates sites for risk,

AGENCY INTERACTIONS AND PRIMARY FUNCTIONS FLOWCHART

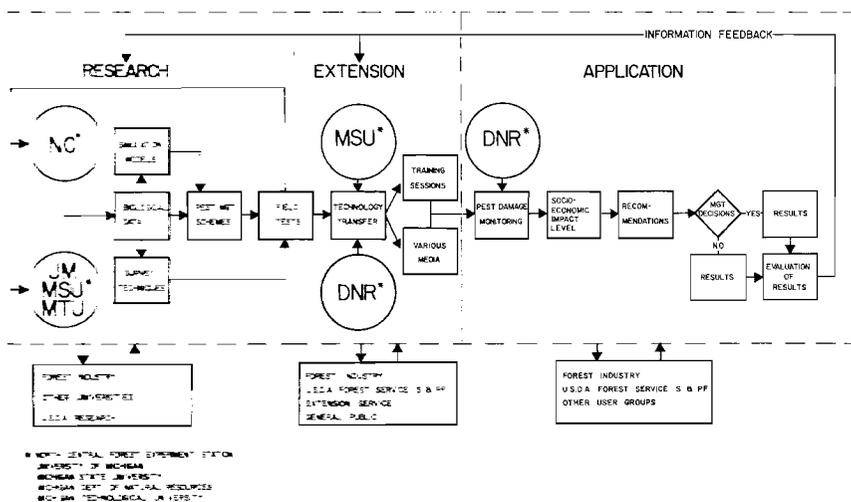


Fig. 2. Agency interactions and functions of Michigan's Cooperative Forest Pest Management Application Team.

evaluates the socioeconomic impact of pest problems, and advises land managers of the consequences of pest management options. Recommendations provide practical alternatives compatible with multiple-use concepts. Currently, responsibility for application is primarily that of the Forest Pest Management Program in the Forest Management Division of the Michigan DNR. The forest pest specialists consult with state, private, and industrial forest land managers. Research and extension group leaders help apply research; and as results, needs, and shortcomings surface, they help to formulate new research and extension programs.

### DISTINCTIVE FEATURES

The Michigan Cooperative Forest Pest Management Program is firmly dedicated to helping fulfill forest management objectives by providing forest land managers with practical pest management information to improve decision making. This goal emphasizes forest management rather than pest management. Pest management is a component of forest management, not a separate entity that directs forest management activities. A holistic approach with full knowledge of forest management goals and objectives is essential to successfully introduce and implement forest pest management technology.

Disseminating pest management information is of prime importance in the new program. As research results are developed, they are reported directly to the forest land managers. This approach differs from the tradition of first submitting research information to technical journals or presenting it at technical meetings and workshops after which nonresearch personnel interpret and transfer the information. It is important to involve scientists in application of their research because they are most familiar with it and will benefit the most from user reviews. This is the fastest and most effective way to introduce new technology and receive much needed feedback to guide research goals and objectives.

Another important feature in the new pest management program includes pest management planning during the DNR forest compartment reviews. The Forest Management Division of the Michigan DNR reviews and prescribes management plans for all State forest land over a 10-year period, with 10% of the compartments being examined each year. Each compartment averaging about a thousand acres is reviewed by an interdisciplinary team consisting of multiple-use forest managers, fisheries biologists, wildlife managers, and forest pest specialists. The pest management team considers this participation a major activity in implementing the program.

The pest management specialist position is an important program feature. Customarily, field personnel are hired for pest management programs with specific expertise in either entomology or pathology. In Michigan, forest pest specialists must be both fully trained in forestry and proficient in forest entomology and pathology. This training lends credibility to the pest management specialist, and in turn facilitates information transfer.

The strongest interagency team effort and commitment is another important feature of the program. Cooperation is the universal thread that binds the system. A team can also solve problems more efficiently and effectively.

### OBJECTIVES

Six specific objectives guide the program.

First objective: bring together expertise from various cooperating organizations. Several agencies working together as a team can accomplish more than several agencies working independently and this integration can more quickly link research to extension and application.

Second objective: investigate forest pest problems and develop pest management strategies. Primary pest problems are chosen for research on the basis of their potential socioeconomic impacts.

Third objective: raise the level of awareness of forest land managers to pest management issues and concepts and improve their skills in dealing with them. Training is important in

any program. Knowledgeable managers can more readily recognize pest management needs and will likely interact more readily with pest specialists.

Fourth objective: assist forest land managers in pest monitoring, evaluation, and decision-making. Pest specialists need to take part in the forest planning process and be able to pass on new survey and control information as developed.

Fifth objective: assist forest land managers in applying pest management strategies to deal with specific pest management situations. Land managers are usually not aware of all pest management alternatives; therefore, the pest specialist is available to provide old and new strategies and predict certain socioeconomic consequences.

Sixth objective: assess effectiveness of strategies to provide feedback to research and extension to adjust or improve pest management strategies and provide better technology transfer.

### PROGRAM EVALUATION

Traditionally, forest pest management programs report accomplishments and are evaluated in terms of readily measurable outputs such as numbers of acres surveyed or numbers of acres treated with pesticides. These figures certainly indicate activity, but not necessarily effectiveness. In fact, large control programs may signify a failure to prevent economic damage from pest outbreaks.

Good management first stresses pest prevention, an approach that reduces the negative pest losses and inherent shortcomings of reaction or control management. However, it is much more difficult to evaluate a program based on the effects of preventive pest management than it is to measure direct suppression (i.e., number of acres sprayed). It is not easy to calculate the number of pest outbreaks avoided, nor is it easy to measure the positive results of better management decisions.

One of Michigan's pest problems serves very well as a quantitative measure of the potential gains of preventive pest management. The Saratoga spittlebug is a major pest of plantation red pine, one of the principal timber species that has been used extensively for reforestation in Michigan. This insect requires an alternate host such as sweet-fern (*Comptonia asplenifolia* L.) for part of its development. In the past it was all too common for sites with abundant sweet-fern to be planted with red pine without planned follow-up pest management. This led to heavy growth loss, tree deformity, and sometimes the entire loss of a plantation.

Under the new pest management program, a comprehensive spittlebug management strategy was implemented. The first step in the strategy is to risk-rate proposed red pine planting sites to determine the potential for injury. If the site is determined to be low risk, planting is done with no further spittlebug management. If the site is moderate or high risk, three options are open to the land manager. He can (1) not plant red pine, (2) destroy the alternate hosts, or (3) plant red pine and follow up with insect surveys and controls. The choice among options would depend on the management objectives, costs of planting, length of rotation, trees planted per acre, site index, rate of return desired on the investment, and damage potential for the site.

Using information generated by that management system, we can illustrate the value and effectiveness of spittlebug management. During the 10-year period from 1981-1990, Michigan's two state nurseries will produce enough red pine to plant 40,000 acres. This is sufficient to meet planting needs on state forest land and part of the needs on private land. Available economic analyses<sup>4</sup> allow us to determine the best options for tree management and calculate a return on the investment. If those trees are to be planted on sites with an average index of 60 ft at 50 years and an investment rate of 8%, the best options are to

<sup>4</sup>For details of analyses and management options see Heyd, R. L. and L. F. Wilson. 1981. Risk-rating red pine plantations to predict losses from Saratoga spittlebug for management decisions. p. 93-98 in Hazard-rating systems in forest insect pest management: symposium proceedings. USDA Forest Serv., Gen. Tech. Rpt. WO-27.

reduce the alternate hosts on high-risk sites and monitor and control as needed on moderate-risk sites. These options will give a net present value of \$174 per acre more on the high-risk sites and \$44/acre more on moderate-risk sites compared to a no-action option. Experience with risk-rating indicates that about 15% of red pine sites are high risk and about 25% are moderate risk. We can derive a potential dollar value for the pest management approach for Michigan by the following:

High-risk sites (.15 × 40,000)	= 6,000 acres × \$174/acre =	\$1,044,000
Moderate-risk sites (.25 × 40,000)	= 10,000 acres × \$44/acre =	\$440,000
		<u>Total \$1,484,000</u>

Thus, the projection for the 1981–1990 period could potentially earn \$1,484,000 more on the investment with spittlebug management than without it. Annually this is \$148,000. The annual cost of Michigan DNR's pest management operation is about \$140,000, so we can see that in this instance alone the value of managing a single pest could pay for the entire program. Of course, if we expanded the example to include the value of managing spittlebug on the entire red pine acreage in the state, the benefits of forest management decisions could be much greater. And these results could increase even more if the benefits of applying pest management to other major pests such as white trunk rot of aspen, jack pine budworm, or spruce budworm are included.

#### LOOKING AHEAD

At this early stage of its existence, Michigan's Cooperative Forest Pest Management Program has purposefully remained provincial, but anticipates growth and eventual regional involvement with other forestry agencies. In the beginning it was important to have the initiating organizations in close contact for efficiency and rapid communication, but these organizations are not sacred to program continuity or expansion. As our program evolved it has had a constant "going and flowing" and not just a rigid structure of boxes and lines that the organizational chart portrays. Eventual development of the program to serve all forest land managers in the Lake States or the North Central Region is a desired goal. Forest land managers throughout the region need access to pest management alternatives and monitoring techniques. Increased cooperation among personnel from federal and state agencies, universities, and forest industries is essential if factual, up-to-date information useful to forest managers is to be presented in the shortest possible time. In addition, we believe it is essential that future expansions of these programs maintain the direct contact between research-extension personnel and field land managers if problems are to be rapidly solved.

As the program grows we need to be constantly aware of new and improved information delivery systems. Practical pest management guidelines within easy reach of pest specialists and forest managers are in short supply. We need a practical looseleaf manual that contains current pest management strategies. It should be one that can be updated as new information becomes available. Also, we plan to use more electronic information gathering, storage, and retrieval systems. Remote access terminals will eventually be available to users to identify pests and seek sound pest management schemes. Currently this program is tied into the Statewide Cooperative Crop Monitoring System, which is designed to assist field personnel in Michigan to collect, coordinate, and summarize pest abundance and damage information and then report summaries back to survey personnel and decision-makers. Reporting pest information is an essential step in this program, but we still need access to stored information so we can immediately deliver survey procedures and solve problems as they arise. Such a network of computer terminals can ideally be part of a regional program.