

IPM Program for Ornamental Nurseries in Wisconsin¹

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The Nursery IPM Program began in May 1991. Funding for the program was provided by a grant from the Wisconsin Department of Agriculture, Trade and Consumer Protection (WDATCP) Sustainable Agriculture Program. This funding source was responsible for the Coordinator's salary, travel and all expenses associated with setting up demonstration sites as well as educational programs and publications for the nursery industry.

The Coordinator was responsible for administering all aspects of the project. This included the hiring and supervision of the program scout, soliciting participation in the full and partial IPM scouting programs, organization, registration and delivery of monthly twilight seminars during the growing season as well as a two-day winter workshop on pest management, pest reporting to

the WDATCP's Cooperative Pest Survey Bulletin, submitting regular articles to the Wisconsin Nurserymen's Association monthly publication, The Green Side Up as well as the development of a scout training manual and the Woody Ornamental Pest Control Guide.

Additional sources of funding for the project included a per acre charge which was allocated to cover the expenses associated with scouting. This charge was assessed to all growers participating in the Full IPM program whereby the program scout monitored enrolled nursery stock on a biweekly basis beginning in mid-May through late August. Surveys distributed to the participating nurseries at the end of the first field season indicated they would pay as much as \$30 per acre for the service provided.

SCOUTING PROGRAM OPERATION

Because early pest detection is critical to the implementation of a successful IPM program, a scouting service was offered to all nurseries in the demonstration area in southeastern Wisconsin.

Abstract - An Integrated Pest Management Program was developed to assist the growers of woody landscape plants in Wisconsin reduce their chemical pesticide inputs through educational instruction on pest identification and the implementation of a stock monitoring program. The nursery IPM program offered alternative pest management options along with the timely implementation of traditional strategies. Educational programs gave growers the opportunity to sharpen their pest identification skills which in turn improved their pest management ability.

During the first year of the scouting program, the scout monitored nursery stock on a weekly basis. This frequency was decreased to biweekly since it was determined that the changes in pest populations over a seven day period were relatively insignificant. Follow-up spot checks were made between regularly scheduled visits as needed to observe pest population dynamics.

The scouting procedure was primarily visual with some use of pheromone traps as necessary. Because most nurseries contained many different species of plant material, it was necessary to examine a sample of each species in each field. Through the use of the key plant and key pest concept as well as phenology, it was possible to reduce the need for the scout to examine every plant species at each visit. By tracking the development of pests through degree day accumulations and indicator plant events, we were able to estimate which insect pests had reached an injurious stage in development. In a single day, the scout could be expected to monitor approximately 30 acres. This number may increase if there are large areas of a limited number of species, such as conifer

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transplants designated for Christmas Tree production.

Prior to each scouting season, a brochure describing the services offered was sent to every licensed nursery in the demonstration area. This list of nurseries was obtained from a database at the WDATCP State Nursery Inspector's office. A close working arrangement was upheld between the State Nursery Inspector and the Project Coordinator throughout the duration of the program since a similar interest, that of maintaining the highest quality of nursery stock possible, was the mission of both.

During the first year, six nurseries totalling 58 acres, enrolled in the program. In 1992 the number rose to nine nurseries and 115 acres; while during the third year, although two additional nurseries were added to the program, the acreage per nursery dropped. Financial constraints imposed by the struggling economy were suspected to be the cause.

The Full IPM Program was designed to target nurseries between 5 and 50 acres in size. It was not cost effective from a nursery standpoint to enroll large acreages in the program. Likewise, it was not cost effective from a program standpoint to scout very small acreages unless they were in close proximity to other enrolled nurseries.

In 1992, a partial IPM program was created whereby existing nursery employees were trained to do their own scouting. Nursery employees would monitor their stock on a biweekly basis and a report was submitted to the IPM Coordinator. Five nurseries, totalling over 700 acres, participated in this program. This

project was less successful than the Full IPM program due to a lack of reporting by many of the nurseries in the program.

At the beginning of the season, the Coordinator visited each participating nursery to obtain a history from the nursery operator. Information derived from this history included the length of time in the industry, planting dates, history of the field prior to planting, soil type and soil test results, drainage, historically significant insect pest problems and their treatment, historically significant diseases as well as treatments and problem weeds. During this visit the Coordinator also presented a contract to the nursery owner for their signature. The contract specifically described the location of the stock to be monitored as well as the monitoring period.

The scout's report contained information on the quality of the stock inspected as well as any pests present. Insects, diseases and plant nutrition were the primary components of the program. A three-ply carbonless form was developed which provided information to the grower on the pest identified, its stage of development, damage site and severity, abundance of the infestation and distribution throughout the planting. Temperature, weather conditions, including wind speed, and pesticide applications were also recorded. A copy of the report was left with the nursery manager upon completion of each visit. Information was discussed as needed. A second copy of the report was given to the county horticultural extension agent for pest management recommenda-

tions. No control recommendations were made by the scout. The third copy was kept on file with the Coordinator for reference at later scouting visits.

Periodically throughout the season, the Cooperator would visit the enrolled nurseries. This was primarily to answer any questions the nursery operator may have as well as discuss any concerns regarding the scout's performance. At the end of the season, a written summary was compiled by the Coordinator for each participating nursery. The report included a listing of each pest identified and future recommendations for long-term management of the problem.

PEST FINDINGS AND PEST MANAGEMENT PRACTICES

In 1992, a survey was sent to 100 growers of coniferous and deciduous nursery stock to determine their pesticide use practices. The project was a joint effort between the Nursery IPM Coordinator, the Wisconsin Agricultural Statistics Service and the Wisconsin Nurserymen's Association. Funding for the project was made available through a grant from the National Pesticide Impact and Assessment Program.

The results of the survey were interesting and somewhat unexpected. When asked what the top ten pests of nursery stock were, growers responded that weeds, deer, rabbits, aphids and eastern tent caterpillars were their top five problems both in terms of abundance and economic impact.. However, in discussions with

various nursery operators as well as observations made by the scout, it appeared that verticillium wilt; annual foliage-feeding insects such as plant bugs, leafhoppers, aphids and leafminers; and foliar pathogens such as apple scab and anthracnose were their main concerns. One explanation for such a discrepancy is that prior to the nursery IPM program, symptoms of problems such as verticillium wilt were unknown to the industry whereas weeds and deer damage were readily apparent and identifiable. Through educational programs, the industry has become more aware of some of the subtle problems which, preceding the nursery IPM program, were unrecognized as being related to diseases and insect pests.

Other topics polled in the survey include the current usage of non-chemical management practices. Over 90% of all respondents indicated that they used at least one type of non-chemical pest management strategy. Response to a question regarding the number of acres treated with a specific active ingredient disclosed that herbicides are most widely used in the surveyed population.

Another component of the Nursery IPM Program was the introduction of the use of phenology in determining the proper timing of pesticide applications, particularly in the case of insect pest management, has reduced pesticide use in many nurseries. However, there are still nurseries which exist in Wisconsin that espouse the idea that it is appropriate to treat all nursery stock with a broad-spectrum insecticide to control all insects which may

be present at a given period. For the majority, however, spot treatments at the most susceptible stage in the insect's development has become the rule.

Weekly reports in the WDATCP Cooperative Pest Survey Bulletin alert growers throughout the state to degree day accumulations and insect development. Recommendations were made for the application of pest management practices based on this phenological information. The reports were brief and concise and fit readily into the busy schedule of the field operators.

The regular availability of educational programs, which prior to the inception of the Nursery IPM Program were virtually non-existent, has improved growers' pest identification skills. Subsequently, this has reduced the number of unnecessary pesticide applications made. During the summer twilight seminars, growers were offered an opportunity to share information with each other. This may have been as important as the information presented by the evening's speaker. Also, tours of host nurseries afforded participants a first-hand view of some of these ideas in practice. A case in point was illustrated by the nursery which successfully established a rye cover crop. Participants at that evening's program were able to question the nursery owner about what variety of rye was planted, where the grower purchased the seed, the cost of the seed and specific planting instructions such as what equipment was needed and the seeding rate. Several participants left the meeting with a much clearer grasp of the concept

of living mulch. They are now in a better position to present the idea to their supervisors and/or coworkers for consideration.

EDUCATIONAL PROGRAMS

In addition to the scouting and pest reporting aspect of the Nursery IPM Program, a strong educational program was also developed. This consisted of monthly twilight seminars during the summer, a two-day pest management workshop in February, monthly articles on pests of woody landscape plants in the Wisconsin Nurserymen's publication, the Green Side Up, the development of a scouting manual and the Woody Ornamental Pest Control Guide as well as increased coverage of pests in the weekly WDATCP Cooperative Pest Survey Bulletin.

The Nursery IPM Twilight Seminars were designed to take an informal, hands-on approach to pest problems and other issues related to pest management in a nursery setting. Nurseries throughout the demonstration area volunteered to host these programs. Speakers were contacted to discuss issues related to pest identification and management. There was no preregistration necessary and the seminars were free of charge. Attendance was not limited to people associated with the nursery industry. After the first meeting, arborists, landscapers, grounds maintenance personnel and municipal workers also began to attend because the programs had a reputation of presenting valuable information for anyone concerned

with the culture and care of woody landscape plants.

Some of the topics discussed include insect identification and management, disease identification and management, weed identification, non-chemical alternatives to weed management, plant nutrition, new cultivars, living mulch for weed suppression, pesticide regulations and worker protection standards, regulated pests in Wisconsin and a hands-on display of the effects of cultural practices on the tree root system.

Alternative weed management practices were presented at one more than one seminar. Alternative practices include the use of a living mulch or cultivation between the rows in lieu of broadcast herbicide applications. This will reduce the amount of herbicide used to only a two-foot band within the row, while the remaining 10-12 feet between rows remains untreated. When compared to traditional broadcast herbicide treatments, herbicide banding does not present an economic savings. On the contrary, nurseries which practice clean cultivation have actually increased their cost by approximately \$150/acre. The benefit from the standpoint of surface and groundwater quality is great and this tends to be the driving force behind the continuation of this practice. However, one must also consider the impact of clean cultivation on soil erosion.

A living mulch or cover crop may offer an alternative to traditional chemical weed management which provides both a reduction in surface and groundwater contamination by chemical herbicides as well as a reduction

in the amount of erosion. In Wisconsin, the nursery industry is divided on their opinion on living mulch. The benefits have already been presented, now the costs must be weighed. The greatest concern lies in the competition between the cover and the desirable stock for nutrients and water. Preliminary research indicates there may be as much as a 10-20% reduction in caliper size when a living mulch is used. Other concerns relate to the potential increase in pest populations depending upon the mulch chosen. The potential for favorable rodent nesting sites was also a concern. At this time, there are nurseries which are strongly in favor of implementing a living mulch system. Demonstrations at these nurseries, through the Nursery IPM Program, have already been responsible for convincing some skeptical growers of this practice.

A more in-depth treatment of the pest problems associated with woody ornamental culture was offered at a two-day winter pest management workshop. The program was presented in both 1992 and 1993 and is expected to continue annually. During the first year, we offered both basic and more advanced topics to the participants. Basic insect taxonomy and plant pathology were offered to bring all participants to an equal level of understanding. From there, the program advanced to discuss some of the specific disease and insect pests of coniferous and deciduous stock. Other topics included nutrient deficiency and toxicity symptoms and recommendations as well as nutrient management. Also, an introduction to the symptoms of

abiotic or environmental disorders and vertebrate pest damage was presented.

Because many people attended the program in 1992, the 1993 workshop was designed to be two one-day seminars with the first day covering the same material as the 1992 program and the second day being devoted to in-depth studies of nutrient and pest problems. This allowed participants to enroll in either day depending on their knowledge base. Participants were also allowed to enroll in both days if desired.

Attendance for both pest management workshops was excellent - the upper limit was reached both years and a waiting list was created. Some of the comments from participants indicated that the programs were very informative. They would like to see the programs continued and would like them to concentrate on specific pest problems and promote discussions in these areas. The use of slides which depicted field symptoms was beneficial and their future use encouraged. On the negative side, participants felt that too much time was spent on the presentation of microscopic identification of fungi and too many graphs and charts were used by some speakers.

The project Coordinator maintained a column in the Wisconsin Nurserymen Association's monthly publication, the Green Side Up. Each month a particular pest or topic related to integrated pest management was discussed. Each pest-related article included coverage of the damage symptoms caused by the pest, identifying characteristics of insects, life

cycles or disease cycles when appropriate, scouting tips and management strategies.

PEST REPORTING PROJECT

With the advent of the Nursery IPM Program, increased coverage of the pests of woody landscape plants appeared in the WDATCP Cooperative Pest Survey Bulletin. Sources of information on pest sightings in Wisconsin included the program scout's reports and the state nursery inspectors' reports. During the second year, nurseries in the partial IPM program who were responsible for their own scouting also provided pest reports. In addition, a strong cooperator network was developed and cooperators from throughout the state provided pest reports.

During the second year, pest predictions were also offered in the Cooperative Pest Survey Bulletin. A weather network was utilized with the assistance of the Extension agricultural meteorologist. Degree-day data was collected from several sights statewide and updated daily. Subscribers to the University of Wisconsin's WISPLAN weather network were able to access up-to-date weather information to aid them in pest management decisions. For the majority of nursery operators who did not subscribe to WISPLAN, degree-day information and pest predictions were provided weekly in the Cooperative Pest Survey Bulletin. This offered growers a more timely source of pest information. Reports of pest sightings may be 10-14 days old by the time the nursery operator receives the

information. Often this is too late to act. However, now growers are alert to pest outbreaks before they occur.

Overall the Nursery IPM initiative in Wisconsin has been well received. During the remainder of 1993, the project will be turned over to various agencies and individuals outside of the University of Wisconsin. In particular the Wisconsin Nurserymen's Association and the Wisconsin Department of Agriculture, Trade and Consumer Protection will be responsible for the continuation of many aspects of the program. It is expected that the Nursery IPM Program will be continued for a long time to come and that the nursery industry in the state will continue to reap the benefits of this initiative.

