IPM: How it is Done at Studebaker Nurseries, Inc.

Dan W. Studebaker
Studebaker Nurseries ,Inc , 11140 Milton-Carlisle Road, New Carlisle, Ohio 45344

Nearly 40 years ago, as researchers noted building insect resistance to blanket pesticide cover sprays, an ecological approach to pest management began to develop that now is know as Integrated Pest Management (IPM). IPM incorporates not only chemical, but also biological, physical, mechanical, and cultural controls into a pest management system that can be more economically efficient and environmentally sound (Davidson and Cornell, 1988). Using **MULTIPLE** pest control tactics, built upon a regular program of monitoring pest levels, the IPM user **MANAGES** insect populations in order to minimize both economic damage to crops and hazard to the environment and humans Linda Fisher, the Assistant Administrator of Pesticides and Toxic Substances of the EPA, stated recently about pesticide usage, "Horticultural practitioners, will have to be prepared to adapt new methods or materials in all aspects of your operations You will have to find ways to use less pesticides and lower risks" (Fisher, 1991) This directive speaks to part of the reason for the burgeoning interest in IPM over the last decade, but the reasons go beyond the EPA's tightening policies.

WHY IPM?

Our industry finds itself in a period of transition from an over reliance on chemical pesticides As a result of wide spread prophylactic use of insecticides, an ever-growing number of insecticide-resistant pests have evolved, up to 800 species currently. Crop damage increases as do the applications of pesticides in effort to gain control With an estimated 90% of the insecticide applied not hitting the target pest, environmental contamination results (Metcalf and Luckmann, 1982). Beneficial predator insects are reduced and secondary insects can become serious primary pests. The presence of pesticides in food, water and every part of the ecosystem has fueled increasing environmental legislation resulting in less availability of pesticides in the future. Rising concern for worker safety and public exposure to widespread use of pesticides is building. Increasing costs of chemicals and the labor to apply them adds to the drive to cut back the amount of chemicals growers apply. With this in mind, we turned to IPM to provide a realistic alternative program for pest management that would satisfy our commitment to reduce chemical usage at our nursery

HOW IPM?

In 1988 a pilot IPM project was developed through the Ohio Cooperative Extension Service that began in 1989 at our nursery and two other southwestern Ohio nurseries. At our nursery, a dedicated worker was selected as the nursery scout and trained in techniques to monitor pest and disease incidence/abundance to enable us to make better informed pest control decisions Using routinely scheduled scouting, more spot spray (or no spray) applications are identified for many pests thus reducing the incidence of over-applying chemicals. Through use of pheromone traps and visual monitoring techniques, growing pest populations can be detected

early and control measures can be properly timed to achieve a high level of economical and effective past control.

Beginning about mid-April, the scout begins his weekly monitoring checks. Since he cannot get to every nursery block in the time allotted, his monitoring is focused upon primarily saleable blocks containing key plants that are more susceptible to a wide variety of insect, diseases and cultural problems The primary target of scouting is to identify and quantify the level of key pests which are those usually present, usually damaging, and therefore, usually requiring control on key plants. Key diseases were also targeted for inspection on key plants in the IPM scouting plan:

I. 1991 IPM Scouting Plan

A. Saleable Block (weekly) vs. non-saleable blocks (bi-weekly)

II. Key insects

A. IPM easily detected
- bagworms
- pine sawfly
- caterpillars
- mite
- aphids
- scale

B. IPM not easily detected and controlled
- Peach tree, ash-lilac, banded ash, bronze birch borers
- black vine weevil
- Zimmerman moth
- European pine shoot moth
- leafhoppers

III. Key diseases

A. IPM non-chemical control
- fireblight
- nectria canker
- black knot
- septoria canker
- nutrient deficiencies
- bacteria leaf spot
- verticillium wilt
- crown gall

B. IPM Preventive chemical control
- apple scab
- rusts
- anthracnose
- juniper tip blight
- septoria leaf spot
- phythium
- phytophthora
- rhizoctonia
- botrytis

Key insects and diseases listed in A-category are more easily detected by regular systematic checking by a scout They can be managed with lessened chemical inputs through spot sprays where pest infestations are localized; through sanitized pruning to remove diseased tissue and other mostly cultural manipulations to reduce verticillium wilt, leaf spot in high pH problems.

The B-category of insects is not as easily monitored as their presence is often detected only after evidence of plant damage is discovered. Where possible, trapping procedures are used to determine dates key insects are first caught or observed by the scout on weekly checks. Selective, preventative pesticide sprays can then be applied within an optimal time frame to coincide with the pest's vulnerable or most damaging stage For example, we spray susceptible tree and shrub species 10 days after the capture of the first clearwing borer moth so as to just precede the larvae hatching and burrowing into the bark.

Where pheromone traps are not available for trapping the Zimmerman and European pine shoot moth or bronze birch borer adults, we refer to the "COINCIDE The Orton System of Pest Management" to determine effective timing of pesticide sprays using the blooming stage of *Viburnum opulus* and *V. dentatum* as indicator plants (Orton and Green, 1989). Suspected black vine weevil (BVW) infestations in *Taxus* are scouted using burlap traps or flat boards placed in the row under plants that are checked for hiding adults (Mulgrew, 1989). BVW presence and evaluation of pesticide applications can be monitored by using a box with fine screening to sift a thin layer of soil from directly under the plants and carefully checking for adults.

The B category of key diseases is usually controlled with traditional preventative chemical sprays. However, in drier years, apple scab and juniper tip blight incidence are lessened and sprays can be reduced accordingly, depending on scouting reports.

Weekly scouting reports provide a written report of pest and disease problems in specific blocks. The data recorded on the IPM Drive Around Form is **Block Number**, **Host Species and Cultivars**, **Type of Pest or Disease**, **Abundance** (none, trace, low, medium or heavy), **Incidence** (localized, scattered or general), **Life Stage** (egg, crawler, nymph, larvae, pupa, adult), **Damage** (none, trace, low, medium or heavy). The field manager uses the report to determine the appropriate pest management action necessary block by block. The scout follows a master IPM Scouting Plan which gives an overall mode of attack for the season. The Scouting Plan contains the following items: six plant **categories**, (conifers, junipers, *Thuja/ Buxus*, deciduous shrubs, *Taxus*, trees), **saleable blocks to weekly scout** of each category by number, **non-saleable to scout bi-weekly** by number (or immediately if problems are found in salable blocks), and **key insects** and **key diseases** to monitor on each plant category. The master scouting plan is updated yearly by the field manager from past years scouting reports plus the semiannual Nursery Inspector's Report which is used as a "report card" of the IPM program Modifications are also made with input from personnel from the Ohio Cooperative Extension Service IPM program who periodically visit to scout pasts and to monitor our progress at the nursery.

It is imperative to the success of the objectives of the IPM program that the scout be allowed a block of dedicated time to complete the scouting plan Beginning mid-April, a scout is budgeted 3 hours daily in which to cover most all saleable categories in a week. Depending on the reports, the plan is amended as needed. More scouting emphasis is spent on categories where more problems are identified and at certain times of the year such as when bagworm larvae emerge from overwintering stage on *Thuja* species or the crawler stage of scale is emerging on *Euonymus alata* 'Compacta'. Scouting is planned for mid-day when insects are more active, the dew has evaporated from plants and the light is better for close visual inspection for pests.

When key insect infestations can be visually located, the scout flags the location with special colored tape so that spot spraying, sanitized pruning and other follow-up measures can be done more efficiently, along with the post-spray evaluations. To check mite infestation levels, the scout carries a small stick, a 17× hand lens and clipboard with a white sheet of paper. Forms of *Picea, Thuja* and *Juniperus* are monitored by striking a selected branch 3 times so that mites present are dislodged

onto the paper and can be counted with the hand lens. This method enable the scout to detect and monitor mite levels well before damaging infestations are reached If through random checking throughout the block, levels of 20 to 25 mites per sample are recorded, then a miticide spray is scheduled immediately to prevent bronzing of foliage.

The placing of pheromone traps to monitor clear wing borer moths has greatly improved the timing and effectiveness of preventative insecticide sprays on borer susceptible trees in the nursery.

Scheduling spraying by calendar dates cannot account for differing environmental factors year to year that affect when pests appear and multiply. The pheromone traps allow the scout to know precisely when adult borers are first present and at what levels The trap contains a synthetic pheromone lure that attracts the male adult (changed bi-weekly) and a sticky coated surface that traps the moth which is changed weekly. The scouts quantify and identify which species of adult moths are present. In 1990 we were able to omit spray treatment on *Quercus* species for virtually no oak clear wing moths were caught in the traps. If peach tree and ash borer adults are still being trapped 6 weeks after the initial spray a second spray is then applied which is usually sufficient for the year. The use of pheromone traps has helped us significantly reduce the severity of damage from clearwing borer moths and the number of preventative sprays needed since IPM began in 1988.

When pests or diseases are located that cannot be identified, samples are sent with a completed information form to the Ohio Cooperative Extension Service Plant and Pest Diagnostic Clinic at Columbus, Ohio for assistance. They can confirm whether a pest or disease is at work, or if purely environmental factors are the primary factor and what recommendations should be followed to alleviate it. References used extensively for identification in our IPM program are listed in the literature cited (Johnson and Lyon, 1976; Nielson, 1989; Sinclair et al., 1987).

COSTS

"Controlling pests should always be approached from the view point of the reduction of a pest population in the most economical and efficient manner, and with the least environmental impact" (Mulgrew, 1989).

The IPM program, besides being a more environmentally friendly program is a more cost effective one for us when compared to blanket, preventative chemical sprays. Having a dedicated scout for 15 to 18 hours a week for 22 weeks is a significant expense. However, we find that every hour spent in IPM scouting equals one hour saved in spraying time. We also gain one more hour of equipment use for another nursery job. The cost of the chemicals that is saved by scouting is savings above the labor tradeoff. We figure that savings at about $2,000 for 1990. Overall insecticide use has been cut in half by using more spot sprays; fungicide use has not changed dramatically because preventative sprays/drenches are still regularly applied to prevent key diseases on propagation cuttings and on container grown plants.

The faithful use of IPM methods unquestionably reduces the amount of plants rendered non-saleable from pest damage. Aside from all the environmental considerations, this benefit of an IPM program is a very significant one in terms of preserving your nursery sales potential.

SAFER CONTROLS

By surveying many chemical alternatives we can select ones that give the highest control on target pests yet are less toxic to humans and the environment. During the last 3 years of our IPM program, we have tripled the amount of horticultural oil applied due to its safety to humans and the environment, and its reasonable cost for wide spectrum control of mite and scale populations The new lightweight 412 summer use oil can now be used relatively safely against immature forms of scale crawler, mealy bugs, aphids, leafhoppers and other soft bodied insects, instead of more toxic pesticides (Johnson, 1985). *Bacillus thuringiensis*, a naturally occurring bacterial pathogen can be substituted to control caterpillars instead of broader-spectrum Sevin which kills beneficial insects along with the target pest. Insecticidal soaps that leave no harmful residues are effectively used against aphids and the crawler stage of scale. By using less toxic alternatives, naturally occurring beneficials can be allowed over the years to regenerate and provide a measure of background control of damaging pests as levels of residual pesticides are reduced

CULTURAL CONTROLS

In trying to solve pest and disease problems the least toxic way, you may find that many plant problems may be managed by simply re-thinking and changing cultural or management practices. There are many and varied examples evident at every nursery that may have been done for many years which can be considered 'IPM Techniques' For example, red clover is cover cropped two years between nursery crops so in "feeding the soil" with organic matter, the stock may be healthier and more resistant to pest infestations Pre-plant treatment of deep tilling, installing drain tile and preparing level liner beds reduces drainage problems and root rot diseases. Tree species that suffer in high pH soils or are susceptible to verticillium wilt are carefully planted away from these areas. Weedy perimeters of fields that harbor insects are mowed regularly. Container grown magnolias are switched to drip irrigation to prevent bacterial leaf spot from overhead irrigation. Propagation watering/misting is scheduled so plants surfaces are dry by sundown to reduce foliar diseases. Improved *Malus* cultivars that have a proven scab and fireblight resistance are grown and customers are sold on the benefits of such. Scattered, over-grown blocks of plants that harbor diseases, weeds and insects are scheduled for clearing so cover crop can be sown. Planting procedures are modified to provide better access and coverage for spraying key plants for key pests, such as two rows of boxwood between four rows of pyramidal arborvitae Short weekly meetings are held between managers for sharing pest activity and information so others can act as secondary scouts.

The IPM frame of mind can spawn endless creative alternative solutions to "adapt new methods...in all aspects of your operations to use less pesticides and lower risks" (Fisher, 1991) To learn more about IPM and setting up a scouting program at your business, inquire about state sponsored programs in your locale or attend seminars at universities where IPM research is conducted. Dr. Richard Lindquist, Entomology Professor at Ohio State University and ORDC In Wooster, Ohio stated, "As we approach the 21st century, pest control will be more demanding for growers than ever before. It will be more effective and socially responsible than any time in the industry's past The growers who prosper will be those who adapt to this reality" (Lindquist, 1991). IPM is an idea whose time is here for everyone to be using now.

LITERATURE CITED

Davidson, J.A. and **S.C.F. Cornell.** 1988. In The Beginning Amer Nurseryman 167(5) 76-86

Davidson, J.A. and **S.C.F. Cornell.** 1988 IPM Parts and Parcel What makes an effective pest control program? Amer Nurseryman 167(8) 91-91

Fisher, L. 1991 Legislative Watch Pesticides and EPA Policy Amer Nurseryman 170(11) 11

Johnson, W. T. and **H. H. Lyon,** 1976 Insects That Feed On Trees and Shrubs Cornell University Press, Ithaca N Y

Johnson, W. T. 1985 Horticultural Oils J Environ Hort. 3(4)189-191

Lindquist, R, 1991 IPM requires adapting to new realities Greenhouse Manager 10(5) 106-110

Metcalf, R. L. and **W. H. Luckmann.** 1982 Introduction to insect pest management 2nd ed John Wiley and Sons, New York

Mulgrew, S.M. 1989 Monitoring adult black vine weevil and strawberry root weevil in field-grown crops using burlap traps Nursery Facts Coop Extension - University Massachusetts L 662 3 pp

Nielson, D. C. 1989 Insect and mite control on woody ornamentals Ohio Cooperative Extension Service Bulletin 504 Columbus, OH

Orton, D.A. and **T.L. Green,** 1989 Coincide. the Orton system of pest management Timing pest management with ornamental plant development Plantsmen's Publications, Flossmoor, IL.

Raupp, M.J., J.A. Davidson, J.J. Homes and **J.L. Hellman.** 1985 The concept of key plants in integrated pest management for landscapes J Arboric 11(11) 317-322

Sinclair, W. A., H.H. Lyon, and **W. T. Johnson** 1987 Diseases of trees and shrubs Cornell University Press, Ithaca N Y.22