Integrated Pest Management

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The following article was written as a partial requirement for Horticultural Science course number 495, a special topic on entomology. Because of its timely information and lucid style, it was selected for publication in the North Carolina Flower Growers Bulletin. Mr. Gumto's family owns and operates a floricultural greenhouse in Pennsylvania.

Integrated Pest Management (IPM) is the newest in a long line of "cure all" solutions to growers' insect management problems. Is it really the savior that the trade journals claim it is? This program contains some fundamental differences that promise a new approach to dealing with insect management. I will attempt to explain the advantages and investigate the costs of IPM with the hope that a fuller understanding of the program before implementation will lead to greater success.

What is IPM? There certainly is as many definitions of this term as there is articles written about it. My particular favorite comes from the Office of Technology Assessment which defines IPM as "the optimization of pest control in an economically and ecologically sound manner, accomplished by the coordinated use of multiple tactics to assure stable crop production and to maintain pest damage below the economic injury level while minimizing hazards to humans, animals, plants and the environment" (Dover, 1985). If this exact definition of IPM could be achieved, it would be appropriately used in the Garden of Eden. To paraphrase, it assures the most control for the least costs and limited external repercussions. The definition also suggests that IPM is perhaps a different attempt at solving, or at least limiting, pest problems than has been attempted in the past. IPM is not a "miracle bullet" that instantly wipes all your troubles away. It is a systematic approach to deal with all pest problems. This different philosophy may be the key that sets IPM apart from past techniques.

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One point which this definition makes that is of particular importance to me is the inclusion of economic considerations. IPM differs fundamentally from other approaches by emphasizing a redefining (not a refining of) pest control strategy and the realization that economic benefits are at least as important to the user as environmental benefits are to the community (Dover, 1985). No one wants to hurt the environment, but since it is a public good, there is an incentive to let the other guy worry about it. (What is owned by everyone is cared for by no one.) By explaining that IPM is a more rational pesticide program on an economic basis, both the interests of the grower and the interests of the community are fulfilled.

There are four broad categories of an IPM program. Some definitions consider up to ten sections. In an effort to keep confusion to a minimum, I favor the four step approach. The first step is pest identification. Inclusive in this area is the knowledge of insect types, the stages they develop through, the kinds of damage they cause, and the types of environment they favor. As much information as possible should be acquired about an insect a grower may encounter. The second step is pest monitoring. This is essential for tracking insect types and for population counts. It provides feedback on what control measures are effective and helps establish thresholds that your business can live with. Keeping in constant contact with what insects are present is essential to a successful IPM program. Pesticide application timing is the third key in the program. This interacts and is based on the first two categories. Applications made at the wrong stage of insect's life or inconsistent with the environmental condition will waste time and money. The last step is record keeping. This information is invaluable in the long run. Knowing trends in control and the effectiveness of certain combinations of procedures will save money and reduce frustration in the future. Keeping accurate records is in effect asking yourself, "What have I learned from using that option?" Such reflections will lead to better handling of pesticides and better results (Miller, 1990).

There are three considerations that an IPM practitioner should understand. First, the organization you are attempting to manage is a part of a functioning ecosystem. This means pests only exist and flourish if an environment to

their liking is available. Often the same environment is desirable for optimum plant growth. In such cases, the environment cannot be altered to discourage pest growth (with some pests environmental manipulation is an option). It should also be realized that an insecticide's success is a function of proper environmental conditions at the time of application. Secondly, users of IPM should accept that having pests does not necessarily mean having a pest problem. It seems the only way to totally eliminate some pests is to eliminate their hosts. If this is economically unattractive, you will have to settle for controlling the pests. Lastly, it is important to consider all possible pest control options. An IPM program needs to be flexible enough to allow experimenting with new methods if they seem appropriate. Because of the diversity of greenhouse situations, not everything will work for everyone (Flint and Van den Bosch, 1981).

IPM was invented as a possible alternative to the setbacks encountered of using other traditional programs. Obviously, it would not be such a popular subject if it did not improve some how on these existing options. What are the benefits of IPM? The current pest suppression program of using pesticides on a preventive basis is becoming increasingly expensive. The continuous application of chemicals to stop a pest problem from occurring can cause pest resistance which then requires the need for more and more volume of an insecticide to produce an equal result (Flint and Van den Bosch, 1981). Eventually the costs of materials, labor, and reduced plant quality outweigh the benefits of spraying. Less control per dollar spent is no long run answer to the problem. IPM is itself a preventive plan, but uses an increased awareness of timing to replace the volumes of chemical uses. This keeps pest damage to a minimum without causing a resistance problem (Dover, 1985).

Another benefit of IPM is the flexibility which allows new innovations to be used within the system as they become available. Advances in areas such as plant resistance, biological controls, exclusion techniques, and even new pesticides can be used immediately. IPM is also flexible in terms of economic benefits of some control potions. The pest management goals are primarily monetary. The market system will provide the optimum selection of quantities and combinations of pest management inputs. Growers reacting to the incentives provided by the market will more quickly grasp the advantages of IPM (Apple and Smith, 1976).

IPM may reduce pesticide use and thus the impact of pesticides on the environment. Although this argument alone will not sway people to utilize IPM, it is certainly a benefit of the program. Neighboring natural resources are in less jeopardy when volume of chemicals used is reduced. The current political climate may lead to government intervention in the application of pesticide, which may then mandate utilizing less pesticides in floral production. If such legislation becomes reality, persons initiating IPM programs early will be in the position to profit from their foresight.

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IPM seems a feasible option when compared with the present control methods being used. Problems such as pest resurgence, secondary outbreaks, environmental contamination, and human health hazards increase the attractiveness of this program (Flint and Van den Bosch, 1981). But as with all programs, IPM has drawbacks. It is important to realize in advance some of the challenges that will be faced when

introducing IPM into your operation. Indirect effects are of particular importance since they are the ones no one expects to have to deal with.

One problem inherent in IPM is the considerable amount of biological information required for a truly integrated pest control system (Burn et al., 1987). This is more of a stumbling block to smaller operations. Larger companies usually have a person whose entire job is pest management. This person would have to have the authority and resources to educate all workers on insect scouting and to open a communication system to inform the management of insect and mite problems. Conversely, smaller companies would have a harder time justifying the salary of a pest management specialist. The information needed to correctly time insecticide applications and knowledge of the effectiveness of different insecticides is not widely available. This makes IPM utilization somewhat difficult.

Another hurdle to implementing IPM programs is the idea of "zero tolerance" (Dr. Roy Larson, pers. comm.). With greenhouse, vegetable, and fruit crops, a blemish left by one pest may destroy the market value of the item. A basic principle of IPM states a certain threshold of insect damage is acceptable. Pesticides are to be used only when damage exceeds this threshold. The zero tolerance philosophy sets that threshold unrealistically low. Unless the present marketing standards can be changed so that some blemishes on these products is acceptable, there seems little hope of producing a classical IPM system that will be relatively acceptable commercially. It is doubtful that the general public will dismiss their present standards to back such a program. The public's revulsion to finding insects, or evidence of their presence, is much higher than their perception (or lack of?) of invisible trace insecticide residues that may be present (Burn et al., 1987).

Criticism has been raised that the research of IPM has been hampered by the policies existing in the Nation's universities. One problem is the fact that IPM is multidisciplinary. This requires a lot of cooperation between researchers to consider all the components of the program. The key to successful research in universities is sometimes seen as producing papers. Researchers are judged on a scale of how many publications they produce in a year. This pressure placed on departments from the university administrators may hinder cooperation between departments. A cooperative effort among say five departments yields one fifth the credit that a single project author receives (Dr. James Baker, pers. comm.; Apple and Smith, 1976).

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Probably the biggest impediments to the acceptance of IPM on a nationwide scale are misconceptions growers have of this program. One misconception is the perception that IPM was invented as an alternative approach to the use of chemicals. IPM simply states that if the chemicals were used at the correct time, then less would be needed. IPM has also been sold by the trade media as "the last program you will ever have to implement". IPM is not a panacea. This attitude harms the program's reputation because people have heard the cure all sales pitch before and it has never been true for long. The third detriment has been the labeling of traditional crop protection as new IPM methods. When IPM became the new approach to pest control, a lot of traditional strategies tried to sell themselves under the IPM label. This was done in an attempt to reestablish old programs and make them look new. The end result gave IPM a bad

name by diluting its performance record (Apple and Smith, 1976).

Integrated Pest Management offers growers an alternative to traditional insect control strategies. IPM is more feasible because it takes into account economic, as well as environmental considerations. Problems such as zero tolerance are important but not unsolvable. As long as growers enter into the program realizing it is not perfect, IPM can be successful. The biggest impediments to the future of IPM exist in the misconceptions of growers and in the insufficient amount of research that is being done on the subject. IPM sets the basis for a successful pest management program and allows enough flexibility to let it adapt to any operation.

Literature Cited

Apple, J.L. and R.F. Smith. 1976. Integrated pest management. Plenum Press, New York.

Burn, A.J., T.H. Coaker, and P.C. Jepson. 1987. Integrated pest management. Academic Press, San Diego.

Dover, M.J. 1985. A better mousetrap. World Resources Institute, Washington, D.C.

Flint, M. L. and R. Van den Bosch. 1981. Introduction to integrated pest management. Plenum Press, New York.

Miller, R. 1990. NY poinsettia growers slash pesticide use and achieve better whitefly control. GrowerTalks. 53(9):56, 58, 60.