New York State Integrated Pest Management Program

Six Steps for Profitable *and* Environmentally Sound Management of Crop Pests

Authors: J. Keith Waldron, Dairy & Field Crops IPM Program Coordinator, Cornell University; Phil Sutton, Dairy and Field Crops IPM Specialist, Cornell University.

How does one successfully balance control of pests with profitable crop production and environmental protection? For many growers, integrated pest management (IPM) techniques provide a very useful and effective means of reaching these two goals. The classical definition of IPM is: a system of pest control that employs the knowledge of many disciplines to manage pest problems in a way that optimizes net profits while minimizing the impact on the environment.

IPM producers utilize a six step approach to successfully manage pest problems. This approach provides individualized crop and pest information to base management decisions on the real needs and condition of the crop.

Six Steps to Successful Pest Management

The following system/approach can help provide the information necessary to detect pest problems before they become significant and avoid unnecessary losses. The system/program involves identification, sampling, analysis, management alternatives, implementation, and re-evaluation. This six step program has big potential for benefits by facilitating "proactive" rather than "reactive" management. Conscientious use of these principles in the order presented will maximize the advantages of using the IPM approach.

How can these IPM principles be applied to crop production? Let's examine each principle in more detail.

Identification

Proper identification is the first, and most important, step in controlling a field problem whether caused by a pest, environmental stress, nutritional deficiency or other factor. This first step is critical to future success, since misdiagnosis leads to mismanagement. Mistaking a disease problem for an insect problem can lead to an unnecessary use of an insecticide or continued replanting of disease susceptible crop varieties. It is also important to know who is your enemy and who is your friend when diagnosing crop problems. Many organisms, particularly insects, can be observed in fields, however, only a relatively few actually harm crops. Before treating a "problem" it is important to recognize friends, such as parasites and predators, that help keep pests in check.

Proper identification generally requires some detective work to determine "who done it?" Fortunately, the identity of most common pest problems is generally predictable. In determining the cause of the problem it is useful to obtain as much information as possible. Answering several questions will help in this process: Is this a historical problem? What type of damage is observed? Is the problem only found in particular locations, rows or drainage patterns or at certain times during the growing season? What part or growth stage of the plant is affected? Dig up plants showing symptoms. Check roots and the surrounding soil for evidence of pests.

Sampling

Once the pest is correctly identified the next question arises: How important is it? Is there risk of it causing significant losses? Correct sampling helps eliminate the guesswork in pest control by providing a means to quantify an old problem or discovering a new one. Is the problem limited to one area of the field or is the whole field affected? What is the extent of the damage? Is the problem a growing threat? For many pests scientific techniques have been developed for assessing damage potential. This knowledge is combined with information on pest and crop biology to help make better management decisions. For example, large cutworms may soon pupate alleviating a problem naturally. Accurate

sampling is systematic and methodical; examining and quantifying all important field information needed to make a sound pest management decision. Properly used these techniques provide data which can be compared to research based information to evaluate need for management actions.

Analysis

The third step in the pest management process is to analyze the information obtained in the first two steps and evaluate it for the need for a pest control action. Time to think and decide how bad it is. Is the damage potential more costly than the control? The observed number or amount of a given pest is compared against reference information which evaluates loss potential at particular crop growth stages. These "action thresholds" are pest control guides that are based on research and experience with similar problems. During the analysis stage the crop compensating and yield capabilities should be considered as well as the pest potentialities. Light pest populations may actually increase yields due to compensation by the plant. Poor stands may not return management dollars. Economic, environmental and time concerns are weighed. What impact will the current pest control decision have on future crop management decisions? It is crucial, however, that a decision must be made, if only to resample in an appropriate length of time.

This and the following step are very interactively linked in the decision making process.

Management Alternatives

When the analysis determines that an action should be taken the next step is to deciding the optimal way to handle the problem. During this stage the costs, benefits, and risks of employing various management options are weighed and evaluated. What can be done to control this pest problem? What are the cultural, mechanical, biological as well as chemical control options? Which is the most practical, cost-effective, effective choice. Does the total management system allow for some options? Alfalfa harvest to control alfalfa weevil may at times interfere with crucial corn planting schedules. Would spraying be a better alternative? Does the control option selected fit with the short and long term plans, labor force, capital equipment or finances of the farm? Is there a need to re-analyze once the management alternative has been chosen and its economics is known.

Implementation

Once the control method is selected it should be implemented with precision and thoroughness. Management procedures should be employed timely manner. Cultivation or using herbicides on weeds, for example, must be done at the right stage of development for greatest impact. Pay close attention to the quality control of pest control actions, such as correct calibration of the application equipment. Look for opportunities to integrate different pest control strategies. Avoid the tendency to use chemicals when effective parasites and predators are in jeopardy or when other equally viable options would be appropriate and feasible. If pesticides are used make sure that they are used according to the label. If desired, small non-treated areas may be left to evaluate control effectiveness.

Re-evaluation

Review what went wrong but more importantly what went right. Did it work? Take a close look, use sampling tools as described above to compare pest activity before and after treatment. Was there tripping or a graceful climb up the steps of pest control? Was the problem identified properly? Was the field sampling unbiased? Was a "fudge factor" added to the threshold? Was the choice of control based on sound judgment or outside pressure? When implementing the control action was the philosophy of "if this much is good twice this amount will be twice as good" used? What changes to the system would make it better?

Following these steps should help to make pest management decisions easier and more efficient. It should be obvious that these same principles can also be applied to identifying and successfully managing other non-pest crop problems as well. A number of publications are available to help identify and manage pest problems, however, unusual problems may require the services of a qualified agricultural professional. Information on pest identification, sampling methods, action thresholds, management alternatives and other considerations is available in the Cornell Field Crops and Soils Handbook and the Cornell Recommendations for Field Crops available through your local Cornell cooperative extension office. For further information contact your local Cornell Cooperative Extension agent or the Dairy and Field Crops IPM Coordinator.