Why IPM?

The History of Pest Control

To understand why IPM is the best way to manage pest problems it is useful to trace the history of pest control to see how the battle between man and crop pests evolved.

Synthetic pesticides are some of the most common pest management tools used today. However, it is important to realize that they have only been available since the 1940's. It is interesting to consider what growers used to control pests before the development of these materials. Basically growers managed pest problems as best they could, many times with a combination of techniques such as rotating crops, tilling to kill insect and weed pests, changing planting dates to avoid peak pest numbers, planting cover crops to provide refuge for pest natural enemies, using biological control of certain pests, and using genetically resistant varieties. These strategies are ones that we also use today.

The DDT Miracle—The answer to all our problems

Things really changed, however, with the discovery of synthetic chloronated hydrocarbon pesticides, particularly DDT, in the 1940's. At the time, these materials appeared to be 'silver bullet' for pest control for which everyone had been looking. They seemed perfect: they were cheap; effective in small amounts and against a broad range of insects; had long residual activity once applied; and were relatively non-toxic to animals and people. Initially insect control was so effective that some entomologists even foresaw the eradication of entire species of pests. Demand for pesticides grew very fast. To meet this demand an immense industry arose to produce chemicals and to develop new, more effective ones.

At first, control was spectacular and before long pest control and chemical control became synonymous. At this stage whenever a pest problem arose, only two questions were asked: 1) What pesticide do I use? and 2) How do I apply it? Consequently, a whole generation of entomologists, pathologists, weed scientists, pest managers, and growers were trained in an approach to pest management that emphasized only one solution to problems—chemicals.

The Pests Fought Back

After a period of time growers encountered difficulties in connection with the use of pesticides. Many pests started to show signs of resistance to the chemicals. As time went on it took more frequent spraying with heavier doses to control these pests. In some cases the pests became so resistant that they could no longer be successfully controlled by that particular pesticide. Next, growers started to see pests that they had never encountered before. This phenomenon was termed a secondary pest outbreak. An insect

or mite that was previously at very low population levels now occurred in epidemic numbers because a pesticide used against another pest species killed the agents that kept this 'secondary pest' at low population levels. Another related problem that emerged was environmental contamination as a result of the use of some pesticides.

Development of the IPM Approach

The combination of problems beginning to arise from overuse of pesticides, such as pesticide resistance, secondary pest outbreaks, and environmental contamination, led a forward-looking group of entomologists at the University of California to conclude that we were heading toward a pest management crisis in agriculture. They realized we had gotten away from the fact that pest problems are complex and ecological in nature. They concluded that the solutions to complex ecological problems must be broad-based and ecological in nature. These researchers developed the IPM concept to better manage pest problems. Since its inception in 1959, IPM has evolved into the best way to manage pest problems on the farm.

What is IPM?

IPM is a long-term approach to managing pests by combining biological, cultural, and chemical tools in a way that minimizes economic, health and environmental risks.

Farming is a long-term endeavor so we want to use management practices that are themselves long-term. By combining chemical, biological and cultural control techniques to manage a pest problem we develop a broad-based strategy that will still be successful even if one particular technique does not work. Based on our experience with chemical controls, we know that pest control decisions must take into account not only economic risks but effects on the environment and public health, too.

Five Essential Components of an IPM Program

There are five essential components to an IPM program.

1. Understanding the ecology and dynamics of the crop.

It is important to gather all of the knowledge we can about the crop we are growing. Most, if not all, pest problems can be directly related to the condition of the crop. The more we know about the ecology of the crop, the better pest management decisions we can make. For example, it is well known that over-vigorous grapevines can support larger leafhopper populations than vines of less vigor. Therefore one way to keep leafhopper populations at acceptable levels is to maintain proper vine vigor.

2. Understanding the ecology and dynamics of the pest(s) and their natural enemies.

It is not only important to know what pests are present but also to know in detail about their life cycles, what makes their populations change, whether any natural controls are present and what effects these may have on the pests. By knowing as much about the pest as possible we may find some weak point that we can exploit.

3. Instituting a monitoring program to assess levels of pests and beneficials.

It is vitally important to constantly monitor the pest levels in the field. This is a crucial aspect of an IPM approach. By knowing how many pests are present we can make the best decision about how much damage they might cause to the crop. If natural enemies are present we also need to know how many there are because they may take care of the pest problem for us.

4. Establishing an economic threshold for each pest.

Effective monitoring and using economic thresholds make up the of core any IPM program. **What is an economic threshold? It is the level of a pest population above which if a control action is not taken the amount of damage caused by the pest will exceed the amount it costs to control that pest.** In other words it is the level of the pest population at which the control measure used pays for itself

5. Considering available control strategies and determining the most appropriate ones

A wide range of control techniques is available for crop pests. They can be divided into 5 broad categories: chemical controls such as pesticides, cultural controls such as mowing and tilling, natural controls such as natural enemy releases, behavioral control such as the use of insect pheromones, and genetic control such as the use of resistant rootstocks.

It is very important to choose the right control strategy based on the economic nature of the pest problem, the cost of the particular control strategy and the effects of this strategy on the environment and public health.

IPM is an 'Approach' and Changes with Time

IPM is not a technique or a recipe, but rather an **approach** to solving pest problems. Particular techniques for pest management may vary from field to field, year to year, crop to crop, and grower to grower but the overall approach is always the same, using the 5 essential components of an IPM program. It is important to point out that an IPM program is not a cookbook approach. It would be nice if we could tackle a pest problem the same way every time but history has shown us that this will not work.

An IPM program is never complete. The reason for this is that over time we learn more about our crop, our pests and their natural enemies, and refine our monitoring programs. We also improve our economic thresholds, and develop new control

strategies. As we gain more knowledge, we need to use it to refine our IPM programs to make them more effective and to ensure they will work in the long-term. This is the best way to minimize the economic impacts of pests in our vineyards and minimize the risks to our health and the environment.