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MANAGEMENT OF INSECT PESTS IN ORGANIC VINEYARDS

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Organic grape growers are faced with the same complex of insect pests as are conventional grape growers. Growers of both organic and conventional grapes will likely be faced with the need to manage grape berry moth and grape leafhopper, the two major pests that are widely distributed and common throughout grape growing areas in the Northeast. In addition to these two key pests, growers in specific areas may face other common pests such as cane borers (common in vineyards surrounding Keuka lake), Japanese beetles (somewhat common in the Lake Erie region), European red mite (Long Island) or rose chafer (vineyards with sandy soils). Other pests, such as flea beetles, cutworms, tumid gall makers, and grape rootworm, may only appear sporadically.
The difference in conventional and organic management methods for insect pests largely rests on what actions a grower is willing to take (or materials he is willing to apply) when confronted with an economically-important pest problem. Ten to 15 years ago, the gap between 'conventional' practices and 'organic' practices was enormous. Pest management recommendations at that time called for 3 applications of insecticides to all vineyard blocks on a preventative basis - a "one size fits all" recommendation. More recently, however, this 'preventative' approach has been supplanted by the Integrated Pest Management (IPM) approach. IPM practices -including Risk Assessment, vineyard sampling for pests, and economic injury levels - have been developed and adopted by many grape growers. The average number of insecticide applications made in New York vineyards has been reduced from three down to one per vineyard through the use of these practices. As a result, the gap between 'conventional' and 'organic' management has narrowed.

Successful management of many grape pests is possible using organic control methods, such as those approved by NOFA- NY or other certification organizations. In this talk I will first describe the key components common to successful IPM programs- whether conventional or organic. I will then explain what types of spray materials are available to organic growers. Finally, I will outline organic management options available for the two major grape pests- Grape berry moth and Eastern grape leafhopper, and briefly touch on how other pest populations may be affected by current organic practices.

Components of IPM. Organic and IPM approaches to pest management are approaches that rely on knowledge and informed decision making. The key components of the IPM approach are:

1. Pest Identification. Proper identification of insect pests and an understanding of their biology is essential for successful management. Many insects feed in vineyards, but only a few cause economic damage. Some cause very conspicuous feeding injury but have no effect on vine productivity. Grape Plume Moth larvae, for example, emerge early in the spring and web together leaves. The result- although conspicuous- has no economic effect, because this pest completes its development and disappears by mid-June. Yet, many growers mistakenly apply treatment, most often after the larvae have completed their development. Other

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less conspicuous pests, like grape rootworm, may cause more serious injury. Proper identification of the pest is an essential first step to appropriate management.

2. Monitoring Pest Populations. Economic effects of insect infestations depend on population levels of pests. Especially in vineyards, pest populations vary greatly from year to year and vineyard to vineyard. Monitoring vineyards to determine population levels is the key to avoiding unnecessary spray applications - and for timely application of spray materials when necessary to prevent economic damage.

3. Economic thresholds. The economic threshold is defined as the population or injury level (determined by monitoring) at which a treatment should be applied to prevent economic losses due to the pest. Our research program has developed economic thresholds for grape berry moth and grape leafhopper that provide guidance for making treatment decisions.

4. Risk assessment. Risk assessment means using information about the vineyard site, weather conditions, and crop condition (such as cropping level and vigor) to forecast or predict the likelihood that pest populations will cause economic injury. Through research, we have developed risk assessment criteria for grape berry moth and leafhoppers that are useful guides to management, as I will mention later in this presentation.

These four elements are common to both conventional IPM and organic management programs. Using them is the key to taking full advantage of the natural factors (biological and non-biological) that often keep insect populations well below the economic threshold.

Organic Spray Materials. Where organic and conventional IPM programs differ is in the types of spray materials that can be used. Organic growers use only non-synthetic, naturally derived materials. These materials, by their nature, are less toxic, more selective, and less persistent than conventional pesticides. They are often more costly to apply. Using these control methods requires more careful attention to results, and sometimes more applications to achieve the desired results.

Organic materials fall into many different categories. Some of the major ones are:

1. Botanicals are insecticides extracted or derived from plants. Many are very toxic to insects. These include rotenone, pyrethrum, ryania, sabadilla, and neem. Note that some plant-derived materials (such as nicotine) are not considered acceptable under organic certification standards.

2. Oils and Soaps. These materials control insects through physical effects on respiration, feeding, or by disrupting the insect cuticle. Included in this category are mineral oils, vegetable oils, dormant oils, and insecticidal soap.

3. Biologicals. Materials derived from pathogenic organisms, such as nematodes, bacteria (*Bacillus thurengiensis),* fungal and viral pathogens are in this class.

4. Behavioral Control agents Materials that protect crops by modifying insect behavior -such as repellents, antifeedants, attractants or sex pheromones used in mating disruption - but do not kill insects are in this category.

Growers that wish to be certified by an organic certification organization such as NOFA-NY need to carefully study guidelines to determine what specific materials are allowed. Some botanical insecticides, for example, contain ingredients such as petroleum distillates, spray adjuvants, or synergists (such as piperonyl butoxide, commonly used with pyrethrum), that are prohibited. Many surfactants, spreader-stickers, and other spray adjuvants are also prohibited.

Organic Management for Grapes. Over the past several years, we have extensively monitored insect pests in vineyards that have received no insecticide treatments. Our studies have consistently shown that economically significant pest infestations failed to develop in well over 50% of vineyards surveyed. Moreover, high insect populations tend to occur at the same small proportion of vineyard sites year after year. What this means is that insect pressure is not a major impediment to organic production for many growers. Organic alternatives are available for the two major pests of grapes- grape berry moth and eastern grape leafhopper.

Grape Berry Moth. Research has shown that grape berry moth infestations tend to recur in the same sites year after year. By following guidelines in the publication *Risk Assessment for Grape Berry Moth and Guidelines for Management of Eastern Grape Leafhopper,* growers can classify each vineyard block as 'high-risk' or 'low-risk'. Many 'low-risk' areas will not develop economic infestations of berry moth in most years. For high-risk areas, two alternatives are available. *Pheromone mating disruption* using ISOMATE-GBM® is a control method that is non-toxic and highly specific to grape berry moth. Pheromone dispensers are placed on the top wire of the vineyard in early May. The pheromones then diffuse out of the dispensers over a period of 10- 14 weeks, disrupting the chemical signals used by male moths to locate and mate with females. This prevents oviposition and subsequent larval damage. Use of this material is described fully in the bulletin *Pheromonal control of the grape berry moth: an effective alternative to conventional insecticides. Bacillus thurengiensis* is a biological insecticide that is effective in controlling larval berry moth. Applications of this material require careful timing, because larvae need to ingest it before burrowing into the grape cluster and feeding internally. Two applications during the extended egg-laying period of each generation are required, because this material persists for < 3 days in the field.

Grape Leafhopper. Grape leafhopper is a pest that can affect vineyard productivity, but that often fails to develop high populations. Our studies have shown that vines can tolerate moderate populations of leafhoppers, without affecting productivity. In addition, high leafhopper populations tend to occur in a small proportion of vineyards. This is because optimal weather conditions for population growth occur only in warmer than average years, and an egg parasite, *Anagrus epos*, is often effective in preventing population growth. However, we have noted that in some organically-managed vineyards, high populations of leafhoppers can develop over a period of a few years, and may require treatment. Organic vineyards with recurring problems may require a different approach than conventional vineyards. In organic vineyards, application of organic materials around bloom may be necessary to reduce populations and allow biological control by *Anagrus epos* to prevent population growth later in the season. In trials, insecticidal soap has sometimes been effective in reducing leafhopper populations. However, this material, to be effective, must be applied with adequate coverage (high water volume), and only remains active until it dries. Thus it is most effective when applied around dawn or dusk. Repeat applications are probably necessary. Some botanicals, such as rotenone, and pyrethrum/ rotenone mixtures have also been effective in insecticide trials.

Other Insect Pests. Many other insect pests appear sporadically in vineyards, or occur at a small proportion of vineyard sites. Specific information about these pests can be found in a series of fact sheets available through Cornell Cooperative Extension. Efficacy of organically acceptable materials for controlling these pests is unknown, and organic growers may have to devise, through trial and error, their own methods for dealing with these pests.

In closing, I want to briefly mention results from our ongoing SARE project that terminated in

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1994. Over five years, and in three different varieties, Concord, Elvira, and Seyval, we had economically-important infestations of grape leafhopper only in one year of the project, and failed to have economic infestations of grape berry moth, in part through the use of mating disruption. A longer-term problem, however, began to emerge. Starting in the fourth year of the project, significant infestations of grape rootworm began to appear in the Concord block. While adults of this root-feeding species are easily controlled with conventional insecticides, no organic methods are available. In future years, as growers adopt both conventional and organic IPM tactics, this pest may again emerge as a major concern for grape growers. Further studies are needed to assess alternate control methods for this pest.

References

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Grape IPM Fact Sheets. (Series of six, available through Cornell Cooperative Extension).

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