

DISCRETE USE OF INSECTICIDES

I don't remember many details from my days as an undergraduate student at USU, but I am often reminded of a presentation delivered one day by a guest speaker. The presenter was discussing new technologies and a modification of commonly used "best management practices". He taught that any method or practice has to meet three criteria before it will ever be adopted and used by the majority of people. First, it must be technically possible, second, economically feasible, and third socially acceptable.

The use of insecticides in the production of agricultural crops, or in personal gardens, is an example of a practice that may or may not meet all three criteria of technical possibility, economic feasibility or social acceptability. Technical possibility certainly exists and new insecticide chemistries are always being created. It may or may not be economically feasible to apply an insecticide. In most cases, society frowns on the use of insecticides unless absolutely needed, so their use is seldom socially acceptable.

A central concept of modern insect pest management is that growers should spray their crops with insecticides only when pest populations are high enough to cause significant economic damage. Too often we don't even use a sweep net to monitor insect numbers, but spray simply because our neighbor did or because a salesman convinced us we should. Such indiscriminate spraying can lead to other difficulties like the development of pest resistance, environmental contamination, and the elimination of beneficial insects. Social acceptance of our practices also become strained.

Cereal leaf beetle (CLB) used to be a major problem for northern Utah barley producers. A little more than a decade ago entomologists began promoting biological control of CLB by introducing a parasitic wasp (*Tetratichus julus*) into infected barley fields. The wasps, affectionately called Tj, would attack second and third instar CLB larvae by laying eggs inside. The Tj larvae would then develop into maggots and feed on the body fluids of the developing CLB. Soon the CLB larvae would die and CLB populations would dwindle. We pled and even begged growers not to spray insecticides, thus allowing the tiny Tj wasps to become established. Some producers lost yields for a year or two by not spraying insecticides, but now have an established population of Tj's which keep CLB pests in control. Other growers insisted on spraying then and still do now because their use of insecticides killed the beneficial insects along with the problem makers. Long term it has proven economically feasible and socially acceptable to allow biological control of CLB instead of using insecticides.

Secondary pest outbreaks are often a concern when the application of an insecticide to control one insect pest leads to high numbers of other pest species and the associated loss in crop yields. In some cases secondary pest outbreaks occur after the use of insecticides, because nontarget beneficial insects are killed in large numbers along with the target pest. Research conducted in Sevier County indicates that pea aphid populations, a secondary pest, increased dramatically when growers sprayed for the alfalfa weevil during the first crop.

A USU study conducted in Cache Valley highlighted the importance of beneficial insect populations and their role in suppressing aphid populations. In a survey of several alfalfa fields we found that alfalfa is home to a diverse community of beneficial insects such as damsel bugs, big-eyed bugs, and lady beetles. We also set up a complimentary field cage experiment at the Greenville Research Farm in North Logan to examine whether it was important to have all of these beneficial insect species to suppress aphid populations in alfalfa. We found that preserving multiple predatory insect species did suppress pea aphid populations in alfalfa. This suggests yet another reason to carefully monitor weevil populations with a sweep net or other means and to avoid unnecessary insecticidal sprays.

The reader can easily tell that I fear some may spray insecticides too frequently and often needlessly. At the same time I vigorously defend the necessary use of all pesticides. Without them we would be unable to feed our growing population and enjoy our quality of life. I am also quick to agree that we can wait too long and be too cautious. The outbreak of spider mites in silage corn during the last few growing seasons is an example of serious economic losses resulting from the delayed use of insecticides.

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