

# UPDATE ON INSECT CONTROL STRATEGIES IN ALFALFA

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## ABSTRACT

Insect pests, especially the alfalfa weevil and lepidopterous worm complexes, are annual problems in alfalfa in California. Several other pests are sporadic problems. Integrated pest management is prevalently used in alfalfa and should take on added importance in future years. The characteristics of alfalfa made it ideal for practicing IPM. Insecticides are one tool used in effective IPM programs; however, changes in the applicability and availability of insecticides in alfalfa are inevitable. This places an increased emphasis and awareness on developing sound, robust IPM programs in alfalfa.

## INTRODUCTION

Insect pests are important factors in alfalfa production and outbreaks occur on a yearly basis; however, insect pests do not limit and threaten alfalfa production as much as other crops. Crops intended for direct human consumption are more heavily scrutinized for pest damage, i.e., the perfect fruit or vegetable is demanded by the public. However, two insect pests or pest groups have to be considered every year by the alfalfa producer, 1.) the Egyptian alfalfa weevil/alfalfa weevil complex and 2.) the lepidopterous worm complex (beet armyworm, loopers, cutworm). Several other pests have sporadic outbreaks and have to be managed accordingly.

Integrated pest management (IPM) fits the alfalfa system to a tee and in fact many of the concepts and strategies of IPM were developed in alfalfa. IPM stresses an integrated approach and not using insecticides until some threshold value is reached. Several characteristics of the alfalfa plant and system are in concert with the philosophy of IPM, including 1.) the abundance of natural enemies in alfalfa, 2.) the ability of alfalfa to withstand moderate insect damage and still produce and recover, 3.) the applicability of alfalfa to plant breeding and insect resistance, and 4.) the low value (at times) of alfalfa.

Natural Enemies: Several hundred different species of insects commonly inhabit alfalfa with numerous ones acting as predators and parasites. Compared with annual crops, the insect diversity (and particularly the natural enemy complex) in alfalfa is extremely high (see Limburg and Rosenheim, 27<sup>th</sup> California Alfalfa Symposium, pp. 165-177). These beneficials can provide considerable pest control.

Ability to Withstand Damage: Established alfalfa plants can withstand considerable defoliation from insects and still produce acceptable yields. In fact, research has shown that in some cases slight defoliation actually increases yields (causes more stems to develop). This allows time (i.e., damage) for cultural and biological controls to function.

Plant Breeding: The development of resistant alfalfa cultivars to pests is an excellent IPM technique and there are several examples of successful breeding programs. Resistance to spotted

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alfalfa aphids and other aphid species as well as ongoing work for silverleaf whitefly (see Teuber et al., 27<sup>th</sup> California Alfalfa Symposium, pp. 179-188) are examples.

Crop Value: Integrated pest management, by definition, incorporates an economic aspect (both crop value and cost of control) and fits with the dynamic nature of alfalfa prices.

Insecticides are also an important part of alfalfa IPM. Annually, some 3/4 million pounds active ingredient are used in the alfalfa system. These are important tools, but are not without some drawbacks. The utility of insecticides as a management tool is being threatened by pest resistance, loss of insecticide registrations through FQPA, proposed restrictions on aerial applications, use restrictions due to aquatic systems and ground water, and the cost of the materials. Insecticides are still needed today and will continue to be needed, but these issues point to the need to better use the products and to use better IPM techniques. What is the future for insecticides and what are the needs in IPM of alfalfa?

During the last ~3-5 years, there has been a flourishing of new insecticide chemical groups and modes of action. What has spurred this activity? Some of this activity is the result of fundamental research finally reaching the end user, i.e., biotechnology and genetically engineered plants. The marketplace has demanded new chemistries to maintain effective arthropod control. The agrichemical industry has responded to these needs. Also, regulatory actions, such as the Food Quality Protection Act, which is threatening the registrations of organophosphate and carbamate insecticides, has fueled research activities into alternative chemistries. The desire by EPA, as well as the general public, for “reduced-risk” chemicals and the suggestion by EPA that they will fast-track the registration of these materials has further enhanced research to this end. These new products have the general characteristics of low mammalian toxicity, high pest selectivity/minimal effects on natural enemies, and generally short residual. Several of these products have not received any federal registrations, whereas others have been available for 2-3 use-seasons in other states. California registrations are beginning to occur for some of these products.

Considerable work remains on incorporating these products into existing IPM programs in California. The very specific activity of many of these products means that the agricultural system must be better understood to optimize control efficacy. Many of these products are “unforgiving” if used improperly. Thresholds need to be developed and refined. The best timing of these products, effects on natural enemies, etc. are key questions. I believe that long-term there will be insecticidal tools for the key alfalfa pests. However, with the probable loss of broad-spectrum materials, insecticides for some of the minor, sporadic pests are already limited and will be further limited. An increased understanding of and emphasis on IPM is warranted at this time to prepare for the future.

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