UNIVERSITY OF CALIFORNIA COOPERATIVE EXTENSION SAN JOAQUIN COUNTY

Field Crops Report

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Lygus Bug Management in Dry Beans

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Background

Lower bean yield and quality damage were significant in 2003 due to high populations of Lygus bugs. Large and baby Lima varieties were hardest hit when in close proximity to safflower drying down and when alfalfa was being harvested.

Together with other researchers at UC Davis, I was able to conduct a trial to measure yield and quality of lima beans using different classes of insecticides representing the standard organophosphates and new softer chemistries. The test plot was next to safflower so the population of Lygus was high throughout the season.

Introduction

The western tarnished plant bug, or as it is more commonly called the lygus bug, *Lygus hesperus*, is one of the most serious insect pests of dry beans in California. This insect is extremely mobile, feeds on numerous crops, can occur in high numbers, difficult to kill with many insecticides and, moreover, can develop resistance to insecticides. Lygus bugs can quickly inflict damage to dry beans. During early bud and flowering stages, lygus bugs cause bud and flower blasting resulting in reduced set and yields. Lygus bugs feeding on young, developing seeds cause blemishes and stings, which reduces bean quality and grade.

Insecticidal control is the primary means used to manage damaging lygus bug populations. This same strategy is relied upon in numerous crops for lygus bugs, including cotton, seed alfalfa, strawberries, and lettuce (just to name a few of the crops). Other strategies such as intercropping alfalfa strips, trap cropping, releases of biological control organisms for lygus bugs, irrigation management, etc. have been tried as ways to manage lygus bugs with moderate, at best, success. New, selective reduced risk insecticides have been developed for many serious agricultural pests such as aphids, lepidopterous larvae, spider mites, and whiteflies. These insecticides generally have favorable attributes in terms of protecting the environment, workers, beneficial insects, etc. Unfortunately, the development of reduced risk insecticides with high levels of activity on lygus bugs is lacking.

Several factors have placed an added importance on implementing reduced risk pest management strategies on beans. The high level of regulatory scrutiny recently placed on organophosphate and carbamate insecticides have threatened the continued availability of these products. In addition, lygus bug resistance to products in these chemical classes is documented in other crops such as cotton. Finally, use of insecticides with broad-spectrum activity has been shown to flare (increase) levels of other pests in beans such as leafminers, whiteflies, spider mites, and aphids. This occurs primarily because these materials kill predators and parasites along with the intended pest species but often results in additional applications to control these "secondary pests".

Test Plot Procedures

Last year a Lygus trial was conducted on baby lima beans (variety Luna) comparing the effectiveness of different chemistries. Two applications were made during the season, the first application was made at an early timing on 1 Aug. when the crop was in the flower stage with 5% open flowers and 95% unopened. A second application was made on 20 Aug post set when bean pods were ½ to 1" long. At both timings, Lygus populations reached or exceeded 1 per sweep from sweep net sampling.

Table 1. Insecticides evaluated against lygus bugs in dry beans.

Product	Rate (formulation/A)	Lbs. AI/A	Chemical Class
Avaunt®	6 oz.	0.11	Oxadiazine
Warrior®	3.84 fl. oz.	0.03	Pyrethroid
Orthene 75SP®	1.0 lb.	0.75	Carbamate
Dimethoate 2.67	1.5 pts.	0.5	Organophosphate
Actara 25WP®	3 oz.	0.046	Neonicotinoid
Untreated	---	---	---

These insecticides were chosen because they are registered or are being developed for dry beans but also because they represent five different classes of chemistry. When an insect develops resistance to a material in a given chemical class, it is generally also resistant to other materials in that class. Therefore, these products were chosen as representatives of the class.

Results

Table 2. Lygus populations and bean yield/quality data from lygus bug insecticide study.

	Lygus Bugs per 10 Sweeps at Days after Treatment					Yield	% Lygus Damaged
Product	5	7	12	15	7 *	(Lbs./A)	Seeds
Avaunt	5.5 a	4.3 a	8.3 a		NS	2213 a	7.0 ab
Warrior	0.0 b	1.8 a	2.5 b	3.5 b	4.3 b	2596 a	4.1 b
Orthene 75SP	3.3 ab	7.0 a	8.8 a		8.0 a	2300 a	8.1 a
Dimethoate 2.67	3.3 ab	4.5 a	6.8 a		NS	2252 a	7.6 a
Actara 25WP	2.8 ab	3.3 a	7.5 a		NS	2387 a	6.6 ab
Untreated	5.8 a	3.8 a	7.8 a	7.3 a	8.3 a	1725 b	6.0 ab

* Days after second application

NS= Not sprayed

Trial Summary

The results from this year's trial showed the effectiveness of pyrethroid chemistry (Warrior) in reducing lygus populations, increasing yield and seed quality. Orthene and dimethoate, considered today's standard practice insecticides, were less effective in this trial. Avaunt and Actara, new and considered reduced risk pesticides did not reduce the lygus numbers beyond a week after application. However, all treatments did increase yields, which demonstrates the yield impact from Lygus. Seed quality based on Lygus sting damage was unacceptable for all treatments, which indicates late season damage occurring during pod fill and the importance for better control at later growth stages.

Monitoring and Management Decisions

Start sampling during the bud stage. Check fields twice weekly. Sampling times are best in the morning when temperatures are cooler. In the hot afternoon temperatures, lygus will move into the lower canopy of the plant and are difficult to sweep and access populations. Determine lygus numbers (adults and nymphs) by using the standard California insect sweep net. Take a series of 5 to 10 sweeps in four to six areas of the field, making certain that all plant growth types occurring in the field are sampled. Pass the net through the top of two rows of bean plants (one bed for two rows of plants/bed; two beds for single row beds). Concentrate monitoring adjacent to neighboring crops known to host Lygus; i.e. alfalfa, safflower, cotton and weedy fields. Treatment thresholds are based on bean yield and may not reflect losses in bean quality. Continue checking fields until seeds become firm and pods are mature. Treatment thresholds are:

BLACKEYES: 0.5 lygus bug per sweep during bud through small pod stage, 1.0 bug per sweep in later season.

DRY LIMAS: 0.5 lygus bug per sweep during early bloom, 1.0 to 2.0 bugs per sweep in later season.

PINKS, KIDNEY types: 1.0 to 1.5 bugs per sweep.

GREEN LIMAS: 1.0 bug per sweep.

No single pesticide approach should be used season long for Lygus control. When using a pyrethroid, multiple applications may flare aphid populations as well as spider mites. Therefore, it would be prudent to rotate with another chemistry (at early applications) that is less disruptive on beneficials. Sweep/monitoring should continue through pod filling and bean seeds are firm.

Cattle poisoning from Alfalfa Hay

Just recently 90 dairy animals from the lower SJ Valley died feeding on weedy alfalfa hay. Death was caused by high nitrate levels (NO3) in the hay that exceeded 40,000 ppm. As a rule of thumb, 10,000 ppm is considered dangerous to ruminant animals. Common Lambsquarter, *Chenipodium album,* was found to be the problem that made up the majority of plant material in the hay sample. High nitrate levels are not uncommon in certain plants and have been cited as a major cause of poisoning ruminant animals that ingest these plants. Conditions that lead to this problem are generally excessive applications of organic or inorganic nitrogenous fertilizers that can result in accumulation of nitrate in crop plants and weeds. It is unusual to reach these high levels of nitrates under our normal farming practices. Nitrate accumulations by plants vary depending on the plant species, stage of growth, organic content of the soil, and high application

of nitrogen fertilizers. Drought conditions, acidic soils, and soils deficient in sulfur, phosphorous, and molybdenum result in higher nitrate accumulation in plants. All plant parts do not readily accumulate nitrates. The leaves and seeds have less with most coming from the stems. Preventing the problem begins with recognizing plants that have a greater potential of nitrate accumulation. *Tables1 & 2* list crops and weeds known to readily accumulate nitrates. All sources of nitrogen fertilizers have the potential for problems if not managed carefully and especially organic sources such as manures. Manures are more difficult to apply at precise and uniform amounts. Therefore caution is advised when using manures as sources of nitrogen fertilizer in nitrate accumulating crops. Information is available through your local Cooperative Extension Office to instruct in the use of manure applications. Other management practices include maintaining good weed control that will insure a clean crop. Prolonged periods of moisture stress on plants will have a direct impact on nitrate accumulation.

Table 1

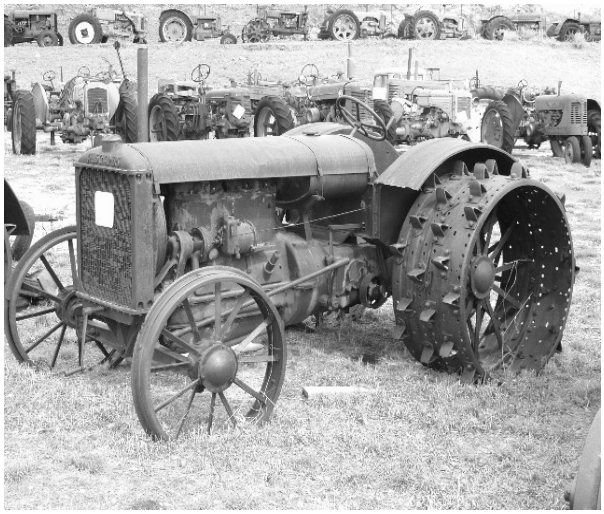
Crop Plants
Oats
Sugar beets
Rape
Soybean
Flax
Alfalfa
Millet
Ryegrass
Sudan grass
Wheat
Corn

Table 2

Weeds
Pigweed
Lambsquarter
Field bindweed
Jimsonweed
Barnyardgrass
Cheeseweed
Smartweed
Curley dock
Russian thistle
Nightshades
Johnsongrass

San Joaquin Historical Museum

The San Joaquin Historical Museum located at Micke Grove Park in Lodi provides a valuable piece of our farming heritage with a nice display of vintage tractors. Anyone having or knowing of an old (antique) tractor/equipment needing a home can arrange for some TLC and be put on display for everyone to enjoy by contacting Jim Beardsley, 209-464-9591, or the museum at 209-953-3460 (from Stockton) or from Lodi at 209-331-2055.



Calendar of Events

2004 UC Davis Weed Day

This field day showcases the latest development in weed control for most crops

Date: July 22, 2004

Contact: Brenda Brinton
phone: 530-752-0612
email: brinton@vegmail.ucdavis.edu

Time: 8:00 am to 4:00 pm

Location: Buehler Alumni Center

Address: University of California Davis campus

Annual California Rice Field Day

Wednesday, August 25, 2004 – 8am – 12 noon
Rice Research Station, Biggs, CA
Web page: http://agronomy.ucdavis.edu/ricestation

2004 Western States Conservation Tillage Conference

West Side Research and Extension Center
September 8, 2004
8am – 3pm
UC Davis Farm
September 9, 2004

The National Alfalfa Symposium

* Addressing Critical Issues for Alfalfa and Harvested Forages *

featuring a Special Seminar:

Biotech Advances in Alfalfa

San Diego, CA
Dec 13-15, 2004

Hosted by the University of California Alfalfa & Forage Workgroup

Check web site: http://alfalfa.ucdavis.edu for program information and registration forms.