Section III
Biological and Cultural Control

ALTERNATIVE METHODS FOR CONTROLLING ONION THRIPS (*THRIPS TABACI)* IN SPANISH ONIONS

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Onions are a major economic crop in the Treasure Valley production region of eastern Oregon and western Idaho. Annually about 20,000 acres of onions are grown. Typically the onions are Spanish hybrids Spanish and are grown for their large size, high yields and mild flavor. The value of the Treasure Valley onion industry for the 2000-year was 94 million dollars. Over the past 10 years the value of the industry has ranged from a high of 140 million dollars to a low of 75 million depending upon market fluctuations.

The principle onion pest in this region is the onion thrips (*Thrips tabaci*, Lindeman) that cause yield reductions by feeding on the epidermal cells of the plant, thus reducing the photosynthetic ability of the plant. Onion thrips can reduce total yields from 4% percent to 27%, depending on variety but can reduce yields of colossal sized bulbs from 28% to 73% percent. The larger sized colossal are difficult to grow and demand a premium in the marketplace. Growers typically spray 3-6 times per season to control onion thrips. Treatments include the use of synthetic pyrethroid, organophosphate, and carbamate insecticides. The ability of these products to control thrips has gone from over 90% percent control in 1995 to less than 70% percent control in 2000. Commercial onion growers are treating more frequently in order to keep thrips populations low. None of the insecticide classes are effective.

Mechanical straw mulching was introduced in 1985 as a means of improving irrigation water infiltration and reducing sediment loss. Some growers using this technique reported having less onion thrips pressure. A possible explanation for decreased thrips pressure may be from enhanced habitat for predators.

New biological insecticides have been developed including neem tree extracts and spinosad, a fungus with insecticidal properties. Both of these materials have been evaluated for thrips control and have performed poorly compared to the conventional insecticides. It was decided to test these products, along with Messinger, a harpin protein thought to enhance the plants ability to withstand stress, in combination with straw mulch to provide predator habitat as an alternative program to the conventional insecticide program currently used by growers.

A 1.8-acre field was planted to onions (cv.' Vacquero'. Sun Seeds, Brooks, OR) on March 23, 2001. The rows were planted as two double rows on 44-inch bed. The double rows were spaced two inches apart. The seeding rate was 154,000 seeds per acre. Lorsban 15 G was applied in a 6-inch band over each row at planting at a rate of 3.7-oz/1000 ft of row for onion maggot control. The field was divided into plots of 40.3 ft wide by 100 ft in length. There were three treatments with six replications.

The grower standard practice treatment included Warrior (lambda-cyhalothrin) and Lannate (methomyl). The check did not receive any treatments for thrips control. The alternative treatment included straw mulch applied to the center of the bed at a rate of 952 lbs/ac. plus Success (spinosad), Ecozin or Aza Direct (azadirachtin neem extract) and Messinger (harpin protein). Treatments were applied weekly or biweekly during the first half of the growing season. All materials were applied with water at 29.7 gal/ac. Straw was applied only between the irrigation furrows on top of the beds to avoid confounding irrigation effects with thrips effects.

Thrips populations were sampled by two methods. First, by visually counting the number of thrips on five plants. The second method was by cutting five plants at ground level and inserting the plants into a modified berlayze funnel designed to hold the plants. Turpentine was used to dislodge the thrips from the plant, where they would then fall into a jar containing 90% isopropyl alcohol. The collected thrips were then counted through a binocular dissecting scope. Thrips populations were monitored weekly though the growing season.

The predator populations were monitored using pit fall traps that contained ethylene glycol. They were evaluated three times per week. The modified berlayze funnel was also used to monitor predators foraging on the plants.

The conventional treatment and the alternative control treatments looked similar throughout the growing season, with minimal thrips damage to the foliage. In contrast, the untreated check treatment had fairly severe foliage damage due to thrips feeding.

Predator make up varied throughout the season but consisted mostly of spiders, big-eyed bugs, damsel bugs and minute pirate bugs with smaller populations of lacewings, ladybugs, assassin bugs and rove beetles. Spiders were initially more prevalent followed by big-eyed bugs. Late in the season minute pirate bugs were the dominant predator.

Most of the predators were in the alternative control plots, particularly early in the growing season (Table 1). Predator populations increased in the unsprayed and conventionally sprayed plots in August, but decreased slightly in the alternative control plots, although the population was still well above the conventionally sprayed plots.

Table 1. Comparison of predator population by month and by treatment as measured by pit fall traps and berlayze funnel. Malheur Experiment Station, Oregon State University, Ontario, Oregon, 2001.

	June	July	August	Total
Check	26	25	43	94
Standard	5	6	13	24
Alternative	64	57	33	154
LSD (0.5)	n.s.	n.s.	6.2	44.5

The onions were harvested on September 13th and graded on September 14 and 17. The results are in Table 2.

Table 2. Onion grade and yield as influenced by commercial and alternate insecticide controls. Malheur Experiment Station, Oregon State University, Ontario, OR. 2001.

Treatment	Yield						
	Super Colossals > 4 ¼ in.	Colossals 4 - 4 ¼ in.	Jumbos 3 - 4 in.	Total Super Col. Colossals Jumbos	Mediums 2 ¼ - 3 in.	Total Marketable Yield	Number 2's
Untreated Check	32.1	193.1	612.7	837.9	49.4	887.3	23.5
Standard	46.9	254.5	628.8	930.2	36.4	966.6	27.2
Alternative Control	63.7	305.1	609.6	978.4	30.2	1008.6	24.5
LSD (.05)	23.8	n.s.	n.s.	94.8	n.s.	64.0	n.s.

There was a significant increase in super colossal sized bulbs in both the standard and the alternative treatments compared to the untreated check. There was also a highly significant difference between these treatments and the untreated check in total yield. There was a trend towards higher super colossals and total yield in the alternative control treatment compared to the standard control, but this was not statistical.