

## **INFLUENCE OF ALFALFA HAY ON EGG PREDATION IN ADJACENT COTTON FIELDS IN NEW MEXICO**

**Jane Breen Pierce**

**Patricia E Monk**

**New Mexico State University, Agricultural Science Center  
Artesia, NM**

### **Abstract**

Cotton in southern New Mexico valleys benefit from close proximity to alfalfa hay which is known for producing high populations of beneficial arthropods. Field trials were conducted on an experiment station to evaluate the impact of hay on predation in adjacent cotton using cotton bollworm eggs from an insectary colony. Eggs were placed in transects to measure the impact on distance to hay, direction, and time of year. Eggs were removed after 48 hours and examined for evidence of predation. Lab-to-field assays were also conducted before, 1, 7 and 14 days after cutting to evaluate the impact of cutting on predation.

Predation was often significantly higher in alfalfa compared to cotton. Mean predation was 79% compared to 48-59% in cotton in 2010. Nabids and spiders were more than 7 and 3 times, respectively, more common in alfalfa than in adjacent cotton. Unlike California and Arkansas, there was no increase in predation after alfalfa was cut. Predation was generally similar or reduced in adjacent cotton a few days after hay was cut.

### **Introduction**

Crops growing in close proximity to cotton may exert important effects on insect pests of cotton by increasing the population of predators or parasitoids in the area. In California, 20 ft strips of alfalfa for every 300-500 ft of cotton serves as an effective source of natural enemies of insect pests of cotton (Stern et al 1969). Whitcomb and Bell (1964) noted that predators increased in cotton after alfalfa fields were cut in Arkansas as well.

In New Mexico, alfalfa is likely an important source of predators for cotton. This study was initiated to evaluate the role of alfalfa in providing predators to cotton in a Chihuahuan desert river valley environment. Objectives were to determine the role of distance, direction, cutting and to relate to predator numbers and species.

### **Materials and Methods**

The degree of predation was evaluated by setting up 4 transects from alfalfa into cotton in each of 4 directions, a total of 16 transects. Each transect had eggs placed 10 feet into the alfalfa stand and 10, 30 and 80 feet into the block of cotton. Field to lab bioassays were conducted 5-7 times each season to determine the degree of predation. Approximately 50 eggs from a laboratory colony were attached to plants at each location. Eggs were approximately 14 hours old when they were placed in the field. They were removed from the field after 48 hours, then examined under a dissecting microscope to check for evidence of predation. Predators were sampled directly, in conjunction with each assay, with 50 sweeps per assay replicated 4 times in cotton and alfalfa.

## Results

Predation was always significantly higher in alfalfa compared to cotton in 2009-2010 with an average 79% predation of eggs over the season compared to 48-50% predation in cotton (Figure 1). Predation was generally not decreased over the relatively short distances into cotton, 10, 30 and 80 feet, although related trials had reductions in predation at 1000 ft (Pierce and Monk 2009). Prevailing winds from the west did not affect egg predation rates in 2008 or 2010. However, predation was significantly higher in the western transect in 2009 on dates where hay was at least 16" tall (Figure 2). Recently cut hay had no difference in predation by direction.

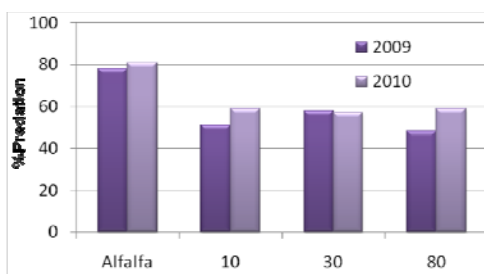


Figure 1. Predation of bollworm eggs as affected by distance from hay

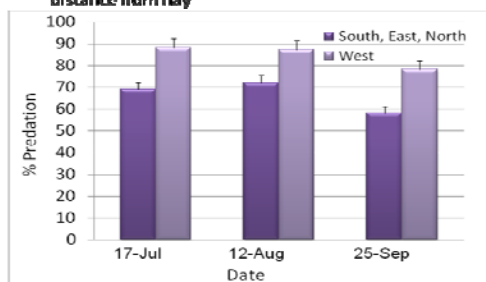


Figure 2. Predation of bollworm eggs as affected by direction in 2009 and 2010.

Ladybugs and green lacewings were collected at similar levels in cotton and alfalfa over the season. Spiders and nabids were more prevalent in alfalfa than in cotton with 3.3 times as many spiders and 7 times as many nabids in alfalfa compared to adjacent cotton (Figure 3).

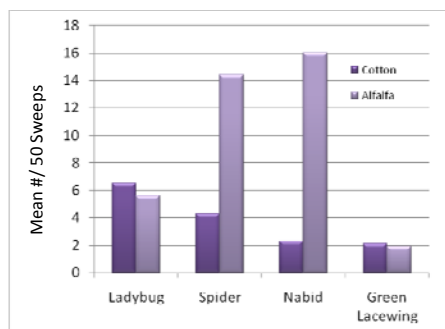
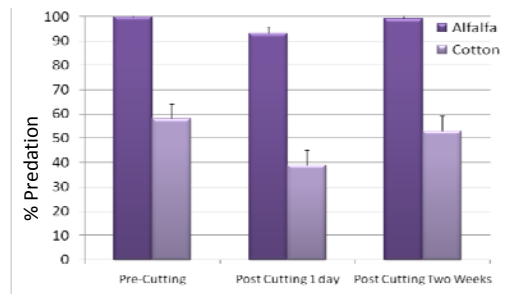


Figure 3. Predator frequency in alfalfa and adjacent cotton

Unlike California and Arkansas, predation did not increase in cotton after alfalfa was cut. In fact, typically there was a reduction in predation in cotton a few days after hay was cut. In 2010, for example, predation in cotton was reduced 33% from 58% to 39% predation just 2 days after hay was cut in July (Figure 4). However, after two weeks predation rates did recover.



**Figure 4. Predation in alfalfa and adjacent cotton before and after cutting hay**

Time of year did, as expected, have an impact on rate of predation with significantly less predation in September-October in 2008-2010 with only 35-46% predation of eggs, compared to 53-86% predation in July and August 2008-2010.

Nabids were the most commonly collected predator in 2008-2010. Spiders followed in abundance in two of three years. Ladybugs were the second or third most abundant predator in three years. No green lacewings were collected in 2008 and few in 2009, but it was the fourth most abundant predator in 2010. They were also very high numbers of green lacewing in pecan in 2010. Other predators found in significant numbers in alfalfa and cotton included big eyed bugs, assassin bugs, and collops beetles.

### References

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