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RELIANCE ON PREDATORS IN MAKING COTTON APHID TREATMENT DECISIONS

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Abstract

The traditional cotton aphid threshold used to make treatment decisions in Arkansas was modified to incorporate the presence of beneficial insects, particularly predaceous coccinellids. The new threshold relies on density estimates of coccinellids (adults and larvae) made by scouts at each field location where aphid samples are routinely taken. Preliminary work has shown application of the new threshold reduced insecticide applications by an average of one application per season. Current research is deploying this new threshold across eastern Arkansas.

Introduction

The current threshold for aphids in Arkansas cotton instructs producers to treat their fields when 50% or more of the plants in a field are infested with a growing cotton aphid population (Greene 2003). Many Arkansas cotton producers treat their fields once or twice prior to the arrival of epizootic of the aphid fungus *Neozygites fresenii*. The current threshold, however, does not take into account beneficial insects, which can play major role in reducing or even eliminating the need for insecticide treatments for cotton aphid. A new threshold was developed and considers the number of predaceous coccinellids when making aphid treatment decisions (Conway 2003). This threshold is the first of its kind to be developed for cotton. While the new threshold is simple to use it is based on a previous, complicated sampling plan which was labor intensive and not economically feasible. This new threshold coupled with the Arkansas cotton aphid fungus sampling service (D. C. Steinkraus http://www.uark.edu/misc/aphid/) which functionally establishes a point at which aphid treatments can be terminated, should help growers maintain effective and economical control of aphids.

Materials and Methods

With assistance from consultants, extension staff, and producers, aphid infested fields were identified at six geographically isolated locations across the state in both 2003 and 2004. We compared treatment decisions using the new threshold with the conventional threshold. Fields (20A minimum) were split with the conventional threshold applied to one half and the new threshold applied to the remainder of the field. One row meter of plants, at 10 randomly selected locations across each treatment in the field were randomly sampled twice weekly for aphids to determine the infestation level and to determine if the population was increasing. The upper-most fully expanded leaf was inspected for aphids. If the field was 50% infested and the population had increased from the previous sample, then the conventional plots were treated (1.5 oz Trimax/A) and the experimental plots were considered for treatment based on counts of coccinellids. Coccinellids were sampled using a sampling pan constructed of a 14.39 x 31.86 x 36.7 cm white plastic pan covered with hardware mesh ($1cm^2$ cells) (Fig. 1). At each sample location all insects in one meter of row were dislodged into the sampling pan and coccinellid species were counted (adults and larvae). If there was an average of 0.2 larvae or 0.3 adults/row-meter present in the plot then no insecticides were recommended and the field was re-sampled in the same manner after seven days. If there was fewer lady beetles present and aphid densities met the criteria of the conventional threshold, then the plot was treated with an insecticide (1.5 oz Trimax/A). Yield of three of the six locations was taken in 2003 and also in 2004 with the assistance of the growers. Cotton was picked with the producer's picker and weighed in a boll buggy equipped with

scales. Yield was converted from lbs. seed cotton/A to lbs. lint cotton/A by the following equation; lbs. seed cotton * 0.35= lbs. lint cotton/A.

Fig. 1 Sampling Pan

Results

Insecticide treatments for aphids were eliminated or delayed across all locations in 2003. Application of the new threshold resulted in similar aphid densities 7 days after treatment (or after the decision not to treat) in 2003.

Application of the new threshold in 4 of 5 locations in 2004 resulted in elimination of the aphid insecticide treatment. Aphid densities were similar in all 5 of these locations 7 days after treatment (or after the decision not to treat) (Fig. 2). The new threshold called for one application of insecticide at one location (Backgate), which resulted in aphid densities similar to the area using the conventional threshold, which called for 2 insecticide applications. Although yield varied across treatments and locations, the new threshold (Alt.) clearly did not adversely impact yield, as it was numerically higher in 5 of the 6 fields from which we obtained yield data over the two years of the study (Fig 3, 4).

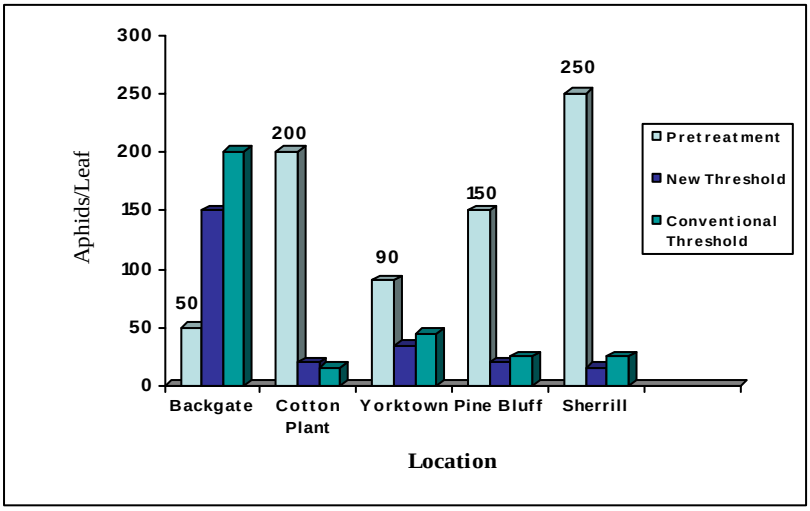

Fig. 2. Resulting aphid densities of the use of the new vs traditional threshold comparison at 5 locations across AR. in 2004.

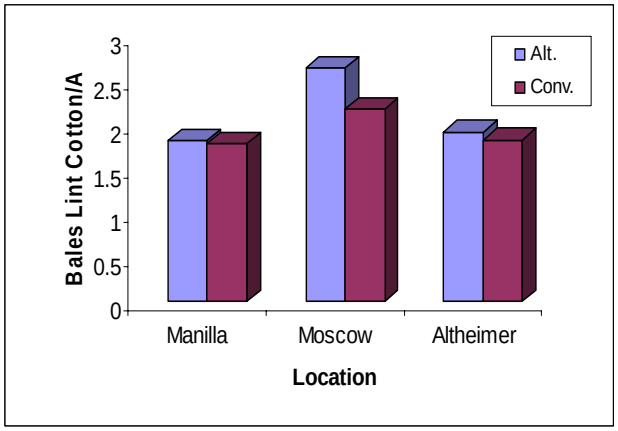

Fig. 3 Yield data collected from three of the test sites in 2003. In all three of the represented trials, the application of the new threshold resulted in a numerical increase in yield.

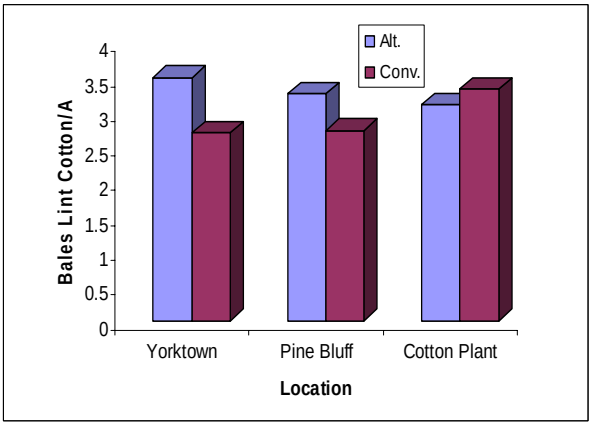

Fig. 4 Yield data collected from three of the test sites in 2004. No significant differences in yield were observed, however in 2 of the 3 locations yield was numerically higher on the side where the new threshold was applied.

Conclusions

This is the first threshold put into practice in cotton that explicitly incorporates beneficial insects. Application of the new threshold allowed the cotton producers to eliminate or reduce (by half) insecticide applications targeting cotton aphid, while not reducing yield. When aphid treatments are warranted, the new threshold often delays the application of insecticide, and in our experience this delay may increased the chance that the application could be coupled with a treatment targeting plant bug. Further reduction in insecticide usage will conserve beneficial insects in the field which may reduce aphid resurgence and provide some reduction of other pest species.

Reference

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