

Sticky Cotton Prevention – Late Season Insect and Defoliation Management

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Preventing sticky cotton is crucial in producing quality cotton. Late-season populations of cotton aphid and Silverleaf whitefly can produce significant amounts of honeydew when populations build. These pests are of most concern from mid-boll filling through harvest, when insect populations build and threaten exposed lint. Pest management guidelines for cotton aphid and silverleaf whitefly focus on strategies to use once threshold pest populations are reached, with the approach varying with the composition of the developing population (nymphs, adults), crop growth stage, and with the presence of exposed lint. Current pest management guidelines for whitefly and aphid can be interpreted as meaning defoliation is the final event of the season. This is based on the assumption that defoliation will remove the leaves and therefore problem insects with defoliant / harvest aid applications. Typically, the period of time between the first defoliation application and actual harvest can be two weeks or even longer, with lint exposed to honeydew if green leaves persist for any duration or significant terminal regrowth occurs.

The project conducted over four growing seasons has evaluated interactions of specific harvest aids and late-season insecticides for their impact on: (1) silverleaf whitefly and aphid population densities during the period from first defoliant application through harvest; (2) cotton stickiness (including measures of stickiness made based on the High Speed Stickiness Detector (H2SD machine) at two to three times (depending on year of study, first harvest aid application, intermediate date, at final harvest) and sugar analysis to evaluate if relative sugar composition matched insect pest distributions. Multiple treatment combinations of defoliant/desiccants differing in mode of action and speed of impact on leaves were each tested with and without combination insecticide applications to evaluate impacts on fiber stickiness.

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1. silverleaf whitefly and aphid population densities during the period from first defoliant application through harvest
2. cotton stickiness (including measures of stickiness made based on the High Speed Stickiness Detector (H2SD machine) at the time of first harvest aid application and at final harvest) and sugar analysis to differentiate whether sugars attributed most to SLWF or cotton aphid were present at each site, and whether relative sugar composition matched insect pest distribution

The work to date on this project has identified that:

- (1) in addition to periods prior to first harvest aid applications, late-season periods between first harvest aid application and harvest can allow risk of exposure to additional stickiness if aphid and SLWF populations are not controlled into final weeks prior to harvest;
- (2) stickiness issues can occur with threshold populations made up of mostly SLWF or cotton aphid;
- (3) the time course of the development of the stickiness was evaluated only in the current year of this three year trial, with the data indicating that with insect pressure, stickiness increases could occur between the first and third weeks after first harvest aid application;
- (4) relationships between stickiness counts at harvest and aphid or SLWF nymph counts on specific leaf positions used for treatment threshold decisions (and at times of about ½ week, one week and two weeks after harvest aid / insecticide treatments) were only roughly correlated;

- (5) Fiber samples were hand collected from all bolls on sampled plants, machine ginned and analyzed for stickiness using a high speed thermal detector. At multiple test locations in prior years, pre-treatment lint collected after 60% boll opening but before defoliant applications averaged <10 sticky spots per sample (borderline "sticky" by high speed detector method).

Previous reports can be reviewed to summarize other project data during prior years. At the time of preparation of this report, we have not finished evaluation of crop agronomic data (defoliation, desiccation, regrowth ratings) or the insect count summary for the project. That information will be worked up and provided in part at the March meeting to report to the Cotton Incorporated State Support Committee. A preliminary analysis of the sticky spot count data has been completed, consisting only of a broad summary of the total number of sticky spots according to treatment. Fiber stickiness levels were highly variable and increased by a factor of 2 to over 3 times pretreatment levels during the 3 weeks after first defoliant, indicating high potential for lint contamination during this period. Stickiness levels were significantly lower in all defoliant and defoliant/insecticide treatments than in untreated controls, and showed a numerical but not statistically significant trend toward lower stickiness levels with defoliant treatments that included tribufos (Def/Folex). Insecticide applications within any defoliant treatment tended to reduce stickiness levels. Studies will continue in 2006 and funding is requested to continue through the 2006, with the project terminating at the conclusion of 2006 efforts.

Plans for Studies in 2006: Further efforts in this project will be directed toward simplified defoliant/insecticide combination treatments, more locations to provide assessment of plant and insect factors best correlated with stickiness, evaluation of relative impacts on stickiness when combination of aphids and SLWF are present (provided situation found in grower cooperator field), and repeated lint sampling dates to evaluate time course of honeydew depositions and measured stickiness levels.

Locations: Plans are to select a minimum of two trial sites, and if possible, increase the locations to three to better characterize the range of conditions and mixes of SLWF and aphids in the SJV. Due to locations of staff involved in the trials, Tulare County, Kings and Kern Counties are the most likely sites, with the county trial locations selected based upon field observations and insect counts made during the month leading up to timing of first harvest aid applications. Research station locations will be used if available and appropriate in terms of pest populations. Grower cooperators will be identified and fields scouted to identify possible sites representing different cropping areas and pest pressures.

Treatments / Measurements: Defoliation / insecticide treatment combinations will be simplified (fewer total treatments) to allow a focus on the plant and insect factors most likely to impact stickiness accumulations and the time course of stickiness accumulations. This is in contrast to the focus of the initial two years of the study, which was on evaluation of differences in stickiness between different defoliants, with and without insecticide applications. Crop management treatments to be considered for comparative impacts include late-season supplemental irrigation and/or nitrogen to impact leaf water and N status. It is already known from a variety of prior studies that more vigorous plants (typically higher water and N availability) can support insect populations later into the growing season, but less is known of leaf level N or water status and its potential impacts on stickiness during this pre-harvest (first harvest aid to harvest) period. Insect scouting efforts will be started earlier to identify prevailing conditions in plots within a week prior to harvest aid applications. At one or two locations on only two treatment combinations, stickiness samples will be collected by pulling cotton out of all open bolls at intervals that match the timing of insect monitoring in select treatments, with three total sample dates at approximately one week intervals. Honeydew accumulations will be evaluated using stickiness measurements on seedcotton of all bolls open at each sampling time. Better understanding of the time course of accumulations should improve our ability to make useful decisions regarding the duration and intensity of control needed for SLWF and aphids during this period.