INSECT GROWTH REGULATORS FOR WHITEFLY MANAGEMENT

Robert Nichols
Cotton Incorporated,
Raleigh, NC
Peter Ellsworth
University of Arizona,
Maricopa, AZ
Tim Dennehy
University of Arizona,
Tucson, AZ

Abstract

The silverleaf whitefly (Bemisia argentifolii) has been a major pest in Arizona cotton (Gossypium hirsutum) since 1992. Typically, 4-10, or more, applications of insecticide have been used for its management in cotton for the past four seasons. The most effective, and therefore most widely used treatments, have been combinations of pyrethroid plus organophosphate or cyclodiene insecticides. The silverleaf whitefly and the closely related sweetpotato whitefly (Bemisia tabaci) have demonstrated a prodigious capacity to develop resistance to insecticides throughout the world. In 1994 monitoring data from Arizona showed one hundred-fold (100X) differences in susceptibility to key insecticides. Accordingly, a comprehensive integrated resistance management (IRM) plan for whitefly control in Arizona was prepared for implementation in 1995. The recommendations were supported by the Arizona Cotton Growers Association, the Arizona Cotton Research and Protection Council, the Arizona Department of Agriculture, Cotton Incorporated, the Southwest Whitefly Resistance Management Working Group, the Sticky Cotton Action Team, the United States Department of Agriculture, and the University of Arizona IPM Working Group. Despite the best efforts of the technical community and the industry, efficacy of the most effective insecticide treatments were lost in major cotton producing areas in Arizona in August and September 1995.

The co-operating organizations convened a series of meetings in August-November 1995. All parties agreed that no acceptable plan for whitefly management for cotton in 1996 was apparent without the availability of new modes of insecticidal action. A proposed IRM for whiteflies in cotton was then developed by including insect growth regulators (IGR's). The plan is broadly based on a similar program currently used in Israel, and credited with greatly reducing problems with sticky cotton that previously had occurred there. In the proposed IRM, the IGR's, buprofezin (Applaud - AgrEvo) and pyriproxyfen (Knack - Valent), each would be used once, in tandem, with the order of application determined by grower preference. Subsequently, treatments would be predominantly with combinations of non-pyrethroid insecticides.

Neither buprofezin nor pyriproxyfen is presently registered for use in cotton in the United States. Therefore, both would require emergency exemptions from registration for use in 1996. The two IGR's have different modes of action. Buprofezin is a chitin synthesis inhibitor, while pyriproxyfen is a juvenile hormone analog. Resistance research in Israel shows no cross resistance between the two compounds, while sustained use of either alone increases resistance ratios in treated whitefly populations. The IRM proposes simultaneous introduction of both compounds, because the silverleaf whitefly rapidly has developed resistance to several modes of action when repeatedly exposed to single classes of chemistry.

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