FIELD EFFICACY OF WIDESTRIKETM INSECT PROTECTION AGAINST PINK BOLLWORM J.M. Richardson, L.B. Braxton and J.W. Pellow

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<u>Abstract</u>

Field studies conducted from 2001 through 2003 showed WideStrike cotton to be effective against pink bollworm, *Pectinophora gossypiella*. In Maricopa, AZ, studies involved both natural and artificial infestations from 2001 through 2003. In Las Cruces, NM, studies involved natural infestations in 2002 and 2003. Experiments included insect protected lines and their non-insect protected recurrent parents. Data were derived from cotton boll dissections and included evaluations of larval entry holes, exit holes, presence of living or dead larvae, and pupae. Results demonstrated that WideStrike provided commercially acceptable efficacy against pink bollworm (PBW) in these Southwestern U.S. locations.

Introduction

One of the most destructive global pests in cotton is the pink bollworm. It enjoys primary pest status in cottongrowing areas encompassing southern CA, AZ, NM, west TX and northern Mexico. Outside North America, it is problematic in Egypt, India, Pakistan and Australia. In some U.S. locations, annual costs for controlling this pest have exceeded \$70 per acre in years with serious outbreaks (Ellsworth and Jones, 2000). Regional programs have been organized to eradicate pink bollworm in some areas of the U.S. in recent years. Cotton varieties expressing insecticidal proteins of *Bacillus thuringiensis* represent a promising component of these eradication efforts.

Dow AgroSciences, LLC has genetically modified cotton to express two separate insecticidal *Bt* proteins: Cry1Ac and Cry1F. The simultaneous expression of these two proteins is referred to as WideStrike. WideStrikeTM *Insect Protection* received deregulated status for cotton from the U.S. Department of Agriculture (USDA), completed Premarket Biotechnology Notice consultations with the U.S. Food and Drug Administration, and full registration from the U.S. Environmental Protection Agency (EPA) during 2004. The new cotton trait will be introduced into the market and available in PhytoGen varieties in 2005.

Materials and Methods

Field trials were conducted from 2001 through 2003 in Maricopa, AZ and in 2002 and 2003 in Las Cruces, NM. All trials included a WideStrike protected line (PHY440W) and its non-insect protected recurrent parent (PSC355). Treatments were arranged in insecticide sprayed and non-insecticide sprayed main blocks. One main plot was sprayed with foliar insecticides to control non-lepidopteran pests as needed during the growing season. The other main plot was treated for lepidopteran pests, timed to coincide with peaks in PBW moth populations, as indicated by pheromone traps.

In Maricopa, plots were artificially infested by stapling egg sheets onto the adaxial surface of the bracts of 20-21-d old bolls. Twenty-five bolls per plot were infested in this manner. Egg sheets contained approximately 200 PBW eggs each. Approximately one week after infestation, bolls were collected and held at 72F. They were then dissected and examined under microscope to gather data on larval entry holes, exit holes, presence of living or dead larvae, and pupae.

Extensive natural infestations occurred in late September and October in Maricopa and Las Cruces. As in the artificial infestations, bolls were collected, dissected and examined for entry holes, exit holes, presence of living or dead larvae, and pupae.

Results and Discussion

In evaluating the data from boll examination and dissection, the WideStrike line (PHY440W) was very effective in eliminating PBW early in the lifecycle.

<u>Maricopa</u>

Numerous late instar larvae, pupae and exit holes were found in the non-transgenic PSC355 in each of the three years. This became particularly obvious as the season progressed. In 2001, no larvae were found in PHY440W, alive or dead, beyond second instar. In fact, second instar larvae were only found at the first evaluation, 21 August. All other 2001 larval detections in PHY440W consisted of first instars only. Five third instar survivors were found in a single boll within the WideStrike plots at one evaluation date (10 October) in 2002. This was from a natural infestation in the non-lep spray main block. Follow-up testing suggested this boll was from an off-type plant. All other 2002 PHY440W evaluations yielded first and second instar larvae only, with dead first instars predominating. A few third and fourth instar larvae were found in WideStrike plots in 2003, considered to be from plants resulting from impurities in the seed bag, a rogue volunteer in the field, or other experimental error. The vast majority of larvae detected in those plots were dead first instars.

Las Cruces

In 2002 and 2003, no live third or fourth instar larvae were found in PHY440W bolls. In contrast, bolls from the PSC355 plots yielded numerous third and fourth instar larvae.

References

Ellsworth, P.C. and J. Jones. 2000. Arizona Cotton Insect Losses. The University of Arizona, Cooperative Extension. Publication #AZ1183. Tucson, AZ. URL: http://ag.arizona.edu/crops/cotton/insects/cil/cil.html.