Benefits of Pyrethroids to Cotton

PYRETHROID WORKING GROUP

Pyrethroids Benefits Project

The Pyrethroid Working Group contracted an extensive analysis of the benefits of pyrethroids to agriculture. A multitude of data was analyzed with different methodologies to determine the value of pyrethroids, and the costs to farmers if they were no longer available. These analyses determined: (1) costs to the farmer of key insect pest management practices with and without pyrethroids, (2) yield benefits of pyrethroids, (3) monetary and non-monetary value of pyrethroids based on a farmer survey, and (4) a multi-market analysis to project the aggregate economic benefits of pyrethroids to the U.S. economy. Below are the primary benefits of pyrethroids to cotton from these analyses.

Benefits to Cotton

1. Costs with and without pyrethroids

- The total market value for U.S. cotton and cottonseed in 2015 was $4 billion and $932 million based respectively on USDA-NASS.
- Cotton has 5.5 million pyrethroid treated product acres across the US.
- For cotton, stink bugs are the primary target pest of pyrethroid insecticides in foliar-based systems, with a 43.8 % share of all foliar treated acres. Lepidopterans are overwhelmingly the primary target pest in soil-based systems, with an 86.3 % share of product acre.
- The targeted pests for the cotton farmer pre-bloom and post-bloom differ. Pre-bloom, the primary pest is thrips, while plant bugs and aphids are minor targets. Post-bloom, the targeted pests shift to bollworms, stink bugs and plant bugs.
- Data averaged from 2012-2014 showed that pyrethroids comprised more than 96% of the total foliar applied insecticide treated acres in cotton. For soil-applied insecticides, pyrethroids comprised about 27% of the insecticide treated acres.
- For both foliar and soil-based systems, the costs for replacing non-pyrethroid active ingredients exceeded the costs for the pyrethroid AIs. However, the application costs for the non-pyrethroid scenario were lower since the total product acres decreased about 684,000 based on Cotton Table 8. As a result, the estimated net effect of the non-pyrethroid scenario on farmer costs was a decrease of almost $1.9 million. Given the 5.5 million pyrethroid product acres, this cost effect would be an average decrease of $0.34/A for each pyrethroid product acre. When spread over all cotton planted acres, the average cost impact was a decrease of $0.17/A for the non-pyrethroid scenario.

2. Yield Benefits

- Yield increases from pyrethroid only treatments were 55% for cotton compared to untreated controls.
- Pyrethroids reduced crop damage as much as 65% in cotton
- The efficacy of all pyrethroid treatments was generally greater than for non-pyrethroid treatments for lepidopterans and plant bugs.
- Pyrethroids demonstrated an advantage for reducing pest abundance and crop damage; however, these advantages did not always result in a yield advantage. The subjective assessment for economic analysis was that a low yield loss of 2% would occur if pyrethroids were not available, largely due to increased insect resistance.

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3. Monetary and Non-Monetary Value to Farmers

- The value of insecticide seed treatments was $79 million, while soil insecticides were worth $15.7 million. The implied value of foliar insecticides before first bloom was $65.7 million with $8.5 million attributed to farmers who used a pyrethroid foliar insecticide on at least some of their cotton acres. The estimated value of foliar insecticides after first bloom was $91.7 million with $22 million attributed to farmers who used a pyrethroid foliar insecticide on at least some of their cotton acres.
- Pre- bloom, thrips were the most actively managed pest in cotton, while bollworms and stink bugs were the most actively managed post- bloom.
- Pyrethroid insecticides are used on a large portion of cotton acres, evidence that the source of their value is something beyond cost, since product and application costs are slightly more than the non-pyrethroid alternatives.
- At least 80% of cotton farmers identified six features of pyrethroids as very important. These features were protecting yield, family and worker safety, consistent insect control, crop price, product and application cost and long lasting insect control.
- The estimated value of foliar pyrethroid treatments was $36.62 per treated acre pre- bloom and $50.06 per treated acre post- bloom.
- The value of foliar pyrethroids pre-bloom was $8.5 million and $22 million post-bloom.

4. Direct and Indirect Impacts

- Net economic benefit is $4.11 per cropped acre and is $8.36 per pyrethroid treated acre for cotton.
- Should pyrethroids not be available, going from three modes of action down to two modes of action would make resistance management in cotton more difficult.