

Benefits of Pyrethroids to Soybean

PYRETHROIDS BENEFITS PROJECT

The Pyrethroid Working Group contracted an economic 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 from these analyses.

BENEFITS TO SOYBEAN

1. Costs with and without pyrethroids

- The total market value of production for soybean in the U.S. in 2015 was \$35 billion according to USDA-NASS.
- Pyrethroids are the most widely used class of foliar insecticides by U.S. soybean growers. Of the 80 million planted acres of soybean, 22 million are insecticide-treated acres, of which 14 million were treated with pyrethroids (65%).
- The soybean aphid is the most actively managed insect for soybean farmers.
- Costs per acre, with and without pyrethroids, demonstrate the value of pyrethroids in soybean. Without pyrethroids, soybean farmers would see insecticide costs increase 25% per treated acre.
- Based on 2014 numbers, pyrethroid treatments averaged \$3.56/acre. Average costs would rise to \$4.77/acre without pyrethroids, or \$1.21/acre. Even this rise can significantly impact a farmer's profits as soybean prices vary.
- In total, the increased net per acre costs to replace pyrethroids in the soybean industry would be almost \$17,000,000.

2. Yield Benefits

- The soybean aphid (*Aphis glycines*) is the primary insect pest of soybean in the U.S. Besides direct yield loss due to feeding damage, soybean aphids also transmit viruses to crops, causing additional yield loss.
- The results of 385 observations in small test plots show that foliar-applied pyrethroid insecticides are the most effective method for managing soybean aphid populations and generating larger yield benefits than other insecticide treatments.
- Foliar-applied pyrethroids are more effective than other foliar-applied insecticides and seed treatments for controlling soybean aphids.
- Foliar-applied pyrethroids generate larger yield benefits than other foliar-applied insecticides and seed treatments
 - Based on the impact to cumulative aphid days (CAD), pyrethroids reduce average aphid pressure by 12 percentage points compared to other foliar-applied insecticides, and by 35 percentage points compared to seed treatments.
 - In addition, the variability of CAD as a percentage of the initial CAD pressure is more than 10 percentage points lower with pyrethroids than with other foliar-applied insecticides or a seed treatment.



- Foliar-applied pyrethroids are the most valuable soybean aphid control option available to Midwestern soybean farmers.
- Without pyrethroids, the loss of these yield gains could be the difference between making a profit and losing money for many farmers.

3. Monetary and Non-Monetary Value to Farmers

- Nearly half the soybean farmers who reported using a foliar insecticide also reported using a pyrethroid foliar insecticide.
- Soybean farmers specified that foliar pyrethroid treatments were worth \$15.18 per treated acre in 2015.
- Given estimated use rates and values per treated acre in 2015, the total value of foliar insecticide treatments to U.S. soybean farmers was \$282 million, with \$133 million of this value attributable to farmers who used pyrethroid foliar insecticides on at least some of their soybean acres.
- The four most important (70%+) non-monetary features of insecticides to soybean growers were family and worker safety, protecting yield, consistent insect control, and public safety.

4. Direct and Indirect impacts

- Of all the crops examined, the aggregate economic benefit of pyrethroid use in soybean was second only to corn, generating more than \$300 million in benefits for the US economy.
- The major users of soybeans reaped most of these benefits as lower consumer prices for meat, dairy and egg products.
- Loss of pyrethroids would result in cost increases reducing farmer profits and increasing the cost of soybean.
- Pyrethroids are a low-cost class of insecticides to use in rotation with more costly insecticides to reduce the likelihood that insecticide resistance will develop to any of the classes.
- Soybean has **four** major insecticide chemistries available, and the loss of this key insecticide would further limit the ability to manage resistant pests.

