ENTO-PU-223
January 2024

THRYVON™ COTTON

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WHAT IS THRYVON™ COTTON?

ThryvOn™ is a cotton biotechnology trait that expresses the Mpp51Aa2 protein (also known as Cry51Aa2). Unlike other Bt proteins used in cotton, this particular Bt protein does not affect caterpillar pests like bollworms. However, it has activity on thrips and plant bugs.

HOW DOES THRYVON TECHNOLOGY AFFECT GROWERS' THRIPS MANAGEMENT DECISIONS?

ThryvOn cotton provides excellent control of thrips and eliminates the need for additional insecticide inputs. Against thrips, ThryvOn provides protection by deterring feeding and oviposition (egg-laying). Thus, adults may still be readily found in ThryvOn cotton, but they will not be feeding as much, or laying eggs, and will be repelled. The fact that fewer eggs are laid results in a great reduction in immature thrips. Comprehensive field trials conducted throughout Texas have demonstrated that ThryvOn has excellent activity on all commonly encountered early-season thrips species, including tobacco thrips, western flower thrips, eastern flower thrips, and onion thrips (Fig. 1).

Data collected by Texas A&M AgriLife Extension has demonstrated that ThryvOn cotton does not economically benefit from additional thrips control delivered from insecticide seed treatments, in-furrow insecticides, or foliar insecticides. ThryvOn cotton not treated with these insecticide treatments may exhibit slightly more damage from thrips feeding, but the damage is very superficial and is not economically significant. In essence, ThryvOn cotton should not need additional control measures for thrips. However, seed treatments or in-furrow insecticides may still be desired for aiding in the management of wireworms, nematodes, or other early-season pests.

Figure 1. ThryvOn (left) and non-ThryvOn (right) cotton seedlings under heavy thrips pressure. *Photo by Suhas Vyavhare.*

ARE INSECTICIDE SEED TREATMENTS OPTIONAL IN THRYVON COTTON?

Yes and no. While current research has documented limited benefits of adding insecticide seed treatment to ThryvOn, the seed will be marketed only with an imidacloprid seed treatment in the eastern half of Texas, where tobacco thrips are the predominant early-season thrips pest. Insecticide seed treatment is optional in the western half of Texas (Fig. 2). The reason for requiring insecticide seed treatment in the region of the state where tobacco thrips are common is for resistance management. The risk of tobacco thrips developing resistance to ThryvOn is considered higher than for other thrips species.

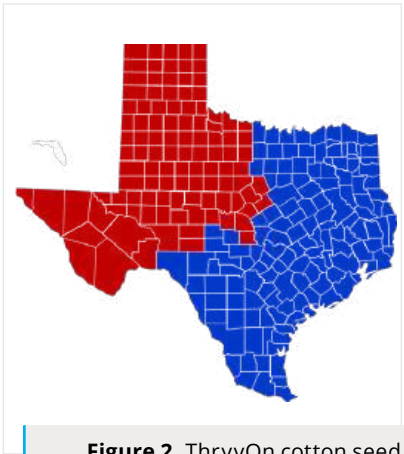

Figure 2. ThryvOn cotton seed planted in the counties highlighted in blue will only be sold with the addition of an insecticide seed treatment, whereas an insecticide seed treatment will be optional for the red counties.

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HOW EFFECTIVE IS THRYVON ON TARNISHED PLANT BUGS?

Although the Bt protein expressed in ThryvOn cotton has activity on tarnished plant bugs (Fig. 3), it primarily offers suppression. ThryvOn has little known activity on adult plant bugs, but it can kill small nymphs. Thus, plant bug populations should not develop as quickly in ThryvOn as in non-ThryvOn cotton. However, insecticide applications targeting plant bugs may still be required. Currently, Texas A&M AgriLife Extension recommends utilizing the same action thresholds for plant bugs in ThryvOn cotton as for non-ThryvOn cotton but anticipates fewer insecticide applications being necessary.

DOES THRYVON HAVE ANY ACTIVITY ON COTTON FLEAHOPPERS?

ThryvOn cotton is not labeled for managing cotton fleahoppers (Fig. 4). However, data collected by Texas A&M AgriLife Extension has demonstrated that ThryvOn has activity on cotton fleahoppers, similar to that observed for tarnished plant bugs. ThryvOn cotton will be readily colonized by adult cotton fleahoppers, but fewer large nymphs will survive. Furthermore, the authors have observed that ThryvOn does affect cotton fleahopper feeding behavior, which results in less cotton fleahopper-induced square loss. Thus, when cotton fleahoppers are present, ThryvOn cotton tends to have better square retention relative to non-ThryvOn cotton. Currently, Texas A&M AgriLife Extension recommends utilizing the same action thresholds for cotton fleahoppers in ThryvOn cotton as for non-ThryvOn cotton.

Figure 3. Adult tarnished plant bug. *Photo by Suhas Vyavhare.*

Figure 4. Adult cotton fleahopper. *Photo by Pat Porter.*

cotton. However, data suggests that cotton fleahopper management with insecticides in ThryvOn cotton will be superior to non-ThryvOn cotton.

WHAT ABOUT THRYVON'S ACTIVITY ON OTHER COTTON PESTS?

The Mpp51Aa2 protein in ThryvOn has no known activity on caterpillars, stink bugs, aphids, or whiteflies. However, it is unknown whether this technology will impact mid- to late-season thrips species, such as chili thrips, bean thrips, or Kurtoma thrips. Additionally, it is unknown if ThryvOn has activity on cotton pests similar to plant bugs, such as the verde plant bug or the rapid plant bug. Efficacy data on these pests has yet to be collected.

DOES THE THRYVON TECHNOLOGY HAVE ANY IMPACT ON BENEFICIAL ARTHROPODS?

ThryvOn has little impact on the most beneficial arthropod species. The Mpp51Aa2 protein has been shown to have some activity on minute pirate bugs in that it delays their development. Also, it does affect thrips, which are often important predators of spider mites.

ARE THERE ANY UNEXPECTED RISKS FROM PLANTING THRYVON COTTON?

Because ThryvOn has very good activity on thrips and thrips are effective predators of spider mites, it has been observed, but not quantified, that spider mite outbreaks may be more likely in ThryvOn cotton than in non-ThryvOn cotton. However, more research is necessary to better understand the magnitude of this risk.

HOW WOULD THRYVON HELP WITH OVERALL CROP MANAGEMENT?

ThryvOn does offer some management flexibility to growers. Managing insecticide applications across a large span of farmland with limited equipment can pose timing challenges. Weather conditions can exacerbate this issue. ThryvOn offers growers a level of flexibility, enabling them to undertake certain activities that were previously unattainable under such circumstances. For instance, during a cool and damp period in the initial stages of the growing season, maneuvering a sprayer across the cotton field might be unfeasible despite the presence of thrips actively feeding. However, with the inherent thrips protection integrated into ThryvOn cotton, growers would not have to worry about this issue. Another advantage of the built-in protection is the elimination of concerns related to chemical wash-off problems and potential insecticide loss due to heavy rainfall events.

DOES THRYVON COTTON NEED A DIFFERENT PLANT GROWTH REGULATOR (PGR) REGIMEN THAN NON-THRYVON COTTON?

Overall, ThryvOn cotton exhibits better fruit retention than non-ThryvOn varieties, which can affect plant growth and maturity. Thus, although the ThryvOn trait in itself does not warrant a different PGR regimen, better square sets may reduce the need for some PGR applications.

DOES THRYVON OFFER GREATER ECONOMIC RETURNS THAN THE NON-THRYVON COTTON?

The economic benefit from planting ThryvOn cotton is dependent upon the pest pressures of thrips, tarnished plant bugs, and cotton fleahoppers. If these pests are not common issues on a particular farm, there is probably little benefit from planting the technology. However, eliminating the need for an insecticide seed treatment or foliar insecticides can provide tangible benefits. In general, if the cost of one insecticide application can be realized on ThryvOn, the cost of the technology will easily pay for itself.

THRYVON TAKE-HOME POINTS

ThryvOn Bt technology has excellent activity on thrips and eliminates the need for supplemental thrips control measures. This technology will aid in managing plant bugs and cotton fleahoppers. Though it will not eliminate the need for insecticides to manage these pests, it may reduce the number of insecticide applications necessary. Timely field scouting, use of action thresholds, and insecticide selection are still important for plant bug and cotton fleahopper management in ThryvOn cotton. Finally, ThryvOn cotton has no efficacy on insect pests, such as aphids, spider mites, grasshoppers, stink bugs, etc., and therefore, regular field scouting and monitoring is still critical in ThryvOn cotton.

ACKNOWLEDGMENT

This work is supported in part by the Crop Protection and Pest Management, Extension Implementation Program [award no. 2021-70006-35347/project accession no. 1027036] from the United States Department of Agriculture (USDA) National Institute of Food and Agriculture.