INFLUENCE OF BOLLWORM MANAGEMENT ON VARIETY SELECTION IN NC

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Abstract

Variety selection continues to be one of the most important decisions that growers make in a given year. For many years, 2-gene Bt varieties provided adequate bollworm control with minimal additional sprays needed. Widespread resistance of bollworms to 2-gene traits became problematic in NC beginning in 2016, and furthermore in 2017, necessitating additional and costly diamide sprays to achieve acceptable control. Simultaneously, 3-gene Bt varieties became commercially available in 2017. The alarming costs of additional diamide sprays incentivized many growers to transition to 3-gene varieties, however, some 2-gene varieties may yield greater than some of the top-performing 3-gene varieties. Yield advantages of a few 2-gene varieties may be high enough to cover the costs of additional sprays while still returning greater profits to producers. The objectives of this research were to quantify differences in bollworm injury or tolerance among the technologies tested, and to determine if yield differences or advantages between 2- and 3-gene varieties were high enough to justify the added cost of spraying for bollworms.

Large-plot replicated trials were conducted across NC in 2017, encompassing all cotton-producing regions within the state. This program is designed to capture as many environments, representative soil types within a region, planting dates, seeding rates, grower management practices, etc. as possible within a given year. This program includes the top 2 varieties from each seed company as determined by participating seed companies. Although every company has a broad portfolio of competitive varieties to offer, the entries were chosen to be the best of each brand for all regions of the state. Experimental or niche varieties were not tested in this program. All varieties and replicates within a trial were managed equally for all practices throughout the year. Cooperating growers were asked to utlilize a mild to moderate PGR program as to avoid penalizing early maturing varieties through aggressive PGR management. Bollworm management decisions were made according to thresholds in Bollgard II plots within a trial. Defoliation occurred when all varieties and all replicates were mature. Percent damaged bolls were measured by cooperating entomologists near the time of defoliation or shortly after, but prior to harvest.

In the trial with the greatest bollworm injury (60 % damage in BGII), it was clear that bollworms were the primary yield-limiting factor, thus 3-gene varieties were the top performers in that trial. In the trial with the next highest degree of bollworm injury (10 % in BGII), bollworms were no longer the yield-limiting factor, resulting in a yield advantage in a BGII variety over the top-performing W3 variety. All other trials experienced less bollworm damage measured at the end of the season. The relative value of all varieties were compared to the most consistent top-performing W3 variety, as a positive or negative quantified value compared to PHY 340 W3E. Value was calculated as the average yield multiplied by \$0.70/lb assuming no discounts nor premiums for fiber quality, and no differences in seed costs. Application costs of \$18/A were subtracted from the values of each 2-gene variety, with the assumption that every 2-gene variety required an additional diamide spray, both once or twice. Values were highlighted to indicate a positive value (after application costs were subtracted) in cases where lint yield was significantly greater ($p<0.1$) than the most consistent top-performing 3-gene variety. Compared to the most consistent performing 3-gene variety, DP 1646 B2XF yielded high enough to cover the cost of 1 diamide spray will remaining more profitable in 43 percent of trials. Yield of this variety was low enough to be less profitable in only 14 percent of trials. Four other varieties (three Bollgard II and one Twinlink variety) were more profitable than the highest yielding 3-gene variety in 7 percent of trials each, but were much more commonly less profitable. Compared to the most consistent performing 3-gene variety, DP 1646 B2XF yielded high enough to cover the cost of 2 diamide sprays will remaining more profitable in 43 percent of trials. Yield of this variety was low enough to be less profitable in 29 percent of trials. Four other varieties (three Bollgard II and one Twinlink variety) were more profitable than the highest yielding 3-gene variety in 7 percent of trials each, but were much more commonly less profitable.

In a season with high yield potential across most of NC, DP 1646 B2XF provided a yield advantage over the top-performing 3-gene variety to the point of justifying the costs of additional diamide sprays and still remaining more profitable in 43 percent of trials. Other 2-gene varieties seldom yielded high enough to justify additional sprays compared to the highest yielding 3-gene varieties. While all varieties were managed equally within a trial, yield advantages do exists with some 2-gene varieties, if scouted thoroughly, and managed in a timely fashion with appropriate product selection. The trial with 60 % damage in BGII clearly illustrates that improper product selection or application timing can easily result in much greater value with 3-gene varieties. Further research needs to be conducted, to evaluate yield advantages between BGII varieties and some of the newer higher yielding 3-gene varieties. Additionally, similar research needs to be conducted in lower-yielding drought stressed environments to determine if these yield advantages are repeatable in lower yielding environments.

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