Minnesota Crop eNews
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University of Minnesota Extension Service

Traits – Are They Increasing Corn Yields?

February 5, 2007

D. R. Hicks, T.R. Hoverstad, and J.L. Gunsolus
Department of Agronomy and Plant Genetics
University of Minnesota

Corn yields have continued to go up and many give credit to the new corn traits for these yield increases. We sorted data from the southern and central zones of the 2006 Minnesota Corn Performance tests to determine the effect of herbicide resistance- and Bt-traits on yields. At the outset, we should point out that these comparisons confound genetics and traits. However, it's valid to make these comparisons because a grower is interested in the yield potential of the combination of genetics and traits. And the large number of hybrids in most categories gives validity to the conclusions.

Table of data from the southern and central zones of the University of Minnesota Corn Performance Tests, 2006.

	Southern Zone		Central Zone	
Trait	**Number of Hybrids**	**Average Yield Bu/A**	**Number of Hybrids**	**Average Yield Bu/A**
All Entries	170	232	147	192
Herbicide Traits				
None	54	230	47	191
Glyphosate	88	231	84	193
Liberty Link	28	237	16	188
Insect Traits				
None	31	234	31	193
Rootworm	7	225	4	197
Corn Borer	96	233	85	192
Corn Borer and Rootworm	36	227	28	189
Triple Stacks	28	228	25	188

All Others	142	233	122	193
No Traits	15	232	11	190
With One or More Traits	155	232	136	192

There were 170 entries replicated three times at each of three locations in the southern zone. The 170 entries averaged 232 bu/a across the three locations with the highest entry yielding 259 and the lowest 205 bu/a. We tested 147 hybrids in the central zone; they averaged 192 bu/a across the two locations with the highest yield of 216 and the lowest 165 bu/a.

Herbicide Traits. After sorting, hybrids in the southern zone without an herbicide resistance trait averaged 230 bu/a. Hybrids with the glyphosate trait and Liberty Link trait averaged 231 and 237 bu/a, respectively. In the central zone, hybrids without an herbicide trait yielded an average of 191 bu/a while hybrids with the glyphosate trait averaged 193 and those with Liberty Link averaged 188 bu/a. Hybrids without an herbicide resistance trait performed very similarly to the hybrids with the glyphosate trait. These are interesting comparisons because some are concerned with continually using glyphosate for weed control in both corn and soybeans. As an average, the hybrids with Liberty Link yielded 5 bu/a higher than hybrids with the glyphosate trait in southern MN and 5 bu/a lower in central MN. In both zones, there were considerably fewer hybrids with the Liberty Link trait compared with the number with the glyphosate trait. These comparisons suggest that growers might choose hybrids with comparable yield potential and have the opportunity to rotate herbicides with the objective of delaying weed resistance development to glyphosate.

Insect Traits. Hybrids in the southern zone without either insect trait yielded 234 bu/a while hybrids with corn borer control averaged 233 bu/a, not a statistical difference. Hybrids with corn rootworm control averaged 225 and those with the combination of rootworm and corn borer control averaged 227 bu/a, both statistically lower yields. Hybrids in the central test without either insect trait averaged 193 bu/a, which was not statistically different from yields of hybrids with

either of the insect traits. These trials were treated with insecticide because some hybrids did not have either insect trait and the goal of the test is to measure yield potential when insects are not affecting yield.

Triple stacks. In the southern test, there were 28 hybrids with the combination of glyphosate, corn borer, and corn rootworm traits. They, as a group, averaged 228 bu/a compared with all other hybrids averaging 233 bu/a, a statistical difference. There were 25 “triple stack” hybrids in the central test that averaged 188 bu/a, which was significantly lower than the average yield of 193 bu/a for all the other hybrids.

Traits and No Traits. There were 15 hybrids in the southern test with none of these traits – they averaged 232 bu/a, which was the average of all the 155 hybrids with one or more of the herbicide and insect control traits. In the central test, there were 11 hybrids without any of these traits that averaged 190 bu/a, a non-significant difference from the 192 bu/a average of all the other hybrids.

This analysis shows there is little to no yield increase due to the addition of insect or herbicide traits in corn hybrids. We feel that corn producers can still select hybrids based on genetic yield potential and then consider insect or weed management tactics based on integrated pest management strategies to protect the genetic yield potential.