

Evaluating the Economic Benefits of Corn Hybrid Traits (St Clair SCIA Regional Partner Grant) (Interim Report)

Purpose:

Seed corn companies offer a number of different traits in their corn hybrids. The traits include: glyphosate tolerance, Liberty tolerance, resistance to corn borer, and resistance to corn rootworm. Many more traits are in development such as drought tolerance, nitrogen use efficiency, and new insect protection, these and more will be offered in the near future. Many seed companies now offer these traits stacked with two or three in the same hybrid. They plan to offer greater numbers of stacks in the near future. Each trait has its value in allowing the use of an herbicide that would otherwise kill or injure the corn plant or by protecting the crop from an insect pest. With each added trait there is an added cost as the seed companies attempt to recover the cost of research and development and make a profit. There are many choices and many different field situations. It can be difficult for a farmer to decide which hybrid and trait to choose and to evaluate if the extra cost was good insurance, it paid in extra yield or provided some other benefit. This project aims to evaluate a corn hybrid and the same hybrid with one or more traits for yield, economic return and other agronomic characteristics.

Methods:

A corn hybrid will be selected which has no traits and the equivalent hybrid with one or more traits, i.e. Hybrid 640, 640 Bt, 640 glyphosate tolerant, 640 Bt + glyphosate tolerant will be compared. A second set of hybrids may be included in the plot. The set of corn hybrids will be replicated at least three times in the plot. To make it easier to get 3 or more replications some co-operators split the planter with the three or six hybrids. The project area is large enough that different hybrids may be chosen as the number of crop heat units declines from Amherstburg to Grand Bend. The hybrids may be tested in different conditions such as very good growing conditions, nitrogen rates, or on sandy soils. Soil samples for fertility analysis will be taken from each plot. The hybrids will be monitored throughout the season for early growth, plant stand, weed control, insect and disease pressure. At harvest stand evaluations and yields will be taken. The economics and other benefits of the hybrid and the associated traits will be evaluated.

Results:

For the full results from 2009 see the previous issue of Crop Advances. A summary of last year's results can be found in table 1. The plots were harvested in a reasonable time given cool summer and later maturity of the corn crop. None of the Roundup Ready hybrids were sprayed with glyphosate as it was too difficult to do so with the non glyphosate tolerant hybrids in close proximity. Yield results for 2010 can be found in table 2. The plots were harvested earlier this year due to early planting and lots of heat during the season which resulted in an early maturing crop. Glyphosate was used on both the Maizex sites and at the Florence site on the Dekalb hybrids.

Country Farm Seeds provided two hybrid sets the first year. The CF 870 set was provided both years and the CF 771/2 set was only provided in 2009. The CF 771 with no traits yielded better than the hybrids with Roundup Ready (RR) and European Corn Borer (ECB) even with moderate ECB pressure in the plot. The CF 870 set did not show

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any yield advantage to the traits in 2009 at any of the three sites and one of them was corn on corn. On average the hybrids with traits yielded lower than the hybrid with no traits. In 2010 one of the sites again showed no yield advantage to the hybrids with traits. However, the second site which was corn on corn in the same field as the previous year showed a yield advantage to RR and ECB hybrids. An even greater yield advantage was seen in the triple stack hybrid (RR, ECB, corn rootworm (CRW)). The roots of the non CRW hybrids were not examined for feeding damage but there was no significant difference in lodging between hybrids.

Dekalb provided the same set of hybrids each year. All of the hybrids had one trait. The RR trait was present in all hybrids, ECB was added in one and the third was a triple stack. They were tested at 3 locations both years. In 2009 two sites showed no yield advantage to the additional traits but the third site showed a yield advantage. On average there was no yield advantage.

In 2010 Maizex provided two hybrids, one with RR and the other a triple stack. They were tested at two sites and on average there was no yield advantage to the extra traits.

The yield is an important part of assessing the value of a trait or set of traits but the economics, mainly the additional seed cost for the trait(s) is key to the bottom line. The corn hybrids without any traits had the least expensive seed cost per bag at a retail price of \$130 and the triple stacks topped out at \$290. Table 1 illustrates the net dollars per acre based strictly on seed cost versus yield gain for the hybrid with trait(s) for 2009 and table 3 for 2010. From table 1 it is apparent that all of the hybrids with traits did not payback any of the extra cost for the seed. If the Thamesville site alone is examined the yield gains there would have paid more than paid for the additional Bt trait costs. In 2010, two of the hybrids had a significant yield increase at one site so on average they provided a payback. As mentioned earlier glyphosate was not used so it is difficult to evaluate the economics of that trait. The lower yield of some of the hybrids with traits or moisture differences were also not taken into account.

Table 1. 2009 Corn Hybrid Trait Yields and Economics of the extra cost of the traits vs. yield gain.

Company	Hybrid	Traits	Average	Seed	Yield	Net
			Yield	Cost/bag	Gain/ac	\$/ac*
			bu/ac			
Country Farm	CF 870	None	180.4	\$130	NA	NA
Country Farm	CF 870 YGCB	ECB	168.2	\$170	0	(16.00)
Country Farm	CF 870VT3	RR, ECB, CRW	174.8	\$230	0	(40.00)
Dekalb	DKC 52-62	RR	179.3	\$240	NA	NA
Dekalb	DKC 52-63	RR, ECB	175.7	\$275	0	\$(14.00)
Dekalb	DKC 52-59	RR, ECB, CRW	178.1	\$285	0	\$(18.00)
Country Farm	CF 771	None	145.4	\$130	NA	NA
Country Farm	CF 772 YGCB	ECB	139.7	\$170	0	\$(16.00)
Country Farm	CF 772 RBt	RR, ECB	136.2	\$200	0	\$(28.00)

* Assumed seeding rate of 32,000 seeds/ac

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Table 2. 2010 Corn Hybrid Trait Yields and Other Site Information

Hybrid	Traits	HU	1		2		3		4		5		6		7		Average			
			Kingsville		Amherstburg		Clay	Florence	Sand	Croton		Florence		Dresden		Tilbury		Yield		
			% M	bu/ac	% M	bu/ac	% M	bu/ac	% M	bu/ac	% M	bu/ac	% M	bu/ac	% M	bu/ac	% M	bu/ac	% M	bu/ac
CF 870P	None	3300	20.7	161.4	18.7	160.3												19.7	160.9	
CF 870 YGCB	ECB	3350	20.5	156.4	19.9	167.0												20.2	161.7	
CF 870 R	RR	3325	20.2	157.2	18.1	179.3												19.2	168.3	
CF 870VT3	RR, ECB, CRW	3350	20.5	153.8	20.6	188.6												20.6	171.2	
DKC 52-62	RR	3100					15.5	150.4	15.2	185.5	15.2	162.8	16.6	144.1				15.6	160.7	
DKC 52-63	RR, ECB	3100					16.0	147.5	15.8	196.0	15.2	157.0	17.0	141.4				16.0	160.5	
DKC 52-59	RR, ECB, CRW	3100					15.2	149.6	15.3	165.5	15.0	166.1	16.7	153.2				15.6	158.6	
MZ 5286 R	RR	3175													16.1	214.5	17.3	158.1	16.7	186.3
MZ 5288 CBR	RR, ECB, CRW	3200													15.7	216.0	17.5	155.3	16.6	185.7
	# of Reps		4		4			4			4		3		3		3			
	Planting Date (2010)		May 27		May 29			April 28			April 27		May 5		April 30		May 27			
	Harvest date (2010)		October 29		November 1			October 16			October 28		October 29		October 26		November 23			
	Soil Type		Brookston clay		Burford loam			Toledo clay loam, Tavistock sandy loam			Caistor clay loam		Brookston clay		Tavistock loam		Brookston clay			
	Tillage		Minimum till		No-till			Minimum till			Conventional		Conventional		Minimum till		Minimum till			
	Previous Crop		Winter wheat		Corn			Soybeans			Winter wheat/RC		Soybeans		Alfalfa/grass hay		Winter wheat			

Notes: CF = Country Farm, DKC = Dekalb, MZ = Maizex, ECB = European corn borer, RR = Roundup Ready, CRW = Corn rootworm

Table 3. Economics of the extra cost of traits versus yield gain.

Company	Hybrid	Traits	Average Yield bu/ac	Seed Cost/bag	Yield Gain/ac	Net \$/ac*
Country Farm	CF 870P	None	160.9	\$158	NA	NA
Country Farm	CF 870 YGCB	ECB	161.7	\$220	1	\$(20.30)
Country Farm	CF 870 R	RR	168.3	\$210	7	\$ 10.70
Country Farm	CF 870VT3	RR, ECB, CRW	171.2	\$241	10	\$ 11.80
Dekalb	DKC 52-62	RR	160.7	\$247	NA	NA
Dekalb	DKC 52-63	RR, ECB	160.5	\$275	0	\$(11.20)
Dekalb	DKC 52-59	RR, ECB, CRW	158.6	\$290	0	\$(17.20)
Maizex	MZ 5286 R	RR	186.3	\$227	NA	NA
Maizex	MZ 5288 CBR	RR, ECB, CRW	185.7	\$272	0	\$(18.00)

*Assume seeding rate of 32,000 seeds per acre and \$4.50/bu

Summary:

The yield results for the 2009 plots when averaged did not show any yield advantage to the hybrids with traits no matter what the trait or combination of traits was. In 2010 a couple of the hybrids with traits showed enough of a yield advantage to cover the extra cost of the traits but the rest did not. Over the two years only one site each year provided an economic return for the hybrid trait or traits.**One of the traits was Roundup Ready (RR) which was difficult for the co-operators to take advantage of as the hybrid without any traits was in close proximity making it impossible to spray glyphosate.

Two years of this project have provided a similar result. One should also consider why a particular trait or set of traits might suit their cropping system based on risk of pest infestation or other management considerations.

Next Steps:

The project will continue for one more year. Some further economics analysis of the data may be done in the final year of the project. Further consideration may be given to the selection of the hybrids. Some consideration may also be given to the use of glyphosate.

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