Intensive Management of Soybeans
(SMART Soy Initiative)

Purpose:

This project assessed the viability of more intensively managed soybean production than is generally practiced in Ontario.

Ontario farm yields of soybeans have been relatively stagnant over the past two decades. With higher commodity prices and larger yield gains found in corn and wheat, soybean growers are seeking a solution to overcome the limitations on soybean yields. Current agronomic recommendations in Ontario are not comprehensive enough to overcome limitations to yield; most recommendations are based on research with relatively narrow objectives that focus on simple effects of a few factors at a time. Management needs to consider additive and synergistic effects on yield and profitability. This project assessed the additive impact of multiple inputs on yield.

SMART in this project is an acronym that means Strategic Management Adding Revenue Today. The soybean portion of this project included both field-scale (conducted by OMAFRA) and small plot intensive experiments (conducted by Univ. of Guelph, Ridgetown Campus); only the field-scale results are presented in this report.

Methods:

Field scale trials included four main treatments:

1. Untreated Check - normal no-till practices (i.e., no pre-tillage, no seed treatments, no fertilizer or foliar fungicides or insecticides)
2. Cruiser Maxx seed treatment + HiStick NT inoculant
3. Cruiser Maxx + HiStick NT + fertilizer + pretillage
   (fertilizer = 40lbs P and 70 lbs K per acre and pretillage = Salford RTS run at 3" depth 3 days before planting)
4. Cruiser Maxx + HiStick NT + fertilizer + pretillage + foliar Quadris + foliar Matador
   (fertilizer = 40lbs P and 70 lbs K per acre and pretillage = Salford RTS run at 3" depth 3 days before planting)

Results:
Table #1 summarizes the results from the SMART project for 2010. Table #3 shows the results from all three years of the study. Yields were strong in 2010 on account of the great growing season. Response to the foliar fungicide and insecticide was lower in 2010 because of less disease and insect pressure compared to the previous years. Aphid levels were very low across these sites and the only foliar diseases at significant levels was septoria brown spot.

Figure 1. Septoria Brown Spot on soybean leaves, 2009

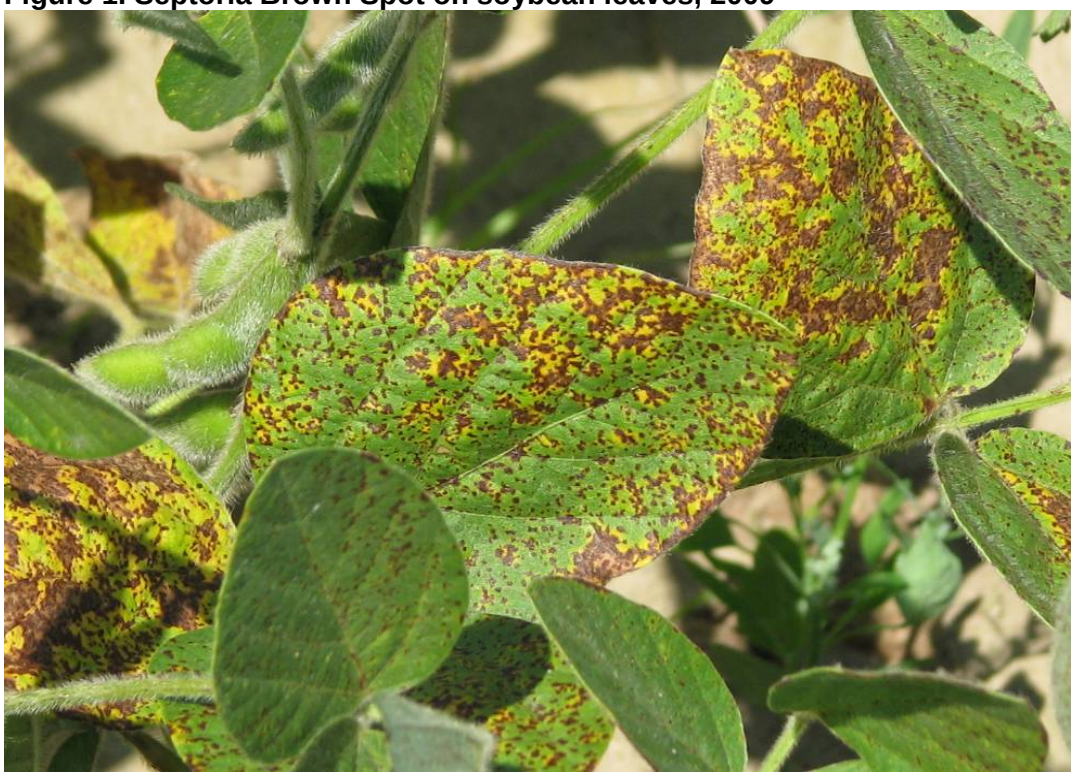

Table 1: Summary of Yield Results and Yield Gains for 2010 SMART Project

Treatment	Average (bu/ac)	Advantage (bu/ac)
Untreated (UTC)	54.4	-
Cruiser + HiCoat (ST)	55.9	**1.5**
Cruiser + HiCoat + Fert + Pretillage (ST + F + PT)	56.6	**2.2**
Cruiser + HiCoat + Fert + Pretillage + Quadris and Matador (ST + F + Q+M)	58.3	**3.9**

[1] UTC=no seed tmts, no pre-tillage, no fertilizer; ST=seed treatment CruiserMaxx + Hi-Stick; , F=fertilizer before planting (40 P and 70 K actual) PT=pre-till, vertical tillage with 2 passes of RTS, Quadris/Matador applied at R2

Table 2, below, shows that, even in a year where there was little disease and insect pressure, a small yield gain was still achieved with the use of a foliar fungicide and insecticide. The effects of the fungicide and insecticide had no impact on the protein and oil content.

Table 2: Summary of Foliar Fungicide and Insecticide on Yield, Protein and Oil Content

Treatment Name	Quadris + Matador					
	Seed Yield (bu/ac)		Protein %		Oil %	
	No	Yes	No	Yes	No	Yes
UTC	55.3	56.3	40.9	40.9	21.4	21.6
ST	56.1	57.0	41.4	41.1	21.4	21.4
PT+ST+F	56.8	58.4	41.5	41.2	21.3	21.6
Average	**56.1**	**57.2**	**41.3**	**41.0**	**21.4**	**21.5**
Advantage	-	**1.2**	-	**-0.2**	-	**0.2**

[1] UTC=no seed tmts, no pre-tillage, no fertilizer; ST=seed treatment CruiserMaxx + Hi-Stick; , F=fertilizer before planting (40 P and 70 K actual) PT=pre-till, vertical tillage with 2 passes of RTS, Quadris/Matador applied at R2

Table #3 shows the yield results from no-till SMART sites over the course of the three year project. The summary shows that all treatments improved yield over the untreated check.

Summary:

1) An average yield gain of 4.6 bu/ac was realized when seed treatements, fertilizer, pre-tillage and foliar insecticide and fungicides were applied together in these no-till fields.
2) A yield increase of 2.0 bu/ac resulted from the use of CruiserMaxx seed treatment along with HiStick NT inoculant.
3) No statistical benefit was found to the additional fertilizer and pretillage in these trials. Please note that the soil test was relatively high at these sites.
4) An additional yield increase of 2.1 bu/ac resulted from the use of foliar Quadris and Matador.
5) Fields responded economically to some inputs but not necessarily to all. For example under lower fertility situations extra fertilizer was economical although averaged across the sites it was not economical.

Table 3: Summary of SMART Soybean No-till Yield Results, 2008-2010

Location	Year	Untreated		Cruiser Maxx + HiCoatNT		Cruiser Maxx + HiCoatNT + Fertilizer + Pretillage		Cruiser Maxx + HiCoatNT + Fertilizer + Pretillage + Matador + Quadris	
		Rep 1	Rep 2	Rep 1	Rep 2	Rep 1	Rep 2	Rep 1	Rep 2
Middlesex	2010	57.0	55.6	59.4	56.1	58.3	59.0	60.5	60.0
Chatham	2010	44.2	48.5	51.7	45.9	51.4	47.4	51.3	49.9
Elgin	2010	60.3	60.0	62.0	59.9	59.3	60.0	61.6	60.7
Norfolk	2010	58.1	52.1	56.7	55.2	58.4	57.5	60.8	57.1
Brant	2010	48.1	51.3	55.1	54.3	57.0	54.9	57.9	57.5
Elgin	2010	56.7	60.5	54.8	59.4	60.1	56.4	61.0	61.1
Elgin	2009	52.0	46.8	54.6	51.0	54.6	52.0	56.9	54.6
Elgin	2009	50.8	51.7	52.4	55.2	53.9	56.3	56.4	59.0
Huron	2009	35.8	37.1	44.0	45.2	44.0	46.1	45.2	48.1
Brant	2009	43.1	42.2	47.9	mv	49.3	50.4	49.3	53.5
Perth	2009	51.1	50.6	51.6	51.6	54.2	53.3	56.0	54.9
Middlesex	2009	44.7	47.6	44.7	47.8	44.2	47.2	52.5	53.4
Middlesex	2009	45.9	44.5	46.2	46.6	46.5	48.5	51.5	46.2
Middlesex	2008	48.0	50.4	49.1	50.4	mv	52.6	mv	52.5
Middlesex	2008	47.2	46.9	49.2	48.0	49.7	50.9	55.0	51.5
Huron	2008	53.5	56.5	53.5	56.9	57.1	58.3	59.9	57.1
Perth	2008	47.7	mv	49.9	mv	54.2	mv	53.2	mv
Brant	2008	64.6	67.7	69.7	65.6	69.9	59.4	62.4	61.5
Elgin	2008	mv	59.2	62.6	60.1	56.4	58.0	59.5	65.8
Elgin	2008	60.4	53.9	57.1	54.8	52.2	55.4	61.2	56.8
Elgin	2008	48.4	49.4	48.5	46.6	46.6	51.3	51.1	51.1
Average Yield (bu/ac)		51.3		53.3		53.8		55.9	
Yield Advantage (bu/ac)		**-**		**2.0**		**2.5**		**4.6**	
Average soil test results for these sites was P = 28 ppm, K = 147 ppm. Mv = missing value									

6) The cost of these inputs per acre was approximately:

1)	CruiserMaxx	$11
2)	HiCoat	$ 4
3)	Pretillage	$15
4)	Fertilizer	$50
5)	Quadris and Matador With application	$30
	Total:	$110

Due to the cost of inputs the most intensive treatment (Cruiser Maxx + HiStick NT + fertilizer + pretillage + foliar Quadris + foliar Matador) was not economically feasible at $10/bu soybeans. (4.6 bu/ac X $10 - $110 = negative $64/acre)

7) The only economically positive inputs on average in these trials were the CruiserMaxx seed treatment + HiStick NT inoculant. These provided a small economic benefit (2 bu/ac X $10 - $15 = $5/acre)

Next Steps:

This data will be used to formulate new recommendations once all data has been collected and analyzed. This information will be used to formulate the next SMART soybean initative.

Acknowledgements:

We would like to thank the cooperators who lent their time and land to the project. Also, AAC will be (and has been) acknowledged upon presentation of the results.

Project Contacts:

Dr. Dave Hooker, Ridgetown Campus, University of Guelph, Ridgetown, ON N0P 2C0
Ph: 519-674-63559; Fax: 519-644-2043; e-mail: dhooker@ridgetownc.uoguelph.ca

Horst Bohner, OMAFRA, 581 Huron St., Stratford, ON N5A 5T8
Ph: 519-271-5858; Fax: 519-273-5278; e-mail: horst.bohner@ontario.ca