

Breaking Through the Soybean Yield Plateau

(Perth SCIA Major Project Grant)

Purpose:

To identify, quantify, and reduce the yield limitations that are impacting current on-farm soybean performance by using the latest technological innovations. This project tried to assess the viability of more intensively managed soybean production than is generally practiced in Ontario.

Farm yields of soybeans have been relatively stagnant over the past two decades in Ontario. 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 will assess the additive impact of multiple inputs on yield.

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/acre and liquid alpine
6-24-6 at 11L/ac, 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 liquid alpine
6-24-6 at 11L/ac, pretillage = Salford RTS run at 3" depth three days before planting)

Twelve field scale sites were set up in 2008 and 11 were harvested. Three of these were conventionally tilled and eight were no till. All were planted with a 15" vacuum planter seeding with an RTK GPS system. Each plot within a trial was 20' wide with a minimum 1,000 foot length.

Results and Summary:

The addition of the various inputs did add additional yield. However, the response to each input was not consistent across all sites (Table 1). On average, the untreated control (UTC) yielded 53.8 bu/ac while the full suit of inputs (PT+ST+F, Quadris and Matador Yes) yielded 57.0 bu/ac.

The overall conclusions from the first year of this study are as follows:

1. Adding inputs did add extra yield but each input was not necessarily additive.
2. Some fields responded economically to some inputs but not necessarily to all. For example, under lower fertility situations, extra fertilizer was economical but foliar fungicides were not.

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- Adding inputs while ignoring agronomic principles did not provide a large enough yield increase to increase profits.

Table 1. Soybean yield and quality responses to combinations of seed treatments, pre-tillage before planting, fertilizer, and foliar pesticide sprays using no-tillage practices on eight field locations across southern Ontario in 2008.

Location –System		Seed Yield (bu/ac)		
		Quadris+Matador ¹		Mean System
		No	Yes	
1	UTC ²	47.7	50.7	49.2
	ST	49.9	48.8	49.3
	PT+ST+F	54.2	53.2	53.7
	Mean	50.6	50.9	50.7
2	UTC	48.9	50.5	49.7
	ST	47.6	51.5	49.5
	PT+ST+F	49.0	51.1	50.0
	Mean	48.5	51.0	49.7
3	UTC	57.1	61.6	59.4
	ST	56.0	63.0	59.5
	PT+ST+F	53.8	59.0	56.4
	Mean	55.6	61.2	58.4
4	UTC	59.2	64.7	62.9
	ST	61.4	62.4	61.9
	PT+ST+F	57.2	62.6	59.9
	Mean	59.3	63.2	61.4
5	UTC	66.2	65.6	65.9
	ST	67.7	66.0	66.8
	PT+ST+F	64.7	62.0	63.3
	Mean	66.2	64.5	65.3
6	UTC	49.2	52.9	51.0
	ST	49.8	50.2	50.0
	PT+ST+F	52.6	52.5	52.5
	Mean	50.1	51.7	50.9
7	UTC	47.1	48.8	48.0
	ST	48.6	48.3	48.4
	PT+ST+F	50.3	53.3	51.8
	Mean	48.7	50.1	49.4
8	UTC	55.0	54.2	54.7
	ST	55.2	59.8	57.5
	PT+ST+F	57.7	58.5	58.1
	Mean	55.9	58.2	57.0
Average	UTC	53.8	56.7	55.2
	ST	54.8	56.7	55.8
	PT+ST+F	55.2	57.0	56.1
	Mean	54.6	56.8	55.7

¹ Quadris + Matador tankmix applied at R2-R3

² UTC = no seed tmts, no pre-tillage, no fertilizer , ST = CruiserMaxx + HiStick NT, PT = pre-tillage (Salford RTS before planting) , F = Fertilizer before planting

Table 2. Soybean yield and quality responses to combinations of seed treatments, fertilizer, and foliar pesticide sprays using conventional tillage practices on three field locations across southern Ontario in 2008.

Location-System		Seed Yield (bu/ac)		
		Quadris+Matador ¹		Mean System
		No	Yes	
1	UTC ²	61.0	61.3	61.2
	ST	61.4	63.0	62.2
	PT+ST+F	61.6	62.8	62.2
	Mean	61.3	62.4	61.8
2	UTC	51.6	52.1	51.9
	ST	54.5	55.5	55.0
	PT+ST+F	.	55.0	55.0
	Mean	53.0	54.2	53.7
3	UTC	53.1	53.4	53.3
	ST	55.4	53.4	54.4
	PT+ST+F	54.5	54.4	54.4
	Mean	54.3	53.7	54.0
Average	UTC	55.2	55.6	55.4
	ST	57.1	57.3	57.2
	PT+ST+F	58.0	57.4	57.7
	Mean	56.8	56.8	56.8

¹ Quadris + Matador tankmix applied at R2-R3

² UTC = no seed tmts, no pre-tillage, no fertilizer , ST = CruiserMaxx + HiStick NT, PT = pre-tillage (Salford RTS before planting), F = Fertilizer before planting

Next Steps:

These results indicate that further study is warranted. More trials will be conducted over the next few years to evaluate the possibility of extra yield and the economics once more data is available.

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