

SOYBEAN

Research Summary 2008

Effect of Stress Mitigation Management Inputs on Soybean Yield

There is increasing interest in various yield-enhancing management inputs to mitigate stress on soybeans. Chemical tools to mitigate soybean stress from weeds, insects, and disease are available to help growers attain higher yields. Monsanto has conducted field testing in Roundup Ready® soybeans to determine the yield effect associated with including a residual herbicide along with seed and foliar applied fungicides and insecticides in the management system.

Soybean stress mitigation field tests conducted in 2008 are listed in Table 1. All treatments were applied across three locally adapted Asgrow® brand soybean products at each location. The control treatment consisted of application(s) of Roundup WeatherMAX® as the only chemical management input in the system. The testing evaluated adding increased management input treatments to the system as follows:

- Preemergence (PRE) or soil residual herbicide treatment

- Seed treatment
- Foliar fungicide treatment
- Foliar insecticide treatment
- Foliar fungicide and insecticide treatments.

Preemergence herbicide products used in the testing included INTRRO®, Prowl® and Boundary® applied according to the product labels. CruiserMAXX™ was applied as the seed treatment.

Table 1. Soybean stress mitigation and increased management input test locations conducted in 2008 (Monsanto protocol 2008-01-76-08).

#	Trial Number	Location	Planting Date	Preemergence Herbicide Application Date	Fungicide Insecticide Application Date
1	2008748608	Storm Lake, IA	4/29	5/8	8/7
2	2008703SM1	Whitewater, WI	5/2	4/25	7/26
3	2008272SM1	Ames, IA	5/9	5/8	7/26
4	2008272013	Atlantic, IA	5/14	5/17	7/30
5	2008703SMS	Rochelle, IL	5/16	5/28	8/13
6	2008272SM2	Ames, IA	5/17	5/17	8/4
7	2008A99040	Washington, IL	5/20	5/22	8/7
8	2008A42SMS	Auroraville, WI	5/23	6/7	7/24
9	2008645N25	Lodi, WI	5/23	6/2	8/15
10	2008B59008	Redfield, SD	5/28	5/30	8/7
11	2008673008	Watertown, SD	5/28	5/28	8/1
12	2008673007	Volga, SD	5/30	5/31	8/5
13	2008385013	Hebron, MD	6/13	6/13	7/25
14	2008734768	Masonville, IA	6/17	6/19	8/11
15	2008987104	Columbia, MO	6/18	6/18	8/15





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Table 2. Soybean yields (Bu/A) as affected by increased management inputs.

Test #	Roundup	PRE Herb Roundup	Seed TRT PRE Herb Roundup	Insecticide Seed TRT PRE Herb Roundup	Fungicide Seed TRT PRE Herb Roundup	Insecticide Fungicide Seed TRT PRE Herb Roundup
1	44.7	45.0	53.0	62.3	53.3	65.7
2	47.0	47.0	50.0	51.5	52.5	53.0
3	50.3	57.3	55.3	56.0	56.0	55.7
4	60.0	60.3	62.0	63.3	63.3	63.7
5	46.3	45.7	49.7	51.7	54.7	54.7
6	46.7	45.7	43.7	43.7	51.7	65.7
7	25.4	25.9	26.1	26.2	26.6	27.5
8	42.0	42.0	43.7	44.3	45.3	47.0
9	47.7	46.3	49.0	48.7	47.7	46.0
10	49.3	48.7	49.7	51.7	55.0	54.0
11	42.0	41.7	50.0	51.3	50.3	51.0
12	21.7	21.7	27.3	34.7	32.7	35.0
13	17.0	16.5	16.0	15.5	18.5	17.5
14	46.3	42.9	44.9	49.2	43.2	50.6
15	47.0	48.3	52.3	52.0	58.0	59.7
AVG	42.2 c	42.3 c	44.8 bc	46.8 b	47.3 b	49.8 a

Yields averaged across several soybean products at each test location. Average values followed by the same letter do not differ significantly at the 0.05 level.

Headline[®] was the foliar fungicide product used, and the foliar insecticide products included Mustang MAX[™], Respect[®] and dimethoate. All products were applied at labeled rates, and the foliar fungicide and insecticide treatments were made to

soybeans in the R3 to R5 growth stages. Yields were averaged across soybean products in each test (Table 2).

Soil-Residual Herbicide. Adding a soil residual or preemergence (PRE) herbicide to the Roundup Ready[®] soybean weed

control system did not significantly increase yield when averaged across all test locations (Table 2). Yield was significantly increased at only one of the fifteen locations (Figure 1).

Seed Treatment. Adding CruiserMAXX[™] seed treatment resulted in a 2.5 Bu/A soybean yield advantage when averaged across all test locations (Table 2). There was a yield increase of 2 Bu/A or more at 60% of the test locations (Figure 2).

Foliar Fungicide and Insecticide Treatments. Soybean yield advantages of 2.5 and 2.0 Bu/A resulted from foliar fungicide and insecticide treatments, respectively (Table 2). A yield increase of 2 Bu/A or more occurred in 7 of 15 locations for Headline[®] fungicide and 5 of 15 locations for insecticides (Figure 3.)

All Management Inputs. When averaged across all locations, soybean yield was significantly increased by 18% or 7.6 Bu/A by adding all management inputs (Table 2 and Figure 6). Furthermore, significant yield increases resulted at 13 of the 15 locations (Figure 4).

Time of soybean planting appeared to play a role in the yield benefit obtained by using the other management inputs. Early planted fields (late April to early

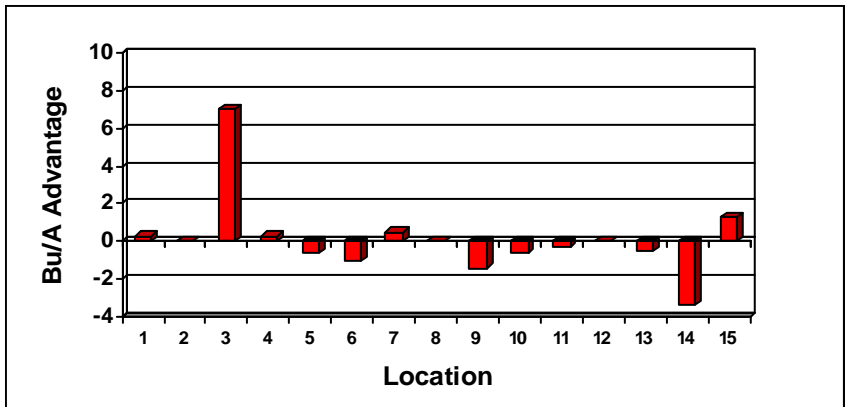


Figure 1. Soybean yield advantage by location as affected by adding a soil-residual (PRE) herbicide treatment.

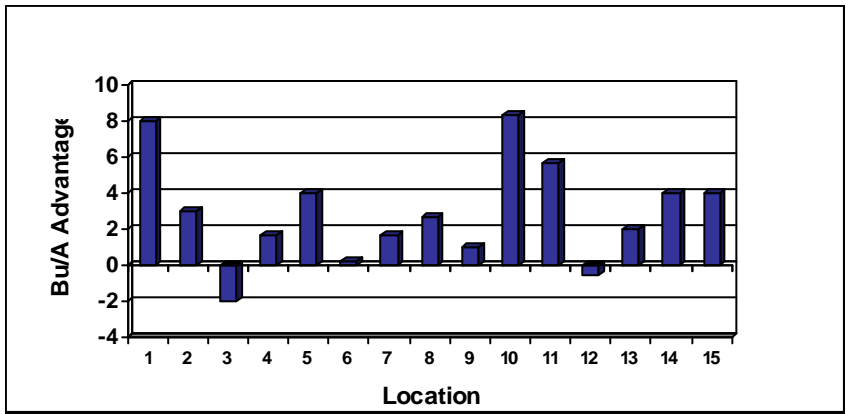


Figure 2. Soybean yield advantage by location as affected by CruiserMAXX™ seed treatment.

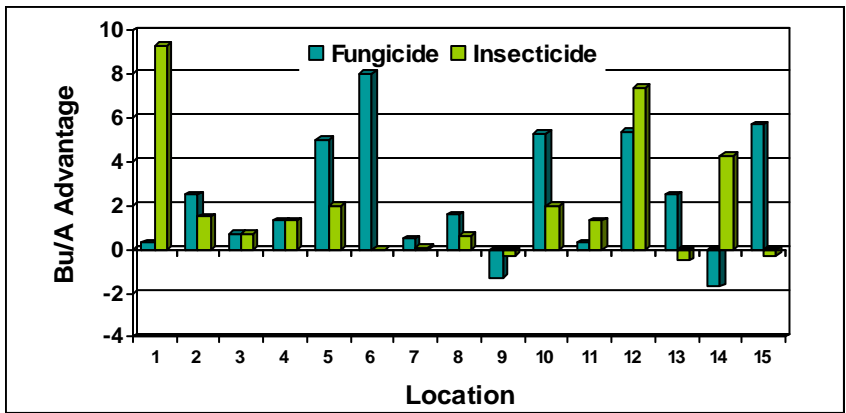


Figure 3. Soybean yield advantage by location as affected by foliar fungicide (Headline®) and insecticide treatments.

May) had a yield benefit of 10.8 Bu/A or a 23% increase compared to late planted fields (June) which had 16% yield increase by using all management inputs (Figure 5). Greater yield benefits occurred when a PRE herbicide, seed treatment, and foliar insecticide treatment were used in early planted fields. Foliar fungicide treatments appeared to have larger yield benefits with later plantings under warmer growing conditions.

Conclusions. A yield benefit due to using a soil applied herbicide product in the soybeans may not always be observed. An average yield benefit of 2 Bu/A was obtained in 2007 trials (data not shown) compared to 0.1 Bu/A in 2008 testing conducted by Monsanto. However, using a soil-residual herbicide in a Roundup Ready® weed control system is considered a good management practice. It reduces early season weed competition, expands the postemergence application timing window for greater flexibility, provides more consistent control of troublesome weeds, and reduces the potential for weed resistance or weed population shifts.

More consistent yield benefits were observed by using CruiserMAXX™ as a seed treatment to manage early season insect and disease stress. An average yield benefit of 3 Bu/A was observed in 2007 trials (data not shown) compared to 2.5 Bu/A in

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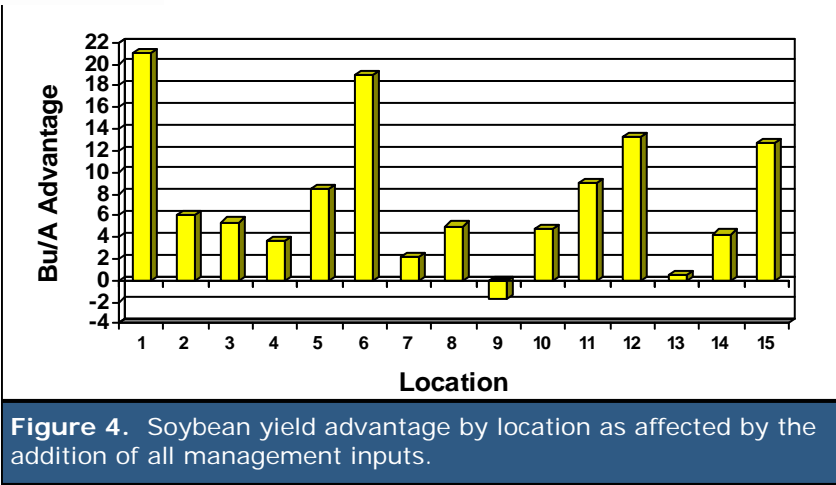


Figure 4. Soybean yield advantage by location as affected by the addition of all management inputs.

2008 testing conducted by Monsanto. Growers should consider using a seed treatment particularly in fields planted early and in high residue conditions such as no-till or minimum tillage fields.

Yield benefits were observed using foliar fungicide and insecticide treatments in soybeans to manage stress from late-season insects and diseases. An average yield benefit of 2 to 3 Bu/A was observed in 2007 (data not shown) and 2008 Monsanto trials testing these management inputs. Both applications of a fungicide with and without an insecticide, as well as an insecticide alone show promising results when implemented around the R4 growth stage of soybeans. Reports indicate that yield enhancement may occur with foliar fungicide and insecticide treatments, even in the absence of visible disease and insect infestations. This suggests that these management inputs can improve general soybean plant health and

ultimately improve yields.

Results showed a significant yield response when using a seed treatment plus a foliar fungicide and/or an insecticide. Significant yield benefits were observed by using the complete stress system (all management inputs) in multiple years of testing. Using all management inputs, the average yield benefit

was 6 Bu/A and 7.6 Bu/A in 2007 (data not shown) and 2008 testing, respectively (Figure 6). The complete stress system produced a significant yield advantage over the component parts in both years of testing. Results suggest that an integrated pest management approach is still the best management strategy.

Soybean yield can be increased when management practices are implemented to reduce crop stress. Growers should consider these practices and identify fields that would benefit the most from their implementation. The testing was conducted to help growers make those determinations and begin to make an analysis of the economic return.

Additional reference material: 2007 Research Summary on effect of management inputs and stress mitigation on soybean yield. Growing Knowledge®

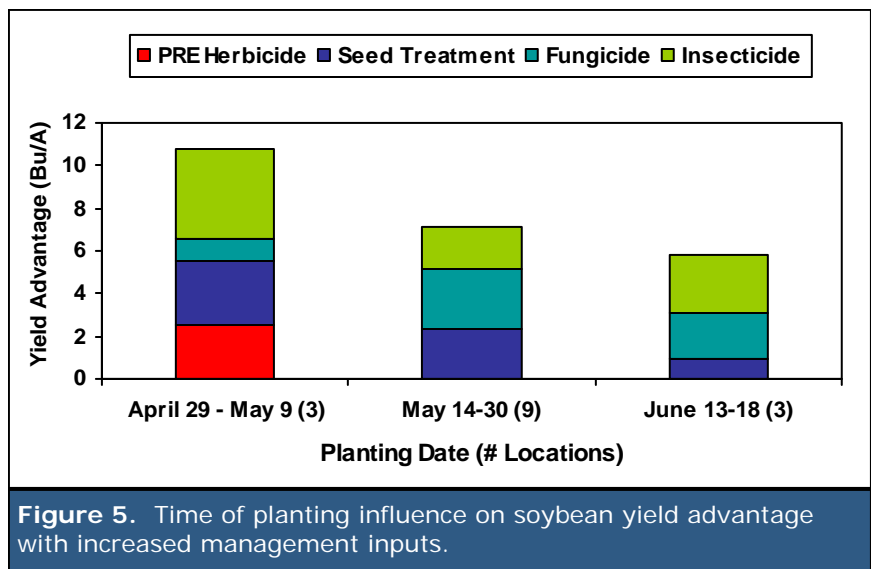


Figure 5. Time of planting influence on soybean yield advantage with increased management inputs.

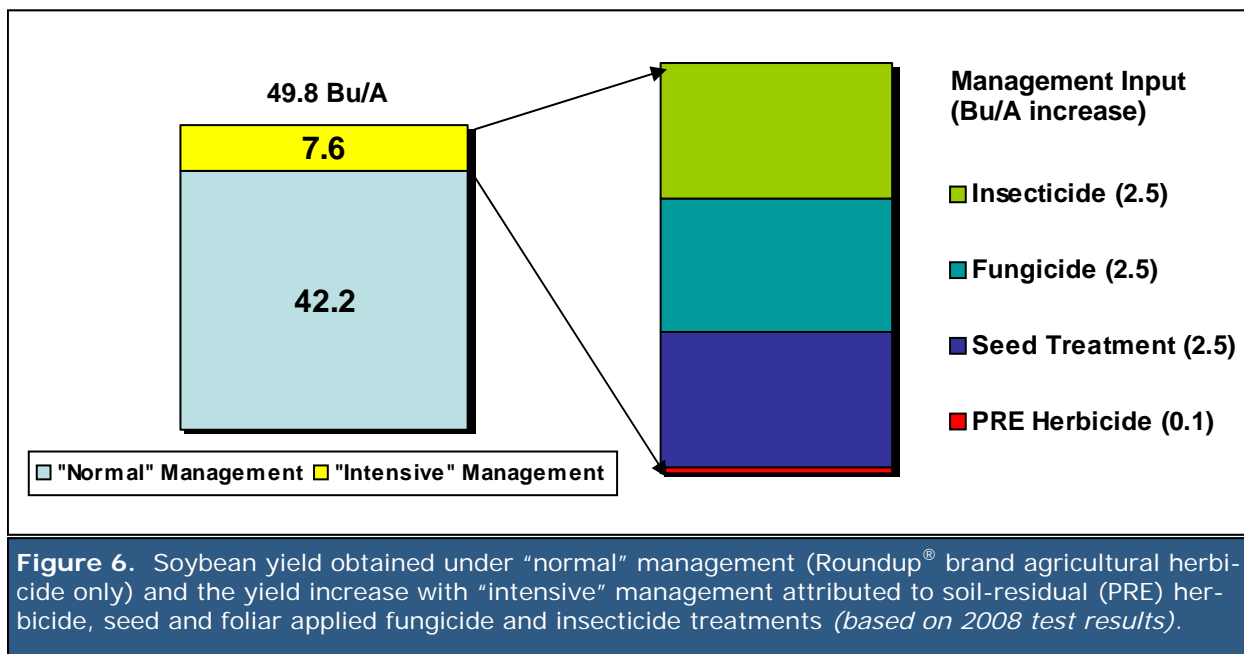


Figure 6. Soybean yield obtained under “normal” management (Roundup® brand agricultural herbicide only) and the yield increase with “intensive” management attributed to soil-residual (PRE) herbicide, seed and foliar applied fungicide and insecticide treatments (based on 2008 test results).

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