HIGH YIELD MANAGEMENT PRACTICES IN SOYBEANS

Every year, farmers should consider several management practices when growing soybeans. It is not easy to figure out which soybean products and practices have the greatest impact on yield potential. To be able to develop recommendations for high-yielding soybeans, Monsanto conducted a demonstration trial to evaluate a combination of practices that influence the potential yield of different soybean seed products.

**Materials and Methods**

In 2012, demonstration trials were conducted at the Monsanto Learning Center at Gothenburg, NE to evaluate the effect of planting date, row configurations, rates of phosphorus (P) application, and plant population on the yield of Genuity® Roundup Ready 2 Yield® soybean products of different maturity groups. Each treatment was evaluated with low and high level of management inputs. Two varieties of Asgrow® brand, Channel® brand, and Fontanelle™ brand seed products were evaluated. Treatments used in the trails are listed in Table 1. In one trial, Genuity® Roundup Ready 2 Yield® soybean products were planted early on May 3; in another trial they were planted later on May 23, 2012.

The trials were established on corn-soybean rotation ground and strip-tillage was done on April 2. Phosphorus fertilizer was applied with the strip till machine. In addition to the rainfall, between May 27 and September 10 approximately 15 inches of irrigation water was applied through a drip system to all plots throughout the season.

### Table 1. Genuity® Roundup Ready 2 Yield® soybean products with high and low input treatments used in trials conducted in 2012.

<table>
<thead>
<tr>
<th>Input Level</th>
<th>Product &amp; Variety</th>
<th>RM*</th>
<th>Planting Date**</th>
<th>P₂O₅ (lbs/acre)</th>
<th>Row Spacing (inches)</th>
<th>Population (seeds/acre)</th>
<th>Fungicide (fl oz/acre)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low</td>
<td>A 1</td>
<td>2.4</td>
<td>Late</td>
<td>60</td>
<td>30</td>
<td>140,000</td>
<td>—</td>
</tr>
<tr>
<td>High</td>
<td>A 1</td>
<td>2.4</td>
<td>Early</td>
<td>80</td>
<td>30-Twin</td>
<td>160,000</td>
<td>6</td>
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<tr>
<td>Low</td>
<td>A 2</td>
<td>3.2</td>
<td>Late</td>
<td>60</td>
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*RM = Relative maturity; **Early = May 3, Late = May 23.
Enlite® herbicide (2.8 fl oz/acre), Roundup PowerMAX® Herbicide (28 fl oz/acre), and Sharpen® herbicide (2 fl oz/acre) were applied pre-plant on April 23. In addition, Roundup PowerMAX® Herbicide (28 fl oz/acre) and Warrant® Herbicide (2 pints/acre) were applied on July 2. Headline® fungicide (6 fl oz/acre), a strobilurin fungicide was applied on July 25 only on the high input treatments. No insecticide was applied to the trial because of low insect pressure. Two rows in the middle of four rows were harvested on September 25. Other agronomic practices were in alignment with local standards.

Results & Discussion

Results show that the high input practices benefited Genuity® Roundup Ready 2 Yield® soybeans more than did the low input practices (Figure 1). Across all varieties, high input practices, which consisted of early planting (May 3), a seeding rate of 160,000 on 30-inch twin rows, and fertilized with 80 lb/acre P, consistently outyielded the low input practices. The latter consisted of later planting (May 23), a lower seeding rate of 140,000 seeds/acre on 30-inch rows, and fertilized with 60 lb/acre P. Average yield difference between low and high input practices ranged between 6 bu/acre for product B and 14 bu/acre for product C (Figure 1).

High input practices increased yield across all products. The greatest observed increase was for product C, where a 25% increase was recorded for variety 2 (Figure 2). Other products at high input showed yield increases that ranged between 5 to 21% over the low input.

It is difficult to determine the one high input practice that may have contributed the most to high soybean yield. Each factor and its interaction with other factor(s) had a significant role in increasing soybean yield.
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Planting Date
Planting date has been shown to have an effect on soybean yields in the past and current demonstrations. Early planting dates have significantly increased soybean yield, especially in higher RM soybean products. The yield difference between early and late planting of 19 bu/acre for product C- variety 2 with 3.3 RM was big compared to earlier RM products.

In a 2011 demonstration trial, the yield of a 2.4 RM decreased by 2 bu/acre while the yield of 3.1 RM product decreased by 3 bu/acre from late to early planting (April 28 and May 23).

In a 2012 planting date demonstration at the Gothenburg Learning Center, it was found that the yield of 3.3 RM product decreased from 91 bu/acre to 79 bu/acre from early to late planting, compared to an increase in yield from 80 to 83 bushels for a 2.4 RM product.

Early planting may help soybean flower early, increase vegetative nodes, and improve the potential of early harvest. In comparison, late planting that can contribute to yield loss due to a combination of weather conditions and disease development during bloom and pod fill. These crop stresses can reduce pod number and consequently reduce the yield.

University results have also shown the yield benefits of planting early. Researchers at the University of Wisconsin found that soybean yields decreased by 0.4 bu/acre per day when planting was delayed past the first week of May.

Row Spacing
The 30-inch twin row spacing showed a yield advantage over 30-inch rows in the past and again in 2012 at the learning center. Yield advantage of 2 bu/acre in 2011 and 4 bu/acre in 2012 were recorded.

An earlier Monsanto trial showed that 30-inch twin rows provided a yield advantage over 30-inch rows, because plant canopy develops quicker and can intercept more light throughout the growing season.

Canopy closure is needed by the start of pod set (R3) for maximum pod formation and seed filling. In addition, better weed control, reduced soil moisture loss, and an easier and more efficient harvest can be achieved with a 30-inch twin row spacing.

Fertility
Earlier Monsanto trials showed few differences in yield with respect to the fertility treatment. However, differences in yield were observed with the combination of planting dates and fertility treatment.

Plant Population
Higher populations contribute to improved soybean yields as well. Demonstration trials in the past have shown higher populations improve yields, but can vary by RM. It was found in 2011 that soybean yield increased with an increase in population from 140,000 to 200,000 seeds/acre for a 3.1 RM product, but the yield remained the same or decreased with an increase in population for 2.9 and 3.3 RM products. In a 2012 demonstration, it was found that the yield of a 2.4 RM product increased from 79 to 92 bu/acre with an increase in population from 100,000 to 190,000 seeds/acre but then decreased to 83 bu/acre with an increase in population to 220,000 seeds/acre. In the same demonstration, a seed product with a 3.1 RM showed an increase in yield from 79 to 87 bu/acre with an increase in population from 100,000 to 220,000 seeds/acre.

Final plant population depends on seedbed conditions and planter settings. Poor seedbed conditions, seed quality, inaccurate planter adjustment, soil crusting, extremely wet soil, disease and insect pressure, and hail or frost damage are factors that can reduce plant population.

Greater seeding rate is usually required to achieve the intended final plant population. Iowa State University estimates a 15 to 30% increase in seeding rate over the desired final plant stand is recommended to compensate for any plant loss.
HIGH YIELD MANAGEMENT PRACTICES IN SOYBEANS

Summary Comments

● Higher yield was achieved with high input practices, which is a combination of early planting, high seeding rate, 30-inch twin rows, and fertilized with a high rate of P.

● Yield difference of 6 to 14 bu/acre was observed between low and high input practices when compared across soybean products.

● Yield difference of 4 to 19 bu/acre was observed between low and high input treatments when compared across soybean products. This reinforced the fact that different products responded differently to management practices. The increase over low input practices ranged between 5 to 25%.

● Each factor and/or its interaction with other factor(s) contributed to a yield advantage over the low input treatment.

● Changing the management practices while considering the soybean products can result in higher yields.

This trial should be repeated in time and across locations to be able to recommend the high input combination for maximum soybean yield. These results will likely vary in subsequent trials, depending on environmental conditions.


The information discussed in this report is from a single site, non-replicated, one-year demonstration. This informational piece is designed to report the results of this demonstration and is not intended to infer any confirmed trends. Please use this information accordingly.

(L): Low input (late planting, 30-inch, 140K seeds/acre, low P).
(R): High input (early planting, 30-inch twin, 160K seeds/acre, high P).
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