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Yield Potential and Response of Roundup Ready Soybean Varieties to Raptor or Pursuit Herbicides

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Weed management is a vital step for ensuring maximum soybean (*Glycine max* (L.) Merr.) yields while maintaining soil productivity for future cropping systems. Weeds compete for moisture, nutrients, and light. In addition, weeds make harvesting and grain storage difficult and grain quality low. Weeds in Kansas soybean fields have been estimated to cause losses of 13 million dollars in production each year. Therefore, weeds need to be controlled effectively and economically, while maintaining maximum soybean yields.

Traditional herbicides used to control weeds in soybean fields vary in crop safety and efficacy on weeds. Genetically engineered soybeans that are resistant to Roundup offer excellent crop safety and broad-spectrum weed control. Roundup Ready soybeans may be used in conjunction with traditional herbicides for early season residual weed control, or to improve control of certain weed species. However, Roundup Ready soybeans must be equally adapted and have comparable yield potential to conventional soybean varieties to be economically viable.

Most soybean variety performance research involves application of traditional herbicides for general weed control. Questions have been raised regarding the effect of traditional herbicides on Roundup Ready soybeans. Consequently, information is needed on the yield comparison of Roundup Ready and conventional soybean varieties and the effect of traditional herbicides on Roundup Ready soybeans.

Field studies were conducted in 1998 at Ashland Bottoms, Manhattan, and Belleville, Kansas to evaluate the yield potential of Roundup Ready soybean varieties and their response to Pursuit or Raptor herbicides. Ten conventional and 10 Roundup Ready, early Group 4 and Group 3 soybean varieties were compared based on seed company recommendations for north central Kansas. All soybean varieties were treated with a preemergence application of Prowl (2.4 pt/a) followed by a postemergence application of Pursuit (1.44 oz/a) at Ashland Bottoms and Belleville or a preemergence application of Prowl followed by a postemergence application of Raptor (5 oz/a) at Manhattan. Roundup Ready soybean varieties also received a postemergence and sequential application of Roundup (2 pt/a) at all sites. Soybean injury from Prowl PRE followed by Pursuit or Raptor POST was minor and similar among the Roundup Ready and conventional soybean varieties (TABLE 1).

Table 1. Injury to Roundup Ready and conventional soybean varieties from Prowl PRE followed by Pursuit or Raptor POST at 1 week after POST treatment.

| Soybean Variety | Ashland Bottoms ^a | Manhattan ^b | Belleville ^a |
|------------------------|------------------------------|------------------------|-------------------------|
| | -----(%injury)----- | | |
| Roundup Ready: | | | |
| Pioneer 9344 RR | 5 | 4 | 3 |
| Pioneer 9396 RR | 5 | 3 | 5 |
| Asgrow A3601 RR | 5 | 3 | 4 |
| Asgrow A3701 RR | 4 | 4 | 3 |
| Midland 8377 RR | 4 | 2 | 5 |
| Midland 8433 RR | 4 | 4 | 4 |
| NK S30-K3 RR | 5 | 4 | 4 |
| NK S36-U2 RR | 4 | 4 | 4 |
| DeKalb CX367 RR | 6 | 3 | 5 |
| DeKalb CX370 RR | 5 | 4 | 6 |
| Mean | 4.7 | 3.5 | 4 |
| Conventional: | | | |
| Pioneer 93B41 | 3 | 4 | 4 |
| Pioneer 93B82 | 4 | 4 | 2 |
| Asgrow A3244 | 4 | 2 | 2 |
| Asgrow A3834 | 4 | 3 | 4 |
| Midland 8391 | 4 | 3 | 5 |
| Midland 8410 | 4 | 3 | 6 |
| NK S33-P2 | 5 | 3 | 6 |
| NK S38-L5 | 5 | 3 | 4 |
| DeKalb CX373 | 4 | 4 | 4 |
| DeKalb CX399 | 5 | 4 | 5 |
| Mean | 4.2 | 3 | 4.2 |
| MEAN LSD (0.05) | N.S. | N.S. | N.S. |

a All conventional varieties treated with Prowl (2.4pt/a) preemergence followed by Pursuit (1.44oz/ac) 3 weeks after planting.

b All varieties treated with Prowl (2.4pt/a) preemergence followed by Raptor (5oz/ac) 3 weeks after planting.

Yields of Roundup Ready soybeans were similar whether treated with a sequential application of Roundup, or with preemergence application of Prowl followed by a postemergence application of Pursuit or Raptor (FIGURE 1, TABLE 2).

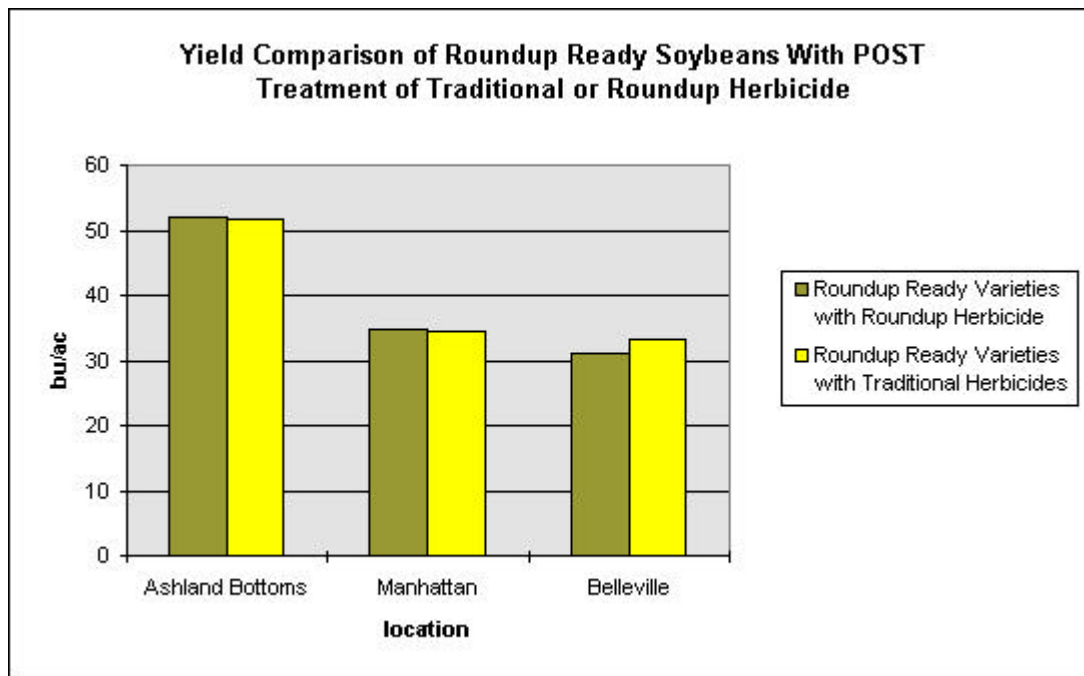


Figure 1. Yield Comparison of Roundup Ready Soybeans with POST Treatment of Traditional or Roundup Herbicide

Table 2. Yield of Roundup Ready soybean varieties treated with Roundup (Ru), or Prowl (Pr) followed by Pursuit (Pu) or Raptor (Ra) in a weed free environment.

| | Ashland Bottoms | | Manhattan | | Belleville | |
|---------------------------|----------------------|----------------------|----------------------|----------------------|----------------------|----------------------|
| | Ru(POST)/ Ru(SEQ) | Pr(PRE)/ Pu(POST) | Ru(POST)/ Ru(SEQ) | Pr(PRE)/ Ra(POST) | Ru(POST)/ Ru(SEQ) | Pr(PRE)/ Pu(POST) |
| Soybean Variety | ----- (bu/ac) ----- | | | | | |
| Roundup Ready: | | | | | | |
| Pioneer 9344 RR | 56.1 | 53.1 | 40.3 | 41.2 | 24.0 | 24.4 |
| Pioneer 9396 RR | 55.6 | 53.3 | 39.3 | 38.2 | 23.4 | 24.1 |
| Asgrow A3601 RR | 52.8 | 53.3 | 39.3 | 39.3 | 30.8 | 37.8 |
| Asgrow A3701 RR | 58.5 | 58.9 | 38.5 | 39.7 | 36.6 | 43.7 |
| Midland 8377 RR | 48.1 | 52.1 | 30.5 | 30.4 | 37.2 | 38.1 |
| Midland 8433 RR | 48.7 | 50.1 | 34.5 | 30.1 | 32.1 | 35.6 |
| NK S30-K3 RR | 51.0 | 47.5 | 32.1 | 32.0 | 33.9 | 29.5 |
| NK S36-U2 RR | 53.1 | 50.9 | 29.6 | 24.1 | 27.2 | 27.4 |
| DeKalb CX367 RR | 51.3 | 50.6 | 30.8 | 35.3 | 31.1 | 40.3 |
| DeKalb CX370 RR | 45.4 | 46.6 | 33.5 | 33.5 | 35.4 | 31.7 |
| Mean | 52.1 | 51.6 | 34.8 | 34.5 | 31.2 | 33.3 |
| MEAN LSD (0.05) | N.S. | | N.S. | | N.S. | |
| VARIETY LSD (0.05) | 4.2 | | 4.4 | | 6.5 | |

Yields of Roundup Ready and conventional soybean varieties varied by location. Pioneer 93B41, Asgrow A3244, Midland 8391, Northrup King S38-L5, and DeKalb CX373 were the highest yielding soybean varieties at Ashland Bottoms within their respective company. Pioneer 9344RR, Asgrow A3244, Midland 8433RR, Northrup King S38-L5, and DeKalb CX399 were the top yielding varieties at Manhattan. Pioneer 93B41, Asgrow A3701RR, Midland 8377RR, Northrup King S33-L5, and DeKalb CX370RR were the top yielding varieties at Belleville. Roundup Ready soybean varieties generally had lower yields than conventional varieties at Ashland Bottoms and Belleville. Yields of Roundup Ready and conventional soybeans were generally the same within seed companies at Manhattan. (FIGURE 2, TABLE 3). Conventional and Roundup Ready Asgrow and conventional Pioneer soybeans were among the top yielding varieties at all locations.

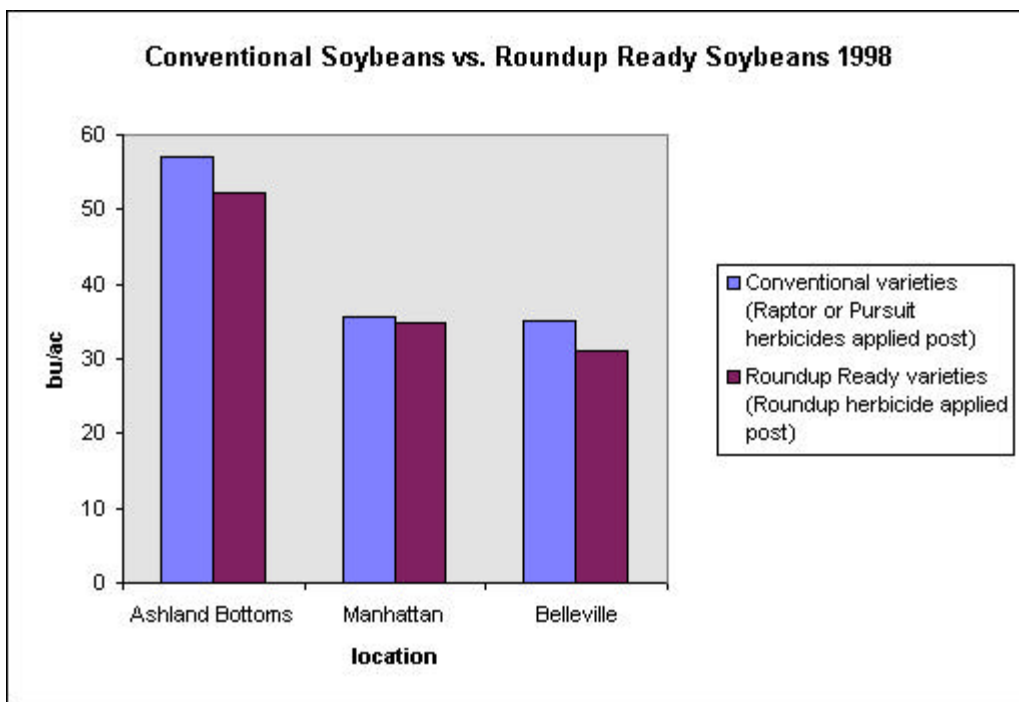


Figure 2. Conventional Soybeans vs. Roundup Ready Soybeans 1998

Table 3. Yields of Roundup Ready and conventional soybean varieties in a weed free environment.

| Soybean Variety | Ashland Bottoms ^b | Manhattan ^c | Belleville ^b |
|-----------------------------------|------------------------------|------------------------|-------------------------|
| | ----- (bu/ac) ----- | | |
| Roundup Ready:^a | | | |
| Pioneer 9344 RR | 56.1 | 40.3 | 24.0 |
| Pioneer 9396 RR | 55.6 | 39.3 | 23.4 |
| Asgrow A3601 RR | 52.8 | 39.3 | 30.8 |
| Asgrow A3701 RR | 58.5 | 38.5 | 36.6 |
| Midland 8377 RR | 48.1 | 30.5 | 37.2 |
| Midland 8433 RR | 48.7 | 34.5 | 32.1 |
| NK S30-K3 RR | 51.0 | 32.1 | 33.9 |
| NK S36-U2 RR | 53.1 | 29.6 | 27.2 |
| DeKalb CX367 RR | 51.3 | 30.8 | 31.1 |
| DeKalb CX370 RR | 45.4 | 33.5 | 35.4 |
| Mean | 52.1 | 34.8 | 31.2 |

| | | | |
|---|------|------|------|
| Conventional: | | | |
| Pioneer 93B41 | 60.0 | 37.8 | 41.7 |
| Pioneer 93B82 | 58.8 | 39.1 | 36.8 |
| Asgrow A3244 | 62.9 | 39.7 | 35.9 |
| Asgrow A3834 | 55.9 | 37.3 | 33.6 |
| Midland 8391 | 54.3 | 33.9 | 33.2 |
| Midland 8410 | 53.4 | 32.7 | 31.1 |
| NK S33-P2 | 56.1 | 29.3 | 38.4 |
| NK S38-L5 | 60.3 | 41.8 | 31.8 |
| DeKalb CX373 | 55.2 | 29.6 | 34.8 |
| DeKalb CX399 | 54.8 | 34.4 | 32.0 |
| Mean | 57.1 | 35.6 | 35.0 |
| MEAN LSD (0.05) | 1.4 | N.S. | 2.9 |
| VARIETY LSD (0.05) | 4.3 | 7.3 | 9.0 |
| a All Roundup Ready varieties treated with Roundup (2pt/a) at 3 and 5 weeks after planting. | | | |
| b All conventional varieties treated with Prowl (2.4pt/a) preemergence followed by Pursuit (1.44oz/ac) 3 weeks after planting. | | | |
| c All conventional varieties treated with Prowl (2.4pt/a) preemergence followed by Raptor (5oz/a) 3 weeks after planting. | | | |

In summary, soybean injury from Prowl followed by Pursuit or Raptor was similar for conventional and Roundup Ready soybean varieties (TABLE 1). Yield of Roundup Ready soybeans was similar when treated with Roundup, and when treated with Prowl followed by Pursuit or Raptor (TABLE 2, FIGURE 1). Soybean yields and variety performance varied by location. Ashland Bottoms and Belleville showed conventional soybean varieties generally yielded higher than Roundup Ready varieties. Manhattan had similar yields among Roundup Ready and conventional soybean varieties (TABLE 3, FIGURE 2). The conventional and Roundup Ready soybeans from Asgrow and the conventional soybean varieties from Pioneer were among the top yielding varieties at all three locations.

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