

# WHEAT AND RELAY INTERCROPPED SOYBEAN YIELD RESPONSE TO HARVEST AID APPLICATION TIMINGS

---

**Kelly Nelson**

Research Agronomist

**Bruce Burdick**

Research Associate/Superintendent

**Ray Massey**

Extension Professor

Early-seeded soybean [*Glycine max* (L.) Merr.] relay intercropped into standing wheat (*Triticum aestivum* L.) using soybean seed-coat technology may allow profitable wheat production in the Midwest on highly erodible soils. Dry conditions in mid- to late June have reduced relay intercropped soybean stands and yield in some years (Nelson et al., 2010a; Nelson et al., 2010b). We hypothesized that using glyphosate as a wheat harvest aid (Monsanto, 2010) would reduce the impact of wheat interference on relay intercropped soybean grain yield and increase gross margins. Field research conducted over four site-years (Novelty in 2003-2005 and Albany in 2004) in upstate Missouri evaluated timings for application of glyphosate as a harvest aid on wheat and relay intercropped soybean. The cost effectiveness of these cropping systems was compared to full-season soybean, double-cropped wheat–soybean, and wheat-only production systems. Glyphosate applied to wheat 1 wk before harvest, after late dough, in a relay intercrop production system with coated-soybean maintained wheat grain yields similar to nontreated wheat, and increased soybean grain yields 4.3 to 11.4 bu/acre compared to nontreated wheat relay intercropped or double-cropped with soybean (Table 1). Earlier glyphosate application timings (2–3 wk before wheat harvest) reduced wheat grain yields 10 to 25% and grain density 3 to 13% (data not presented), but soybean yield increased 6.4 to 7.7 bu/acre compared to nontreated wheat in a relay intercrop system (Table 1).

Based on these results, farmers could use glyphosate as a harvest aid to reduce the impact of wheat interference on soybean yield in a relay intercrop system. Applicators should carefully follow label restrictions for preharvest wheat applications and be cognizant of the stage of wheat development, minimum preharvest interval, and restrictions on wheat grown for seed (Monsanto, 2010). This research indicated that profitability of relay intercrop soybean depended on relative wheat and soybean prices. A relay intercrop production system on claypan soils prone to drought stress with glyphosate as a harvest aid may allow farmers in the Midwest to profitably maintain wheat in their crop rotation while minimizing risk associated with an early fall frost or dry conditions at seeding that may otherwise decrease double-crop soybean yields.

**Table 1.** The effect of wheat row spacing, soybean cropping system, and glyphosate harvest aid application timing on wheat grain yield, soybean population at harvest, soybean grain yield, receipts, expenses, and gross margins. Data were averaged over site-years (Novelty in 2003-2005 and Albany in 2004).

Wheat row spacing	Cropping system <sup>a</sup>	Harvest aid application date <sup>b</sup>	Wheat yield bu/acre	Soybean Yield bu/acre	Receipts \$/acre	Expenses \$/acre	Gross margins <sup>c</sup> \$/acre
0	FS soybean	None	0	49	424	169	255
38	RI	10 June	34	34	488	292	196
38	RI	17 June	41	32	518	293	225
38	RI	24 June	46	30	530	294	236
38	RI	None	45	26	488	267	221
38	DC	None	46	22	464	266	198
38	FS wheat	None	46	0	271	175	96
19	DC	10 June	44	22	445	278	167
19	DC	17 June	51	22	483	279	204
19	DC	24 June	58	19	502	280	222
19	DC	None	58	19	498	268	230
19	FS wheat	None	58	0	336	177	159
LSD ( $P = 0.05$ )			5	3	40	1	39

<sup>a</sup>Abbreviations: DC, Double-crop; FS, Full-season; RI, Relay intercrop.

<sup>b</sup>Application date was one (24 June), two (17 June), and three (10 June) weeks before harvest.

<sup>c</sup>Gross margin was calculated as the difference between the gross receipts and marginal cost for each cropping system. Wheat and soybean grain prices were \$5.70 and \$8.70, respectively.

## **References**

- Monsanto. 2010. Roundup WeatherMAX<sup>®</sup> herbicide specimen label. Available at [http://www.monsanto.com/monsanto/ag\\_products/crop\\_protection/labels\\_msds.asp](http://www.monsanto.com/monsanto/ag_products/crop_protection/labels_msds.asp) (accessed 5 Jan. 2010, verified 3 Feb. 2011).
- Nelson, K.A., C.G. Meinhardt, and R.L. Smoot. 2010a. Wheat (*Triticum aestivum* L.) cultivar selection affects double-crop and relay-intercrop soybean (*Glycine max* L.) response on claypan soils. *Int. J. Agron.* doi:10.1155/2010/543261.
- Nelson, K.A., R.L. Smoot, and B.A. Burdick. 2010b. Seed coat technology affects relay intercrop, full season, and double crop soybean yields in upstate Missouri. *Online. Crop Management* doi: 10.1094/CM-2010-06XX-01-RS.