NASS *Highlights*

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AGRICULTURAL RESOURCE MANAGEMENT SURVEY

U.S. Soybean Industry

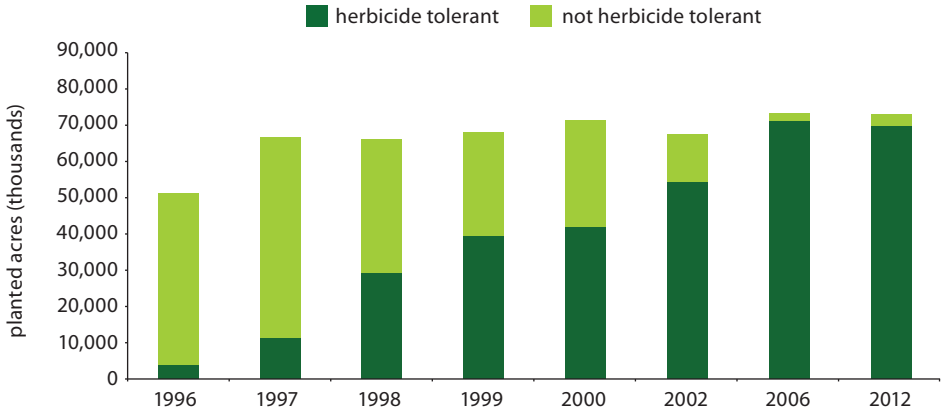
About this Publication

USDA's National Agricultural Statistics Service (NASS) and Economic Research Service (ERS) conducted the Agricultural Resource Management Survey (ARMS) of the U.S. soybean industry. During the summer and fall of 2012 and winter of 2013, trained enumerators conducted personal interviews with almost 2,500 soybean growers in the 19 largest soybean-producing states. The farmers provided information about their production practices, operating costs, and soybean production. This publication includes highlights of their production practices and resource use.

Glyphosate Effectiveness Declines

U.S. soybean producers have planted genetically-engineered (GE) glyphosate-tolerant (GT) varieties on a steadily increasing share of acreage since 1996, the year these varieties became commercially available (Fig. 1). Herbicide use increased from almost 61 million pounds of herbicide active ingredient in 1996 to almost 133 million pounds in 2012. Glyphosate accounted for an increasing share of total herbicide use, accounting for 15 percent of total herbicide active ingredient in 1996, increasing to 89 percent in 2006, and declining to 83 percent in 2012.

Fig. 1: Planted Soybean Acres by Herbicide Tolerance, 1996-2012



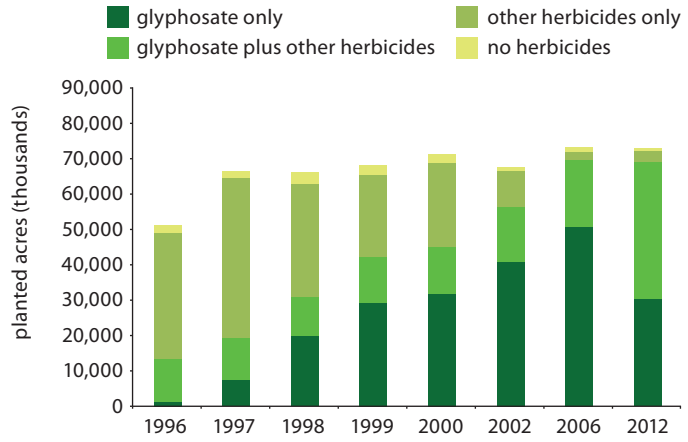
Source: USDA NASS.

USDA **United States Department of Agriculture**
National Agricultural Statistics Service

www.nass.usda.gov

From 1996 to 2006, growers applied glyphosate as the only herbicide to an increasing share of soybean acreage (Fig. 2), which is a practice that can contribute to glyphosate resistance in weeds. Acreage receiving herbicides, other than glyphosate, declined with the increasing adoption of GT varieties. In 2006, growers applied glyphosate and no other herbicides to more than 50 million soybean acres. By 2012, that acreage declined by 20 million acres, perhaps as a management response to glyphosate-resistant weeds, as acreage receiving glyphosate plus at least one other herbicide increased by roughly the same amount.

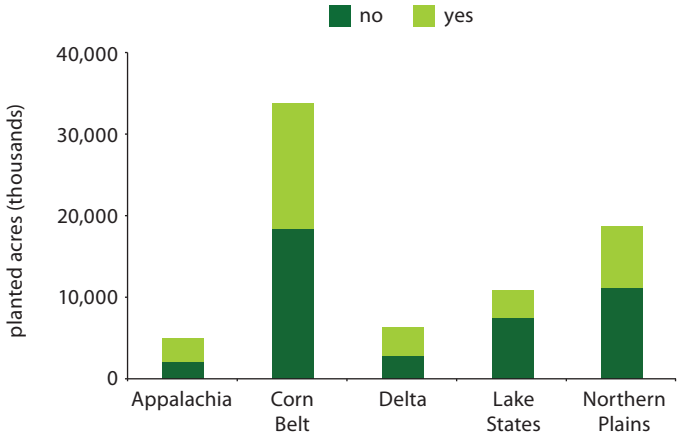
Fig. 2: Herbicide Use Practices on Soybean Acres, 1996-2012



Source: USDA NASS.

Farmers reported a decline in the effectiveness of glyphosate on almost 44 percent of acres planted to soybeans in 2012. More than 47 percent of those acres are in the Corn Belt, which accounts for the majority of soybean acreage in the United States, followed by the Northern Plains (23 percent), Delta (11 percent), Lake States (10 percent), and Appalachia (9 percent). Figure 3 shows whether farmers observed a decline in effectiveness for acres that had been treated with glyphosate.

Fig. 3. U.S. Soybean Acres with an Observed Decline in the Effectiveness of Glysophate in Controlling Weeds



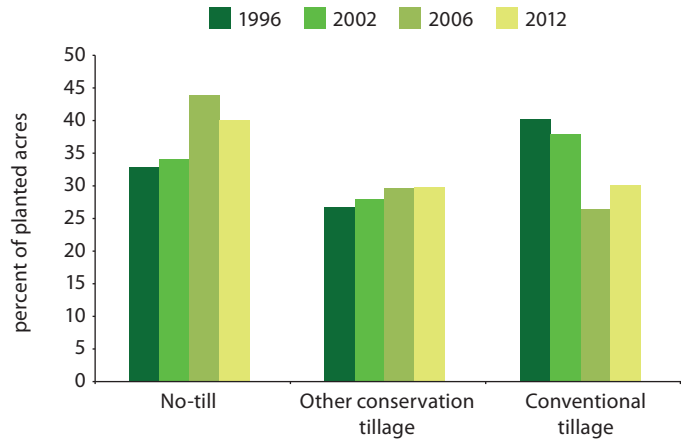
Note: Appalachia = Kentucky, North Carolina, Tennessee, Virginia. Corn Belt = Iowa, Illinois, Indiana, Missouri, Ohio. Delta = Arkansas, Louisiana, Mississippi. Lake States = Michigan, Minnesota, Wisconsin. Northern Plains = Kansas, North Dakota, Nebraska, South Dakota.

Source: USDA NASS.

No-Till Acreage Declines since 2006

The widespread adoption of GT soybean varieties facilitated the use of no-till and conservation-tillage practices, although no-till acreage declined during 2006-2012 (Fig. 4). As the name implies, no-till is a crop production system where crops are planted without using tillage. No-till can reduce soil erosion, increase soil organic matter content, and reduce soil compaction. Between 2002 and 2006, the use of no-till increased sharply in soybean production, rising from 34 to 44 percent of acreage in four years.

Fig. 4: Soybean Tillage Practices, 1996-2012



Source: USDA NASS.

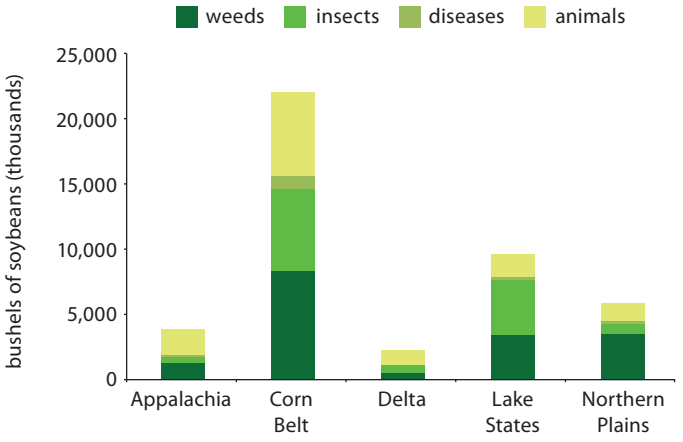
The percentage of soybeans planted using other conservation tillage practices, mostly mulch till, was roughly the same in 2012 as in 2006. Mulch till requires that farmers use tillage sparingly, leaving at least 30 percent of the soil surface covered by crop residue at planting time. The no-till expansion between 2002 and 2006 appears to have come, at least in part, from land in conventional and reduced tillage. Conventional tillage, where residue cover is less than 15 percent at planting time, increased between 2006 and 2012, suggesting that some farmers switched from no-till to conventional tillage. Nonetheless, conservation tillage, which includes no-till, is still practiced on about 70 percent of soybean acres.

Weeds and Other Pests Cause Soybean Yield Losses

Yield losses due to pests (weeds, animals, insects, and disease), in spite of pest control efforts, were reported on almost 15 percent of soybean acres in 2012, and tended to be higher in regions with more production (Fig. 5). Total yield loss due to pests in 2012 was more than 43.8 million bushels, which is a small percentage of the 2.95 billion bushels growers produced in 2012. Weeds accounted for 39 percent of total yield loss, followed by animals (29 percent), insects (28 percent), and plant diseases (only 4 percent).

However, the cause of yield losses from pests varied among regions. In the Northern Plains, weeds accounted for 60 percent of reported losses due to pests. In Appalachia, animals accounted for 51 percent, and in the Lake States, insects were the largest cause at 44 percent.

Fig. 5: Soybean Yield Losses in 2012 by Pest and Region



Source: USDA NASS.

Three Percent of U.S. Soybeans Are Non-GE Variety

Growers planted more than three percent of soybean acres in 2012 to non-GE varieties (Table 1) and sold soybeans from more than 63 percent of those acres in markets specifically for non-GE soybeans (This is lower than the official NASS estimate, which is based on more complete data, of seven percent of soybean acreage in 2012 (NASS June Agricultural Survey). Sixty-three percent of those acres received certified non-GE seed. Farmers tested nearly 35 percent of non-GE soybean acres for the presence of GE traits. Farmers grew almost 32 percent of non-GE acres under a production contract that specified the use of a particular seed variety. The average price premium was $2.50 per bushel.

Table 1: Non-genetically engineered soybean attributes, 2012

	Percent
Non-GE seed as a percent of all planted acres	3.2
Of acres planted with non-GE soybeans:	
Non-GE soybeans were sold through non-GE market	63.5
Non-GE seed was certified as non-GE	63.0
Non-GE seed was tested for presence of GE traits	34.6
Non-GE soybeans were grown under contract specifying seed variety	31.5
Price premium received for non-GE soybeans (per bushel)	$2.50

Production Costs Increase Substantially since 2006

The costs of major inputs including seed, fertilizer, and chemicals increased substantially from 2006 to 2012 (Table 2). Before adjusting for inflation in input prices, during 2006-2012, seed costs were up more than $20 per acre, fertilizer costs were nearly $20 per acre higher, and chemical costs were almost $12 per acre higher. After adjusting for inflation, seed costs were actually $8 per acre lower in 2012, suggesting an improved efficiency of seed technologies and/or seed use. Fertilizer and chemical costs remained higher in 2012 than in 2006 even after price levels were adjusted, suggesting that more fertilizer and chemicals were applied to soybeans in 2012 than in 2006.

Table 2: Soybean production costs per planted acre, 2006 and 2012 (2012 dollars per planted acre)

	2006	2012
Purchased Seed	62.10	54.05
Commercial Fertilizer	16.25	27.06
Chemicals	16.57	25.10

Note: The national agricultural seed and plant price index, mixed fertilizer price index, and total chemical price index were used to convert 2006 nominal costs to 2012 U.S. dollars (USDA, NASS, Agricultural Prices).

Additional Information

For additional information about the Agricultural Resource Management Survey and other soybean industry reports, visit:

www.nass.usda.gov
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