26. Herbicide Tolerant Soybean

Weeds compete with soybeans for soil moisture, nutrients, sunlight and space in the field. More than thirty plant species infest soybean fields in the major soybean producing areas of the US. Annual broadleaf and grass weeds are major problems. In some areas, perennial grass, broadleaf weeds and sedges are troublesome. Ragweed, foxtail, nightshade, lambsquarters, smartweed, and velvetleaf infest more acreage in the Midwest than in the Delta. Morningglory, barnyardgrass, signalgrass, prickly sida, hemp sesbania and sicklepod infest more acreage in the Delta. Cocklebur, johnsongrass, crabgrass and pigweeds infest sizable acreages of soybeans in all soybean producing regions.

Natural weed populations in most fields are high enough to cause devastating soybean yield losses if left uncontrolled. Loss figures of 50-90% are common for soybeans grown in natural weed infestations. Research has shown that a period of 4 to 6 weeks without weed competition at the beginning of the growing season will allow production of maximum yields under most environmental conditions.

By the early 1990’s, there were at least 70 registrations for individual herbicides or packaged herbicide mixtures for weed management in soybeans. The average number of treatments per acre rose from 1.5 in 1990 to 1.7 in 1995 as it was more common for soybean growers to make both an at-plant and postemergence treatment or make two postemergence treatments. A steady increase in the number of herbicide active ingredients applied to treated soybean acreage occurred between 1986 and 1995: from 1.4 to 2.7. In 1994, 43% of US soybean acreage were cultivated during the growing season.

Soybeans have been transformed with a bacterial gene for resistance to the non-selective herbicide glyphosate. Upon glyphosate treatment, the transgenic plant remains unaffected. The use of glyphosate over-the-top of Roundup Ready soybeans was researched extensively prior to and immediately after their introduction in 1996. A single application of glyphosate provided annual weed control throughout the entire growing season. The Roundup Ready technology was planted on two-thirds of the nations soybean acres in 2001. Postemergence glyphosate applications largely replaced the previous herbicides.

In addition to changing herbicide use patterns, US soybean growers have also changed tillage practices following the introduction of Roundup Ready soybeans. A recent survey indicated that 53% of US soybean growers reported making fewer tillage passes through their fields since 1995 with the average reduction reported as 1.8 tillages/acre.

Several new herbicide active ingredients and combination products were introduced to the US soybean market 1997-2001. Generally these active ingredients have been shown to work best in combination with other products which extend the period or spectrum of control. Recent tests with newly-registered active ingredients indicate that combinations of 4-5 active ingredients could provide effective weed control of common grasses and broadleaves approximately equal to those provided by glyphosate.

A survey of Extension Service weed scientists solicited herbicide replacement scenarios for Roundup. For most states, the specialists indicated that at least 3 products would have to be used to effectively replace Roundup. Most Roundup programs use approximately 1 lb/AI and cost $15-16/A. Most alternative programs cost $30-40/A and utilize more than one pound of active ingredient per acre. The impact estimates represent a simulation of the costs that growers would incur if they replaced the Roundup Ready program with an equally effective herbicide program to control problem weeds without the need for additional cultivation.

**Estimated Impacts of Herbicide Tolerant Transgenic Soybean**

| Change in Pesticide Use: | 28.7 million lbs/yr decrease in herbicides |
| Change in Production Cost: | $1.1 billion/yr savings |

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For the full report click here