31. Herbicide Tolerant Field Corn

Corn yield loss is generally proportional to the amount of weeds present. Some studies suggest that for every pound of weeds dry matter, there is a reduction of approximately one pound of corn dry matter.

Herbicide use in corn became widespread by the end of the 1970’s. In the mid-1990’s, it was reported that US farmers applied herbicides to 98% of the nation’s field corn acres. In combinations, the herbicides used with conventional corn cultivars provide fair to excellent control of most of the troublesome weed species in corn. Notable exceptions are bermudagrass, field bindweed, hemp dogbane and wirestem muhly. A species that is becoming more problematic in cornfields is shattercane.

Roundup Ready corn has a single added protein: the enzyme mEPSPS, which is resistant to the effects of glyphosate. For corn, the source of mEPSPS was its own cloned gene that had been mutagenized in vitro. Liberty Link corn varieties were developed to withstand application of the herbicide glufosinate (Liberty). Resistance to glufosinate was obtained originally from a gene found in a bacterial species.

University research has demonstrated that glyphosate or glufosinate use with herbicide tolerant corn provides effective control of certain weed species which had not been effectively controlled with traditional corn hybrids: wirestem muhly (PA), wild proso millet (UT), field bindweed (UT), burcucumber (PA) and yellow nutsedge (WI).

It is estimated that national adoption of the herbicide tolerant cultivars represents 5.8 million acres or 8% of corn acreage. Significant adoption of the herbicide tolerant corn technology has occurred in western and eastern states. University weed scientists report that adoption has been largely driven by improved control of troublesome weed species for which there are weaknesses in conventional programs; wild proso millet, burcucumber, wirestem muhly, sandbur, hemp dogbane, bermudagrass and perennials in general. The university specialists reported that the adoption of the herbicide tolerant corn varieties has replaced previously-used herbicide programs in two ways: (1) growers have reduced the rates of soil-applied preemergence treatments and used glyphosate or glufosinate to effectively control weeds that emerge and (2) growers have substituted glyphosate or glufosinate for their previously-used postemergence applications. These substitutions are estimated to save corn growers approximately $10/A. It is estimated that replacing the currently used herbicide programs results in an average reduction in herbicide use of 1 lb/A and costs of $10/A.

Impacts of Herbicide Tolerant Transgenic Field Corn

Change in Pesticide Use: 5.8 million lbs./yr. Decrease in herbicide active ingredients
Change in Production Costs: $58.0 million/yr. Savings in weed control costs

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