

COMPETITION OF VOLUNTEER CORN (*ZEA MAYS* L.) AND REMOVAL FROM TRANSGENIC CORN HYBRIDS

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Volunteer corn (*Zea mays* L.) results from seed dropped due to weather, insect, and disease induced lodging as well as harvest inefficiencies. The increasing popularity of glyphosate-resistant (Gly-R) corn results in additional Gly-R volunteer corn as a management problem. Gly-R volunteer corn is managed easily in Gly-R soybeans (*Glycine max*) through the postemergence application of grass selective herbicides such as Fusion, Poast Plus, and Select.

However, there are fewer options to remove volunteer corn from a corn or sorghum crop. Tillage is one option, but few growers use in-crop tillage due to the time constraints and fuel costs. In some situations, specific herbicides could be used to remove volunteer corn, provided there is a difference in selectivity between the volunteer corn and the planted corn. For example, glufosinate-resistant (Ignite®) and imidazolinone-resistant (Lightning®) corn hybrids could be planted in a field following glyphosate-resistant corn, and Ignite and Lightning respectively, applied to remove glyphosate-resistant volunteer corn.

Research is limited on the impact and management of Gly-R volunteer corn in corn. In fact, a recent study in South Dakota estimated that 3 volunteer corn plants per square yard had limited effect on corn yield. Research is needed under Missouri field conditions to estimate the impact of season-long competition of volunteer corn in corn. The objectives of this research were three-fold: 1) Sample a number of corn fields in central Missouri in the fall following corn harvest to determine the extent of corn loss due to environmental and mechanical factors; 2) Establish field trials to determine the potential for Ignite in Liberty-Link® corn and Lightning in Clearfield® corn to remove glyphosate-resistant volunteer at various growth stages and 3) Determine the potential impact of volunteer corn to compete season-long with planted corn.

Field trials were established in Novelty, Missouri in 2008 and 2009. Under no-till conditions, corn hybrids (population of 69,190 seed per hectare) were sown in 76 cm rows in a randomized complete block design. Nitrogen, at 168 kg/ha in 2008 and 120 kg/ha in 2009 was broadcasted at the time of planting. To determine competition effects, Gly-R volunteer corn was planted randomly with a jab planter at densities ranging from 0 to 8 plants/m², and was allowed to compete season-long. In a second study with glufosinate-resistant or imadazolinone-resistant corn, Gly-R volunteer corn was planted randomly in plots to establish densities of 1 and 4 plants/m². Gly-R volunteer corn was treated with Ignite or Lightning when volunteer corn reached 10, 20, or 40 cm in height.

In the competition study, a portable meter (SPAD meter) was used to estimate chlorophyll levels (an indication of leaf nitrogen content). SPAD meter readings decreased for corn at the V8, VT, and R1 growth stages by 13, 20, and 6%, respectively at 4 volunteer corn plants/m² compared to the untreated control. However, in 2008 when rainfall amounts were 48 cm greater during the growing season compared to normal conditions, competition effects resulted in no significant yield losses due to increasing densities of volunteer corn. In the management study and at both

volunteer corn densities, Ignite resulted in control of ≥ 97 , 19, and $\leq 50\%$ at 10, 20, and 40 cm removal treatments, respectively. Lightning resulted in greater than 80% control of volunteer corn. Dry weights of volunteer plants were reduced 74 to 99% for treated compared to untreated plants. For both sets of studies, there was no consistent relationship between the density of volunteer corn and the timing for removal with reductions in grain yields of planted corn. Volunteer corn competes with planted corn for available nitrogen, but impacts on grain yield may be minimal with adequate levels of nitrogen and rainfall. Ignite and Lightning are an adequate means of volunteer corn removal at early growth stages.