EFFECT OF GLYPHOSATE-RESISTANT VOLUNTEER CORN ON GLYPHOSATE-RESISTANT CORN. Lizabeth A.B. Stahl, Milton J. Haar, Jodie K. Getting, Ryan P. Miller, and Thomas R. Hoverstad, Assistant Extension Professor, University of Minnesota, Worthington Regional Center, Worthington, MN 56187, Assistant Professor, Scientist, University of Minnesota, Lamberton, MN 56152, Assistant Extension Professor, University of Minnesota, Rochester, MN 55904-4915, Scientist, University of Minnesota, Waseca, MN 56093.

Corn acreage and corn-on-corn acres are increasing. In Minnesota, the number of acres planted to corn increased 12% from 2006 to 2007 (USDA National Agricultural Statistics Service). Glyphosate-resistant corn hybrids have gained wide acceptance and the potential exists for glyphosate-resistant volunteer corn in glyphosate-resistant corn. Storm damage, harvesting problems, poor stalk quality, and insect damage are among the factors that can lead to kernel and ear loss, and volunteer corn the following year. Limited information exists about the competitive effects of volunteer corn in corn and at what point management is needed to help protect yield. Management is complicated because both the crop and the volunteer crop are the same plant and both are resistant to the glyphosate used for weed management. This study was initiated to examine the effect of glyphosate-resistant volunteer corn in glyphosate-resistant corn and determine the potential for this situation to be a management problem.

Research was conducted in 2007 at two locations in MN, the Southwest Research and Outreach Center at Lamberton and the Southern Research and Outreach Center at Waseca. Treatments consisted of various populations of volunteer corn planted as kernels and whole ears. Carry-over seed from a glyphosate-resistant hybrid grown in the 2006 cropping season was hand-seeded at 2 to 3 times the target volunteer corn populations of 4046, 8093, 12139, 18209, 24279, 30349, and 36148 plants/acre. The intent was to thin plants after emergence to target populations. Plots were then field cultivated, and planted to a glyphosate-resistant corn hybrid. Various populations of corn ears, simulating a population of 650, 1600, and 32,000 (Lamberton only) volunteer corn clumps/acre, were hand seeded after planting. Three additional treatments included a low target population of volunteer corn clumps (650 ears/acre) combined with a low, mid or high population (12139, 24279, and 36418 plants/acre, respectively) of volunteer plants. DKC52-40 was planted on May 14, 2007 and DKC54-46 was planted on May 11, 2007 at 33,000 plants/acre in 30-inch rows at Lamberton and Waseca, respectively. Acetochlor plus atrazine was applied PRE followed by a POST application of glyphosate.

Volunteer corn populations were lower than the target populations. This was due in part to a lower-than-expected germination rate of the carry-over seed and loss of some volunteer plants by the POST glyphosate application. Because of segregation, not all progeny of the resistant hybrid were resistant. Average volunteer ear populations were closer to targeted populations. Compared to the untreated controls, corn yield was reduced 23.2 and 40.2 bu/acre by volunteer corn populations of 19348 (Lamberton) and 21152 plants/acre (Waseca), respectively, the highest rates evaluated. At Waseca, there was no difference among the whole ear and combination treatments, but all decreased yield compared to the untreated control. At Lamberton, treatments consisting of whole ears only had no effect while yield reductions were observed in the combination treatments consisting of the mid and high volunteer plant populations. Because ears alone did not have an effect, this result was attributed mainly to the volunteer corn planted as separate kernels.

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