

VOLUNTEER CORN CONTROL EFFECT ON CORN AND SOYBEAN YIELD. Jill Alms, Mike Moechnig, Darrell Deneke, and Dave Vos, South Dakota State University, Brookings, SD.

Volunteer corn can be a problematic weed in corn-soybean and corn-corn cropping systems. However, there is little information available quantifying the effects of volunteer corn on soybean or corn yield, particularly in drier regions of the Midwest where competition for soil moisture may influence weed-crop competition. One option for controlling volunteer corn in corn may be to rotate glyphosate- and glufosinate-resistant corn varieties. However, glufosinate may only partially control volunteer corn which could result in corn yield loss. Similarly, glufosinate used to control volunteer corn in glufosinate-resistant soybeans may also result in partial volunteer corn control and soybean yield loss. Studies were conducted in Brookings, SD to 1) quantify the effect of volunteer corn on corn yield, 2) quantify volunteer corn control using glufosinate, 3) quantify the effect of volunteer corn on soybean yield, and 4) quantify the effect of partially controlled volunteer corn on soybean yield.

The effect of volunteer corn on corn yield was determined by establishing volunteer corn densities at 0, 0.2, 0.8, 1.2, 1.9, 2.5, 2.7, and 3.5 plants m^{-2} in 2007 and 0, 1.3, 2.3, 3.4, 4.5, 5.3, 8.0, and 8.5 plants m^{-2} in 2008 in Dekalb DKC 46-60 VT3 corn. Volunteer corn density treatments were established in a RCB design with four replications. Volunteer corn seed collected from DKC 58-73 in 2006 was spread on the soil surface on May 14, 2007 and volunteer corn seed collected from DKC 51-45 in 2007 was spread on the soil surface on May 16, 2008. In each year, volunteer corn seed was incorporated approximately 0-4 cm below the soil surface using a field cultivator. Corn and volunteer corn was harvested with a plot combine in the center 1.5 m of each 3 m wide plot on November 10, 2007 and November 5, 2008. Corn yield loss ranged from 0-9% in 2007 and 0-40% in 2008. To quantify volunteer corn control using glufosinate, volunteer glyphosate-resistant corn was established in glufosinate-resistant corn at 3.5 plants m^{-2} in 2007 and 7 plants m^{-2} in 2008. Glufosinate (482 g a.e. ha^{-1}) was applied when volunteer corn was 13, 18, 28, or 46 cm tall in 2007 and 15, 30, 61, or 91 cm tall in 2008. These treatments were established in a RCB design with four replications. In each year, volunteer corn control was greatest when glufosinate was applied to 18-30 cm tall volunteer corn. Corn yield loss was not significant ($P>0.05$) among glufosinate treatments in 2007, but ranged from 0-23% in 2008. Corn yield loss in 2008 may have been due to partial control and early season competition. These results indicated that uncontrolled, partially controlled, or late controlled volunteer corn caused corn yield loss.

The effect of volunteer corn on soybean yield was determined by establishing volunteer corn densities in soybeans at 0, 0.2, 0.6, 1.5, and 3.5 plants m^{-2} in 2007 and 0, 0.2, 0.9, 2.3, and 4.4 plants m^{-2} in 2008. Volunteer corn treatments were established in a similar manner as the volunteer corn in corn studies. Soybean yield loss ranged from 0-54% in 2007 and 0-58% in 2008 among the volunteer corn densities. To quantify the effect of partially controlled volunteer corn on soybean yield, volunteer corn was established in soybean at 1.5 plants m^{-2} in 2007 and at 2.2 plants m^{-2} in 2008. Clethodim was applied at 12.7, 25.5, or 51 g a.i. ha^{-1} when volunteer corn was approximately 51-61 cm tall. At the low clethodim rate, 16% control resulted in 21% yield loss in 2007 and 12% control resulted in 14% yield loss in 2008. At the medium clethodim rate, 77% control resulted in 14% yield loss in 2007 and 54% control resulted in 18% yield loss in 2008. At the high clethodim rate, 98% control resulted in 5% yield loss in 2007 and 91% control resulted in 5% yield loss in 2008. These results indicated that volunteer corn greatly affected soybean yield and even partially controlled volunteer corn resulted in soybean yield loss.