

LANDSCAPE-LEVEL GENE FLOW FROM CLEARFIELD WINTER WHEAT TO CONVENTIONAL WHEAT OVER THREE YEARS. Philip Westra\*, Pat Byrne, Todd Gaines, Scott Nissen, Dale Shaner, Brien Henry, and Christopher Preston; Professor, Professor, MS Graduate Student, Professor, ARS Scientist, ARS Scientist, and Professor. Colorado State University and USDA/ARS, Fort Collins, CO 80523.

Pollen-mediated gene flow among crop cultivars and from crops to compatible relatives is an important issue for crops with regulated markets and with traits that may impact non-target organisms. The objectives of this project are to evaluate landscape-level crop-to-crop and crop-to-weed gene flow in wheat using commercially available varieties. Gene flow was estimated using pollen drift from 'Above,' a non-transgenic, imazamox-resistant winter wheat cultivar to susceptible wheat and jointed goatgrass. Wheat and jointed goatgrass samples were collected in eastern Colorado in 2003, 2004, and 2005. Additionally, a Nelder wheel plot was sampled in 2004 to estimate gene flow to two wheat varieties and jointed goatgrass. Wheat sub samples from commercial fields were screened for resistance by treating with 44 g/ha imazamox in field plots. Jointed goatgrass and Nelder wheel samples were screened in the greenhouse. In both the field and greenhouse, hybrids were identified by an injured (tillering) phenotype and were confirmed with a PCR-based marker. Two wheat varieties (Jagger and Prairie Red) were found to have significantly ( $\alpha=0.05$ ) higher cross-pollination rates in 2003 at one to fifteen feet from Above than the nine other varieties sampled, at 2.7 percent and 1.1 percent. Cross-pollination rates of 0.01 percent to 0.5 percent were observed at the farthest sample distance of 120 feet in 2003. The average cross-pollination rate for jointed goatgrass collected within the Above plot at the Nelder wheel was 0.18%. No cross-pollination was detected in five field jointed goatgrass samples in 2003 and five in 2004; one sample from 2004 had cross-pollination of 1.6 percent. Hybridization rates between wheat and jointed goatgrass were low in this study and gene flow did not occur over distance. Cross-pollination in wheat declines rapidly with increasing distance from the pollen source. Samples collected in 2005 are growing in the field test site and will be sprayed in the spring of 2006 with imazamox to complete the third year of testing on this project. Jointed goatgrass collected in 2005 is currently being screened in the greenhouse. The data from this research provide an excellent validation of the empirical model for pollen-mediated gene flow in wheat published in Crop Science by Gustafson et. al in May, 2005.