COMMERCIAL-SCALE POLLEN–MEDIATED GENE FLOW IN WINTER WHEAT IN THE CENTRAL WESTERN GREAT PLAINS. Todd A. Gaines, Patrick F. Byrne, Philip Westra, Scott J. Nissen, W. Brien Henry, Dale L. Shaner, and Phillip L. Chapman, Graduate student, Department of Bioagricultural Sciences and Pest Management, Colorado State University, Fort Collins, CO 80523-1177, Associate Professor, Department of Soil and Crop Sciences, Colorado State University, Fort Collins, CO 80523-1170, Professor, Department of Bioagricultural Sciences and Pest Management, Colorado State University, Fort Collins, CO 80523-1177, Professor, Department of Bioagricultural Sciences and Pest Management, Colorado State University, Fort Collins, CO 80523-1177, Research Geneticist, USDA/ARS Corn Host Plant Resistance Research, Mississippi State, MS 39762, Plant Physiologist, USDA/ARS Water Management Research, Fort Collins, CO 80526, and Professor, Department of Statistics, Colorado State University, Fort Collins, CO 80523-1877.

Pollen-mediated gene flow (PMGF) in wheat (*Triticum aestivum* L.) has been investigated in several studies, but most have been conducted on relatively small experimental plots. The introduction and widespread planting of a Clearfield (imidazolinone herbicide resistant) wheat cultivar in Colorado provided the opportunity to examine PMGF in commercial-scale production fields. We sampled a total of 56 large wheat fields in eastern Colorado in 2003, 2004, and 2005, and tracked the movement of the resistance gene from resistant cultivars to adjacent susceptible cultivars at distances up to 61 m. The highest level of PMGF we observed was 5.3% at 0.23 m, and the farthest sample at which we detected PMGF was 61 m. All 18 sampled cultivars showed some level of PMGF, with earlier heading cultivars having higher levels of cross-pollination than those that were late heading. At least in some cases, higher PMGF in early cultivars appeared to be due to late frosts that rendered recipient plants male sterile and therefore more susceptible to fertilization by foreign pollen. We used these data to develop a generalized linear mixed model with a random location effect. Based on the model results for cultivars heading earlier than the pollen source, the required separation distance between fields to ensure 95% confidence that 95% of locations have PMGF less than 0.9% is 41.1 m. For cultivars heading later than the pollen source, the equivalent required distance is 0.7 m. These are conservative confidence limits that should represent the highest levels of PMGF occurring in winter wheat in the central western Great Plains.

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