

WEED SEED FATE IN SOIL SEEDBANKS: NC202 REGIONAL RESULTS. Adam S. Davis*, Karen A. Renner, John Cardina, Frank Forcella, Gregg A. Johnson, John L. Lindquist, Ed C. Luschei, Marty M. Williams II, Christy L. Sprague, Research Associate and Professor, Michigan State University, East Lansing, MI 48824; Associate Professor, Ohio State University, Wooster, OH 44691; Research Agronomist, USDA-ARS Soil Lab, Morris, MN 56267; Research Agronomist, University of Minnesota Southern Research and Outreach Center, Waseca MN 56093; Associate Professor, University of Nebraska, Lincoln, NE 68583; Assistant Professor, University of Wisconsin, Madison, WI 53706; Assistant Professor, Washington State University, Prosser, WA, 99350; Assistant Professor, University of Illinois, Urbana-Champaign, IL 61801.

Weed seedbanks are primarily responsible for recurring infestations of annual weeds. Yet the amount of variation in weed seedbank persistence in the soil and factors regulating this parameter are poorly understood. A field experiment was initiated by the NC202 regional weed management working group to determine the range of variation in weed seedbank decline in MI, OH, IL, WI, MN, NE and WA. In October of 2001, freshly harvested seeds of common lambsquarters, giant foxtail and velvetleaf were buried within 0.5 mm mesh nylon bags at depths of 0, 2 and 10 cm. Two bags per species were buried at each depth, each containing one hundred seeds. One bag in each pair was recovered in April and the other bag was recovered the following October for the determination of seedbank decline during the winter and summer months, respectively. Seed viability was determined through germination tests and tetrazolium assays. Seedbank decline for both the winter and summer months varied between locations ($P < 0.001$) and species ($P < 0.001$). During the overwinter burial period, common lambsquarters seed mortality ranged from 5% in NE to 50% in WA, giant foxtail seed mortality ranged from 10% in NE to 40% in IL, and velvetleaf seed mortality ranged from 3% in OH to 35% in NE. During the period from April 2002 through October 2002, seedbank decline (including both seed mortality and seed loss due to germination) varied from 22% in MI to 45% in MN for common lambsquarters, from 50% in IL to 95% in MN for giant foxtail, and from 18% in IL to 85% in WI for velvetleaf. Annual rates of seedbank decline ranged from 30% in MN to 80% in WA for common lambsquarters, from 70% in MI to 95% in MN for giant foxtail, and from 30% in OH to 90% in WI for velvetleaf. During both burial periods, significant depth by species interaction effects ($P < 0.001$) indicated that seedbank decline for ABUTH and CHEAL was greatest at the 0 cm depth and lowest at the 10 cm depth, whereas seedbank decline for SETFA did not vary in a consistent way with depth. In multiple regression models for each species, burial depth, precipitation and mean air temperature all made small (< 5%) contributions to explaining variation in overwinter seedbank mortality. Unexplained location effects were consistently the most important variable in the models, explaining up to 45% of the variation in the response variable. A tremendous amount of variation exists in the rate of weed seedbank decline across the North Central Region. To make use of such variation in management strategies, however, additional controlled experiments isolating environmental and management variables will be necessary.