

WHEN DOES TARGETING WEED SEEDBANKS MAKE SENSE? Adam S. Davis, USDA-ARS, Urbana, IL, 61801.

Weed management tactics generally target the seedling stage of the weed life cycle. Controlling weed seedlings reduces the potential for crop yield loss due to weed interference and also has the potential to reduce the number of weed seeds that enter the soil seedbank. Moreover, there are numerous, cost-effective ways of killing weed seedlings. When, if ever, does it make sense to deploy management tactics targeted directly at weed seeds? The weed science literature contains relatively few examples of seedbank dynamics having an impact upon weed management outcomes. This may be due partially to lack of cost-effective methods for seedbank management, and partially to the complex, labor-intensive studies necessary to understand weed seedbanks. To assess the potential for weed seedbank management to influence overall weed management success, a variety of scenarios were run with matrix population models using published values for weed demographic rates. Simulations were performed for two annual weeds of arable fields, giant foxtail and common lambsquarters, a biennial weed of woodland habitats, garlic mustard, and a perennial weed of arable fields, Canada thistle. Scenarios explored how variation in life history, efficacy of control tactics aimed at weed seedlings and plants, fecundity and seed longevity affect the importance of seedbank control measures for reducing weed populations. For giant foxtail and common lambsquarters, over a wide range of conditions, changes in overwinter seed survival had a larger impact on population growth rate than changes in other demographic rates. Survival of dormant seed in summer months had the lowest impact of any demographic parameter on population growth rate of giant foxtail and common lambsquarters. Increased mortality of newly shed giant foxtail or common lambsquarters seed could directly compensate for reductions in efficacy of seedling control for these species. For both garlic mustard, and Canada thistle, survival of rosettes to the flowering stage had the greatest regulatory control over population growth, and survival of seeds in the soil seedbank had the lowest importance. Factors influencing inputs of new seeds into the soil seedbank, however, had an effect on population growth rate that was second in importance only to rosette survival for both garlic mustard and Canada thistle. Simulation models will be useful in developing weed seedbank management strategies that complement control tactics aimed at aboveground life stages.