HOW CAN WE TARGET THE WEED SEEDBANK? Eric R. Gallandt, Assistant Professor, Department of Plant, Soil and Environmental Sciences, University of Maine, Orono, ME 04469-5722.

Strategies to manage the weed seedbank may be considered within the broad categories of reducing seed inputs, increasing seed losses, and reducing the likelihood of establishment. Herbicides and cultivation aim foremost to reduce crop yield loss, but, by reducing weed density and offering a competitive advantage the crop, they further reduce weed biomass and seed inputs. Likewise, cover crops may be planted to preempt niches otherwise occupied by weeds thereby reducing weed biomass and seed inputs. However, the extraordinary reproductive potential of annual weeds suggests that strategies focused solely on reducing seed inputs should be supported by efforts to increase losses from the seedbank and to reduce the probability that remaining seeds establish.

Germination, predation, and decay are the primary sources of loss to the seedbank that may respond to management. Farmers have long prepared stale seedbeds in which shallow soil disturbance encourages germination losses. Decision aides that integrate information about weed biology with real-time environmental conditions could optimize the efficacy of this practice. Post-dispersal seed predation by vertebrate and invertebrate granivores may cause high rates of seed mortality in a wide range of cropping systems, but asynchronous seed dispersal and predator activity and seed burial may limit the overall effect on the seedbank. Although seeds would seem to be an ideal carbon source for soil microorganisms, the evolutionary success of many annual weeds rests in their ability to resist decay and produce a persistent seedbank. Limited evidence from a study of wild oat (*Avena fatua* L.) suggests that decay may be less responsive to management than germination, and likely predation.

A final management objective, supporting a program which aims to reduce seedbank inputs and increase losses, is to reduce the size of the effective seedbank through manipulation of residues and disturbance to reduce the probability of establishment. Incorporation of green manures generally reduce weed establishment whereas larger-seeded or transplanted crops may better tolerate the residue-mediated changes in the chemical, biological and physical properties of the soil surface environment. Evidence from no-till systems further support the hypothesis that changes in soil surface conditions may regulate the abundance of “safe-sites” for weed establishment thereby modulating the size of the effective seedbank.

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