

Symposium

Integrating measurements of seed availability and removal to estimate weed seed losses due to predation

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To better understand seed predation and enhance weed seed losses in arable fields, we developed a conceptual model that integrates seed dispersal, seed burial, and seed demand, the three processes that determine the dynamics of summer annual weed seeds on the soil surface in late summer and autumn. Published and unpublished experimental data were used to parameterize a simulation model for a number of crop–weed combinations. Sensitivity analyses of models for giant foxtail in corn and soybean indicated that factors related to seed availability were more important in determining overall seed losses due to predation than those related to seed demand. Delaying harvest date and destroying unshed weed seeds collected at harvest emerged as promising strategies to reduce seed input into the seed bank. The role of plant debris in hiding weed seeds from predators was ambiguous and requires further investigation. Estimates of overall seed losses due to predation based on model simulations in various crops and cropping systems indicated that weed seed predation could serve as an important tool in ecological weed management.