An ecologically based decision support system for managing leafy spurge (*Euphorbia esula*) infested rangeland

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Abstract:

Successful leafy spurge management depends upon our understanding of plant community response to management. Our object was to use current information and field research to develop an ecology-based computer-driven predictive model designed to aid land managers in making cost-effective and sustainable leafy spurge management decisions. The model is based on a conceptual diagram of a weed population including life history stages (state variables) and the demographic processes that regulate the rates of transition between state variables over a one-year period. Intra- and inter-specific density-dependent regulation of leafy spurge, Kentucky bluegrass, and western wheatgrass, grasses that are often found growing in association with leafy spurge, are included in the model. The model predicts the number of individual spurge plants and grass biomass per unit area every year (generation) for a selected number of years. The impact of weed management was inserted as a selected level of mortality, and a selected level of fecundity reduction was included to simulate biological control. A series of input menus allow the user to describe the plant community being managed and propose management alternatives. The program then provides graphical output of predicted plant community dynamics. Field experiments are being conducted to determine the competitive relationship between leafy spurge, Kentucky bluegrass, and western wheatgrass. Data from natural plant communities will be used to validate the model, collect starting parameter values, and assess site-to-site and year-to-year variation. Information from past research and research conducted by TEAM Leafy Spurge will be incorporated into the model.