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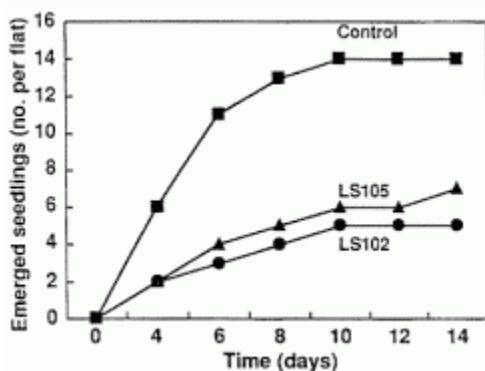
Root-associated microorganisms of leafy spurge as potential biocontrol agents

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Current biocontrol of leafy spurge involves host-specific insects that have successfully reduced infestations in specific habitats and fungal pathogens that require specific conditions to function as mycoherbicides to effectively control established plants. Bacterial components of the rhizosphere that inhibit plant growth, (deleterious rhizobacteria; DRB), and root-associated fungi have not been intensively examined for potential biocontrol activity. We are investigating DRB and root fungi isolated from leafy spurge accessions for growth-suppressive activity toward seedlings and established plants.

Two DRB isolates, LS102 (*Pseudomonas fluorescens*) and LS105 (*Flavobacterium balustinum*), with consistent growth-suppressive activity were selected through primary screening on leafy spurge tissue culture and seedling bioassays (2). Secondary screening of the isolates in soil in the greenhouse resulted in 65 and 50% reduction in seedling emergence by LS102 and LS105, respectively, applied as liquid formulations (Fig. 1). The isolates reduced root development >65% and shoot growth $\approx$ 80% at 21 days after inoculation. Both isolates colonized leafy spurge roots based on culturing on selective media. Root colonization is an important attribute for DRB to persist in the rhizosphere and sustain growth suppression (1).



To further enhance survival and establishment of DRB, calcium alginate formulations have been prepared for delivery of high cell concentrations to the soil and rhizosphere in the field. Preliminary trials in the greenhouse on leafy spurge seedlings and potted plants indicate that the DRB were able to colonize roots and reduce root growth and shoot development comparable to or better than liquid formulations.

Combinations of DRB with selected detrimental root fungi will be examined to assess any improvement of biocontrol efficacy. We plan to field test DRB formulations at sites with high leafy spurge seed/seedling densities and on established plants. DRB and root fungi are primarily growth-suppressive; integrated or “multiple agene” approaches to include these agents with other microorganisms and insects (i.e., *Aphthona* spp.) may be the most effective means for successful biocontrol of leafy spurge.

References

1. Kremer, R. J. and A. C. Kennedy. 1994. Rhizobacteria as biocontrol agents of weeds. *Weed Technol.* 8 (in press).
2. Souissi, T. and R. J. Kremer. 1994. Leafy spurge (*Euphorbia esula*) cell cultures for screening deleterious rhizobacteria. *Weed Sci.* 42:310-315.