Evaluating the Allelopathic Potential of Fine Leaf Fescue

Festuca species, especially tall fescue (*Festuca arundinacea* Schreb.), have long been reported to possess allelopathic properties, which are genotype-dependant. Past research showed that creeping red fescue sod (*Festuca rubra* L. spp. *trichophylla* Gaud or spp. *litoralis* [Meyer] Auquir)—both living and killed—was weed suppressive in comparison to sods of other turfgrass species and residues of cover crops.

Cornell researchers are investigating the development of weed-free turf (seen on the left) without the use of pesticides.

Based on the evaluation of the 80 fine leaf fescue cultivars established for the National Turfgrass Evaluation Program, we observed a consistent difference in weed suppressive ability among the cultivars over two growing seasons. Based on our field analysis, we evaluated the allelopathic potential of several fine leaf fescue cultivars in the laboratory using weed seedling bioassays with agar and sand as growth media. Weed suppressivity was also cultivar-dependant, with four cultivars exhibiting strong inhibitory activity of selected weed seedlings and four cultivars showing less activity.

Examination of the living root system of fescue and surrounding agar showed that the fescue seedling releases significant quantities of growth inhibitors into the rooting environment of developing weed seedlings, resulting in significant growth reductions and chlorosis. Light microscopy revealed that fine leaf fescue seedlings produce tiny golden droplets of exudate. The production of bioactive root exudates is not unique to fescue species; exudates are produced by numerous plants including sorghum.

For chemical and physiological studies, root exudate was collected using a modified capillary mat system, which generated large quantities of healthy root tissue for exudate extraction. All cultivars of fine leaf fescue produce bioactive exudates, but activity and quantity produced varies with cultivar. Presently, we are elucidating the chemical structures of the bioactive substances contained in fine leaf fescue root exudates and their mode of action.

We are currently working with our industry cooperators to select for enhanced weed suppressivity in fescue germplasm, using both traditional and molecular approaches, in an attempt to produce a turfgrass requiring significantly reduced herbicide application for use in home, public or commercial settings.

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Program Spotlight

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