Allelopathy vs. *Acremonium* Endophytes vs. Competition Effect On Crabgrass Suppression by 12 Perennial Ryegrasses

Dr. John King

University of Arkansas

Goals:

- Conduct *Lemna* bioassays for allelopathic effects from leaf-stem and root tissue extracts from field grown plants.
- Conduct crabgrass seedling bioassays by overseeding crabgrass into the field plots.
- Evaluate crabgrass suppression by overseeding the perennial cultivars into a common bermudagrass lawn area and overseeding with crabgrass.
- Conduct crabgrass seedling bioassays by overseeding crabgrass into petri dishes containing the surface 1 cm of soil from a 5 cm diameter plug.
- Determine *Acremonium* endophyte content of field grown plant stems.
- Determine *Acremonium* endophyte contribution to allelopathy in the cultivar(s) showing strong allelopathic effects in the bioassays.

Twelve perennial ryegrasses, which range from moderate to high stand density and 0 to 95 percent endophyte infection, were established into six replications in late October 1993. The cultivars and their expected percent endophyte infection are Loretta (0%), Gator (0%), Derby (5-10%), Derby Supreme (40-45%), Envy (40%), Omega II (76%), Manhattan II (50-90%), Saturn (80%), SR 4200 (80-85%), Brightstar (90%), Assure (95%), and Yorktown III (97%). The plots are maintained with good fertilizer, weed control, irrigation, and 2 cm mowing practices.

Our basic laboratory evaluation for allelopathy is the *Lemna minor* L. (duckweed) bioassay. The *Lemna* bioassay measures allelopathic effects of extracts of plant tissues against the growth rate of duckweed fronds. Extracts from shoots are applied to duckweed cell plates at three concentrations. Loretta, Derby Supreme, Envy and Brightstar inhibited duckweed at certain concentrations. Stimulation of duckweed occurred from most other concentrations and cultivars. Root extracts from Gator, Derby, Saturn, SR 4200, Brightstar and Assure were tested at three concentrations. Full strength extracts from Gator, Saturn and Brightstar stimulated duckweed, but no effects were found from other concentrations.

We have developed a crabgrass bioassay which uses a ryegrass extract-agar. Ryegrass tissue extracts are added to agar in the cell plates then crabgrass seeds are placed on the agar, and seedling germination and development are measured. Problems with procedures to improve crabgrass germination and surface sterilize the seed to prevent fungal contamination have been largely overcome.

Determination of *Acremonium* endophyte content of stem samples from field plots showed actual infection levels different from those expected, so monitoring endophytes is important.

One half of each field was overseeded with crabgrass in March 1994. Crabgrass stands ranged from 16 to 23 percent of plot cover by late June, but the correlation between perennial ryegrass density in May and crabgrass cover was not statistically significant.

The original field plots were overseeded with small amounts of seed from the original seed lots in mid-October 1994. Bermudagrass "fairway" plots were overseeded with new seed lots of the 12 cultivars on October 25, 1994. Half of all plots will be overseeded with crabgrass early next spring and evaluated for crabgrass suppression.