

EFFECT OF TILLAGE ON WOOLLY CUPGRASS POPULATION. Damian D. Franzenburg, James F. Lux, and Micheal D. K. Owen, Ag Specialists and Professor, Agronomy Department, Iowa State University, Ames, IA 50011.

A four year field experiment was initiated in fall, 1998 to determine the effect of tillage management strategy and herbicide treatment on woolly cupgrass population and seedbank dynamics. The split-plot experiment, containing tillage as the whole plot and herbicide treatment as the split-plot, was established near Ogden, IA. The crop rotation was corn and soybean. Treatments were replicated four times.

Whole plot tillage treatments following corn included fall chisel plow, fall disk and no-tillage. Following soybean, these treatments were fall chisel, spring field cultivation and no-tillage, respectively. Spring seed bed preparation included field cultivation on the fall chisel and fall disk plots. Split-plot treatments included a weed-free treatment that received a postemergence herbicide application supplemented with handweeding. The second treatment received an early single postemergence herbicide application with expectations of escaped woolly cupgrass plants returning seeds to the soil seed bank. Herbicide treatments and application rates varied to suite the existing weed spectrums.

Woolly cupgrass seed distributions in the seed bank were determined by soil sampling prior to tillage each fall. Soil samples were subdivided into 0-5, 5-10 and 10-15 cm cores. Woolly cupgrass plants were enumerated prior to implementation of herbicide treatments. Additionally, 10 woolly cupgrass plants per plot were excavated and measured to determine depth from which germination occurred.

Seed bank numbers from 1998, prior to experiment initiation, indicated no differences between treatments. The vertical seed distribution demonstrated that the 0-5 cm depth had significantly higher numbers than the 5-10 and 10-15 cm depths. In 1999, soil sampling revealed that spring disk, averaged over all treatments, had significantly fewer seed numbers than chisel plow and no-tillage treatments. Chisel plow and no-tillage treatments were not significantly different. Woolly cupgrass seed numbers were halved when the single herbicide application was compared to the weed free control. Vertical seed distribution, averaged over all treatments, was highest at 0-5 cm depth. The 5-10 cm depth had significantly higher seed numbers than the 10-15 cm depth. Within the 0-5 cm depth, seed numbers were very high in the no-tillage treatment. Seed numbers in the spring disk treatment tripled with each decrease in soil depth from 10-15 to 5-10 to 0-5 cm. The chisel plow treatment, however, had the highest seed numbers in the 5-10 cm depth, followed by 0-5 and then 10-15 cm.

Plant counts were conducted for 1999 and 2000. As expected, the 2000 weed free treatment demonstrated lower emergence. Tillage treatments did not demonstrate the same trend for emergence and seed numbers; no-tillage plots had the highest 1999 seed numbers but lowest 2000 emergence. Chisel plow and spring disk treatments were similar in 2000 emergence, even though 1999 seedbank counts demonstrated lower seed numbers for the spring disk treatment.

Germination depth was also measured in 1999 and 2000. Chisel plow and spring disk treatments demonstrated similar mean germination depths. The no-tillage germination depths were shallower for both years.