

TIME OF TILLAGE EFFECTS ON WEED COMMUNITIES IN CONTINUOUS SOYBEANS. John Cardina and Catherine P. Herms, Associate Professor and Research Associate, Department of Horticulture and Crop Science, The Ohio State University / Ohio Agricultural Research and Development Center, Wooster, OH 44691.

A weed seedling emergence study was conducted from fall 1996 through fall 2001 to evaluate the long-term impacts of the use and timing of tillage on weed communities in a continuous soybean system. The study was conducted in a 1-ha field at the Ohio Agricultural Research and Development Center near Wooster, Ohio. The field had been in a corn-soybean rotation for three years prior to initiating the study. A 2 x 2 x 2 factorial experiment was conducted in a randomized complete block design with five replications. The three factors were fall field preparation (tillage / no tillage), spring field preparation (tillage / burndown) and the timing of spring preparation (early / late). Tillage consisted of a single pass with a chisel plow, followed immediately by a disking/finishing tool. Fall tillage occurred about two weeks after the first killing frost. Early spring tillage occurred at the earliest practical time the soil was fit for equipment operation, and late spring tillage occurred at the latest practical time for soybean planting. For burndown treatments, glyphosate herbicide was applied up to eight days before planting. Following early and late spring treatments, a glyphosate-tolerant soybean variety was planted at 18-cm row spacing in plots 6.1 m wide and 15.2 m long. Weed seedling emergence was counted immediately before spring field operations and weekly thereafter through the growing season in eight permanent quadrats (30 x 30 cm) per plot. The seasonal total and relative abundance index (RAI = relative density + relative frequency / 2, where relative density = number of weed Y / total number of weeds, relative frequency = absolute frequency of weed Y / total absolute frequency of all weeds, and absolute frequency = number of samples with weed Y / total number of samples) of each weed species was calculated, and data were analyzed using multivariate techniques in PC-ORD (version 4, MJM Software Design). Indicator species analysis was performed using abundance data, and MRBP (blocked multi-response permutation procedures) and cluster analysis were performed using RAI data. Only results from the final year of the study (2001) are reported here.

Twenty nine weed species were recorded in field emergence counts in 2001. Plots clustered into two main groups based upon the timing of spring field preparation. Weed communities in early spring tillage and burndown plots were more similar to each other than to weed communities in late spring tillage and burndown plots, and vice versa. The MRBP analyses confirmed this result, but also indicated an effect of the interaction of the timing and type of spring field preparation on weed community composition. Based upon indicator species analysis, mouseear chickweed (*Cerastium vulgatum* L. CERVU) and wild carrot (*Daucus carota* L. DAUCA) were associated with early spring tillage plots, velvetleaf (*Abutilon theophrasti* Medicus ABUTH) was associated with early burndown plots, common chickweed (*Stellaria media* L. Vill. STEME), common purslane (*Portulaca oleracea* L. POROL), dandelion (*Taraxacum officinale* Weber in Wiggers TAROF) and purple deadnettle (*Lamium purpureum* L. LAMPU) were associated with late spring tillage plots, and field pennycress (*Thlaspi arvense* L. THLAR) was associated with late burndown plots. There was no effect of fall field preparation on weed communities. In summary, both the timing and type of field preparation in the spring had an impact on weed community composition in a continuous soybean system.