EFFECTS OF CROP CANOPY LIGHT INTERCEPTION ON WEED EMERGENCE. Rutendo P. Nyamusamba*, Michael J. Moechnig, Darrell L. Deneke, Graduate Research Assistant, Assistant Professor, Integrated Pest Management Coordinator, Plant Science Department, South Dakota State University, Brookings, SD 57006

Understanding weed germination patterns is important for optimizing weed management programs in most cropping systems. Crop canopies may vary greatly based on crop species, agronomic practices or weather damage. However, there is limited information available regarding the effect of crop canopies on weed recruitment. Some studies suggest that canopy light interception may suppress weed emergence. If so, defining the effect of crop canopy cover on weed germination could increase our understanding of potential weed growth suppression using alternative agronomic practices such as cover crops, planting densities, row spacing and time of planting. Field experiments were conducted at Brookings, SD to 1) quantify the effect of crop canopies on weed germination rates and 2) relate our understanding of weed germination rates to weed management programs in soybeans.

Weed germination rates were quantified in corn, soybeans, spring wheat, field pea, alfalfa and fallow. The crop species treatments were established in an RCB design replicated four times. All crops were planted on May 9, 2007 using local standard agronomic practices for each species. Emerged weeds were counted twice a week for the first month after emergence and weekly thereafter until September 17 in three $1m^2$ subplots in each main plot. Emerged weeds were removed by hand after each counting. Counted weed species included crabgrass (*Digitaria sanguinalis*), foxtail species (*Setaria* spp.), common lambsquaters (*Chenopodium album*), pigweed species (*Amaranthus* spp.), and wild buckwheat (*Polygonum convolvulus*). Leaf area growth was measured for each crop species. Data loggers were used to measure daily soil moisture using a gypsum block moisture sensor (0-5cm below the soil surface) and temperature using a thermocouple (0-2cm below the soil surface) in each plot. Proportional weed emergence was fitted to a sigmoidal equation from which the days to 50% and 90% weed emergence in each crop was determined for each weed species. Weed emergence rates were similar ($P > 0.05$) among weed species and crop environments. However, crop leaf area and soil moisture differed among crop species. These results indicated that crop canopies did not affect weed emergence rates.

Results from the weed emergence experiment were used help explain weed growth and competition in a study regarding the critical period of weed control in soybean. To quantify the critical period of weed control, treatments included weed-free periods of 0, 1, 2, 3, 4 or 5 wks after soybean emergence and periods of no weed control of 2, 3, 4, 5 or 6 wks after soybean emergence. The timing treatments were established in an RCB design with three replications. Results indicated that the critical weed control period was between 2 and 4 wks after soybean emergence. According to the weed germination experiment, this time period would correspond to approximately 45-65% weed emergence. Although weeds that emerged after the critical period of weed control did not cause significant soybean yield loss, weed biomass was still produced. Weeds emerging 2 and 4 wks after soybean emergence produced approximately 270 and 3 g biomass m^{-2}, respectively. These results indicated that including weed emergence predictions with critical periods of weed control may help identify weed management programs that optimize crop yield and minimize weed biomass and seed production.