COMPETITION BETWEEN SOYBEAN AND SICKLEPOD AS AFFECTED BY METRIBUZIN RATE AND TILLAGE

Suzanne Dyal, Graduate Student and Raymond N. Gallaher, Professor, Agronomy Department, IFAS, University of Florida 32611.

Sicklepod (Cassia obtusifolia) is one of the major pests to soybean (Glycine max L. Merr.) in the southern United States. Metribuzin (4-amino-6-tert-butyl-3-(methylthio)-as-triazin-5(4H)-one) is a herbicide that deals with rates of metribuzin and the use of a previous rye (Secale cereale L.) crop residue to control siklepod populations. A comparison of dry matter and energy yields of both the soybean and sicklepod is focused on over their life cycle.

Objectives

1. Evaluate the sicklepod-soybean dry matter accumulation over their life cycle.
2. Determine the competition between soybean and sicklepod for dry matter and total caloric energy.
3. Compare sicklepod-soybean competition as affected by rye straw residue incorporation.

Materials and Methods

Soybean followed rye grain in succession. Rye straw (4000 kg/ha) was incorporated in one treatment, and removed prior to tillage in another. 'Bragg' soybean were planted into a conventional seedbed. Five rates of metribuzin were split plots (0, 0.28, 0.56, 0.84, 1.12 kg active ingredient (a.i.)/ha). Soybean and weed samples were taken five times during the growing season. The data are presented for 0.56 kg a.i./ha metribuzin rate. Whole plant samples of soybean and sicklepod were collected from one-half square meter of each treatment. Dry matter was determined after drying at 70 C. Samples were ground with a Wiley mill to pass a 1 mm screen and stored in air tight containers. Combustible caloric energy was determined using a computerized Adiabatic calorimeter. Regression analysis was performed on data with the following equation: DM or $E=a+bx+bx^2+bx^3$ where DM = dry matter and E = caloric energy. Calories per unit weight was multiplied times plot weight to get total energy per plot.

Results

Dry matter and energy data are presented in Figures 1 through 8. Fitted curves were plotted based on regression analysis.

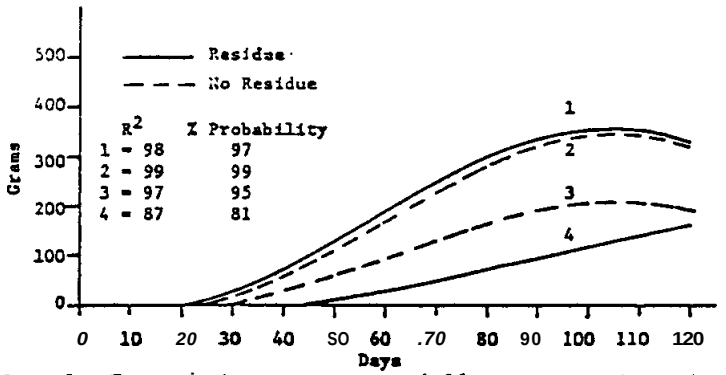
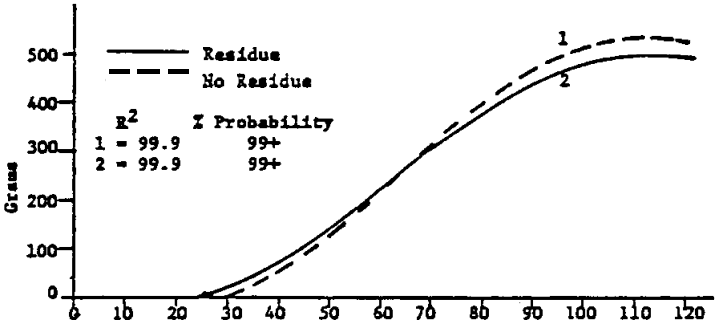
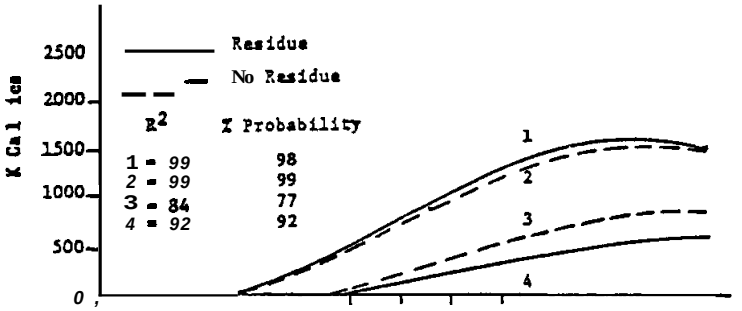


Figure 1. Change in dry matter per one-half square meter for soybean and weeds during the soybean growing season. 1 and 2 = soybean; 3 and 4 = weeds.





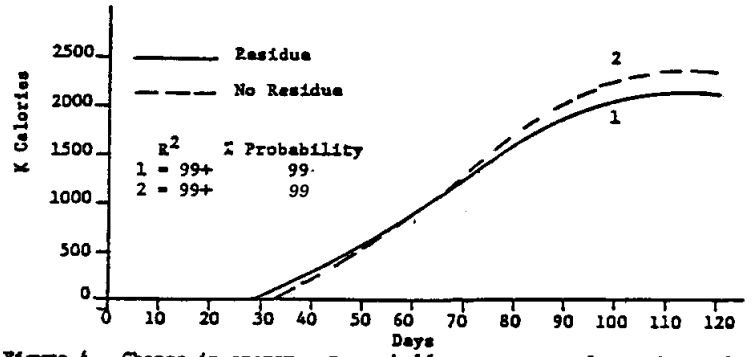


Figure 4. Change in energy per one-half square meter for soybean plus weeds during the soybean growing season.

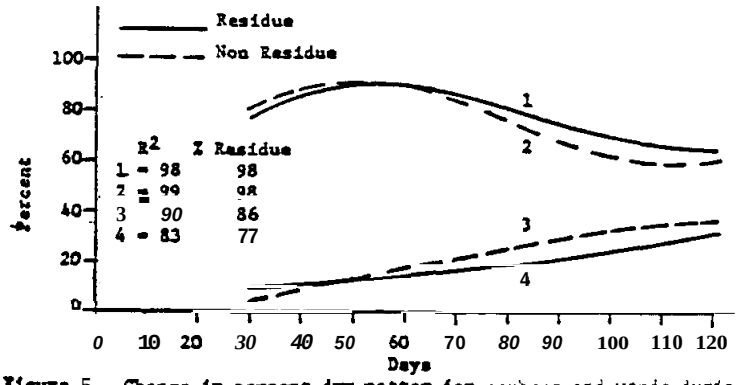


Figure 5. Change in percent dry matter for soybean and weeds during the soybean growing season. 1 and 2 = soybean; 3 and 4 = weeds.

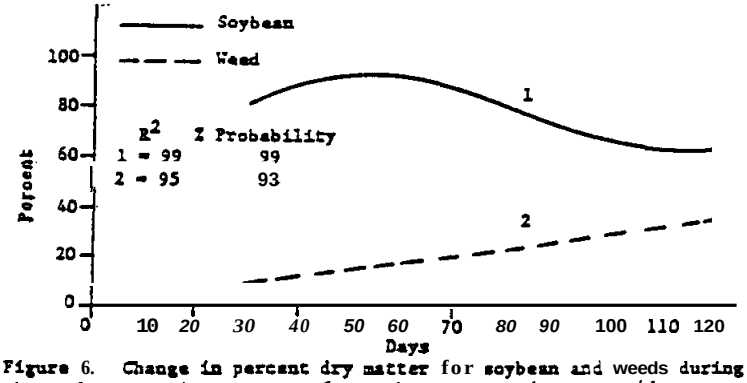


Figure 6. Change in percent dry matter for soybean and weeds during the soybean growing season. 1 = soybean averaged over residue treatments; 2 = weeds averaged over residue treatments.

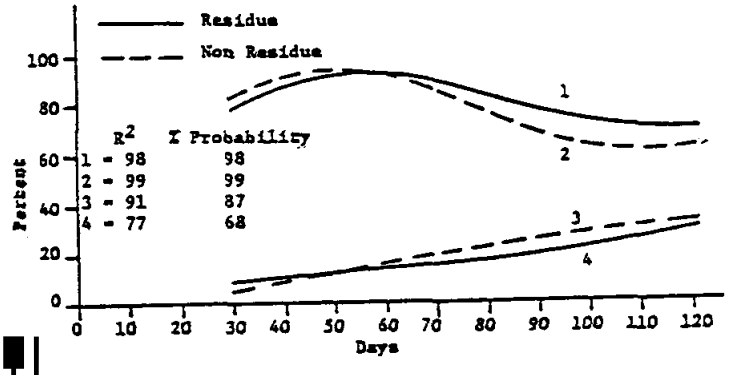


Figure 7. Change in percent energy for soybean and weeds during the soybean growing season. 1 and 2 = soybean; 3 and 4 = weeds.

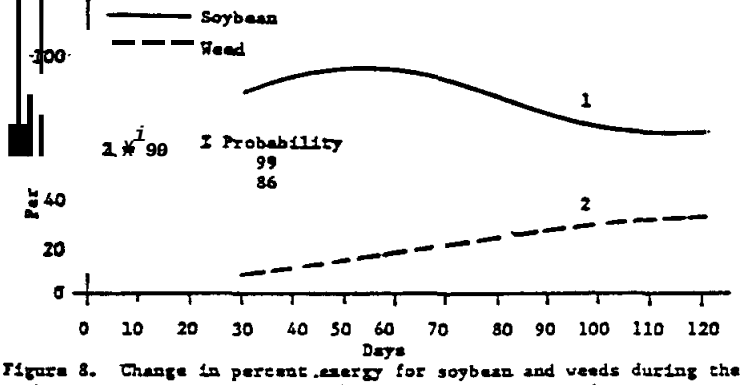


Figure 8. Change in percent energy for soybean and weeds during the soybean growing season. 1 = soybean averaged over residue treatments 2 = weeds averaged over residue treatments.

Conclusions

Residue incorporation had a greater influence on sicklepod than soybean. Residue reduced sicklepod dry matter. Total soybean plus sicklepod dry matter was greater for residue plots for the first 30 days of soybean growth but this relationship reversed for the last 50 days. The higher dry matter in non-residue plots is likely due to moisture stress causing deeper soil penetration of roots. Total caloric energy followed the same trends as for dry matter but had slightly different slopes of change over time. Sicklepod competed very little with soybean during the first 50 days of growth. After 50 days, competition for space steadily increased for sicklepod and caused major competition for soybean. Residue incorporation gave less competition by sicklepod as compared to non-residue. We estimate that soybean energy accumulation was reduced by one-third due to competition of sicklepod.