

Effects of soil moisture management on the growth and yield of soybean (*Glycine max*(L.) Merr.) in different seasons

Y. H. Tsai

Z. J. Chang

Abstract

Field experiments were conducted out from the autumn of 1983 to the spring of 1984 in well drained sandy loam soil. Plants were treated with different soil moisture potentials. In vegetative stage, it was treated with -0.2 Bar, -0.4 Bar, and -0.6 Bar, and -0.3 Bar and -0.6 Bar in reproductive stage.

The results obtained from this experiment indicated that the loss of water in the soil under different crop seasons affected largely by both climatic factors and crop growth. The rate of water loss in the different soil depth was different between autumn and spring crops.

The soil moisture treatments in vegetative stage showed that it was significantly effect on number of pods and plant dry weight in the autumn crop. In R_2 (beginning flower) growth stage, and the plant dry weight of spring crop decreased with the reduction of soil moisture potentials (-0.2 bar, -0.4 bar, -0.6 bar), and it was -0.4 bar -0.2 bar -0.6 bar in the autumn crop. In maturity stage, irrespective to crop seasons, the plant dry weight indicated that the influence was -0.4 bar -0.6 bar -0.2 bar.

The moisture treatments in reproductive stage also showed that large effect on seed weight of spring crop and plant dry

weight of spring and autumn crops. In autumn crop, the plant dry weight of R₅ stage (start to filling) was higher in -0.6 bar than in -0.3 bar. The plant dry weight became higher in -0.3 bar when the plant reached the maturity stage.

Number and weight of nodules were recorded from R₂ stage of spring crop, and both R₂ and R₅ stages of autumn crop. It was found that -0.2 bar treatment gave higher number and weight of nodule than others. The number of nodules in the autumn crop was higher in R₅ stage than in R₂ stage.

In vegetative stage, different soil moisture treatment could affect the nitrogen, phosphorus and potassium contents. The nitrogen content of plant tissues in R₂ stage decreased with the increase soil moisture potentials (-0.6 bar -0.4 bar -0.2 bar). It was reversible reaction when the plant reached R₅ stage. The phosphorus and potassium contents in different plant parts varied in the different crop seasons and plant growth. In spring crop with higher soil moisture potential promoted the phosphorus content of leaf blade and stem of plant. In autumn crop, phosphorus content of seed portion was higher in -0.4 bar treatment. In vegetative stage, the soil moisture potentials also affected the potassium content of different plant parts of autumn crop during maturity, and it was not observed in R₂ and R₅ stages.

Seed yield was higher in -0.4 bar treatment when the soil moisture potentials were treated in the vegetative stage. The higher seed yield was obtained from -0.3 bar treatment when soil moisture potentials treated in reproductive stage.