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Tillage practices and fertilization effects on growth and nitrogen efficiency in soybean

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Abstract

A field experiment was performed to evaluate the effects of tillage systems and fertilizer management on yield and nutrient uptake in Soybean. The plant height, fresh weight and dry weight of conventional tillage were much higher those observed for no-tillage. Significant differences in plant height were observed under tillage practices combined with fertilizer treatment. However, the greatest plant height (128.47 cm) was observed in conventional tillage with chemical fertilizer, and the lowest (45.4 cm) was observed in the no-tillage with green manure treatment. The highest fresh weight (172.4 g) and dry weight (44.1 g) were observed from the no-tillage chemical treatment in the late flowering stage of soybean. The plant concentration of nitrate was higher (2.29%) in no-tillage with green manure than it was with chemical fertilization. However, nitrogen increased steadily in all treatments, and the highest quantity of total nitrogen (476.7 Kg/ha) was observed in no-tillage with green manure. The N content in the soil decreased gradually just after the vegetative stage. Tillage practices and additional fertilizer application had an adverse effect on the uptake of N, P and K in soybean seeds. The nitrogen concentration in seeds was found to be increased in the no-tillage with green manure treatment. The uptake of more nitrogen induced a better yield. Thus, the no-tillage with green manure treatment had the greatest yield, although no significant difference was observed among foliar-applications and additional fertilization. Additionally, the phosphorus and potassium concentrations in seeds remained the same between the conventional tillage and no-tillage treatments. The results obtained in this study indicate that no-tillage strategies with fertilizers may influence the growth characteristics and mineral uptake in soybean.

Keywords: conventional tillage, fertilizer management, no-tillage, nutrient efficiency

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