ABSTRACT

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Management of soil physical properties for the production of maize and cowpea on a heavy clay soil in Guyana.

Studies were conducted to develop a system for the management of the physical properties of a heavy clay soil in Guyana for the production of short term food crops in the wet seasons. Field trials were laid down to test firstly the effect of three tillage systems on the growth of maize and cowpea. The use of vegetative mulches in the soil management system was also evaluated in a series of field trials. Finally the effect of three years of continuous no tillage with mulching for maize and cowpea was compared with conventional tillage.

A comparison of reduced, conventional and deep tillage showed no significant differences in the yield of maize and cowpea. The effect of tillage was very short lived as rainfall caused the tilled soil to slake, swell and subside soon after tillage. All tillage treatments showed similar soil physical properties soon after tillage.

The use of vegetative mulching did not reduce the adverse effects of rainfall on the tilled soil. Vegetative mulching, however, increased cowpea and maize yields under moderate rainfall conditions.

With very high rainfall, mulching caused soil saturation which led to poor crop growth and yield.

In the minor rainfall period, three years of no-tillage progressively enhanced cowpea yield but the yields were not significantly different from the yields of conventionally tilled cowpea. In the major rainfall period, indications are that no-till maize needs improved surface drainage to perform as well as tilled maize. Increased N fertilization has also been shown to enhance no-till maize production. Yield differences were, however, not significant under the two systems.

Three years of no-tilling only slightly improved soil physical properties. The no-till soil had significantly higher organic matter content than the tilled soil on the surface horizon and this is believed to have contributed to the improved soil physical conditions and the improving yields.

The no-till system of crop production is recommended for the clay soils on the coast of Guyana in both wet seasons, provided that improved drainage layout and increased N fertilization levels are investigated.