

Effects of phosphorus fertilisation and mulching practice on soybean yield in the Mid-altitude Zone of Rwanda

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Abstract

In Rwanda, crop productivity is limited by low soil fertility due to continued land degradation, effects of erosion and low utilization of agricultural inputs. Fertilizer use is one of the most important factors to increase crop yield and soil nutrients uptake by plants. The study was conducted to examine the effects of P application and mulching practice on the yield of soybean (*Glycine max* (L.) Merrill) in the mid-altitude zone of Rwanda. Peka-6 soybean variety was evaluated for grain yield response at the farm of the National University of Rwanda during 2012/2013A growing season. The following treatments were tested: application of triple superphosphate as source of phosphorus (40 kg ha^{-1}) (T1), application of rice straw mulch at 11 t ha^{-1} (T2), combination of triple superphosphate (40 kg ha^{-1}) and rice straw mulch (11 t ha^{-1}) (T3) and the control without fertilizers and mulch (T4). The research was laid out in a randomized complete block design (RCBD) with four treatments with four replications. Soybean growth and yield parameters were tested. The number of seeds per pod, the number of seeds per plant and the weight of 100 seeds were increased by P application, mulching and their interaction. Application of rice straw mulch increased the number of pods per plant and number of seeds per pod by 4.8% and 17% ($P=0.008$) respectively. Mulch treatment and its combination with phosphorus increased the number of seeds per plant by 19.7 % ($p < .001$) and 20.5 % ($p= 0.02$) respectively compared to the rest of other treatments. Application of rice straw mulch at 11 t ha^{-1} increased significantly the seeds' moisture content by 35.9% ($p= 0.004$) compared to other treatments. Therefore to improve soybean productivity in loamy soils of Ruhunde station farmers should consider applying sufficient P fertilizers at 40 t/ha and mulch, preferably from rice straw at the rate of 11 t/ha .

Key words: Phosphorus fertilizer, Rice straw mulch, Soybean yield