CONTINUOUS PRODUCTION OF SWEET POTATO ON AN ACIDIC SOIL

A.R. Anuar and T. Jamal

Department of Land Management, Faculty of Agriculture Universiti Putra Malaysia, 43400 UPM, Serdang, Selangor Malaysia

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Introduction

Sweet potato production in Malaysia could not meet the demand for local consumption. Production can be increased through increasing more acreage to be planted with sweet potato and also through the improvement of its yield potential. However, land is becoming scarce in Malaysia and eventually the marginal soils need to be utilised for agriculture expansion. Another alternative is to increase the yield through continuous planting. Sweet potato production by farmers in Malaysia and elsewhere indicated that continuous planting decreased in yield even though the same cultural practices were carried out throughout the successive planting. Research on fertiliser programme and soil management for continuous planting of sweet potato is limited and need to be exploited to increase its yield potential.

Materials and Methods

A factorial 3 (fertiliser) x 2 (EM) field experiment with four replications arranged in randomised complete block design was conducted for three consecutive seasons of sweet potato on an acid soil to evaluate the yield and changes in selected soil physical and chemical characteristics. The treatments include the application of inorganic, organic and a mixture of organic and inorganic fertilisers each inoculated with EM or without EM. The rate of NPK applied for the planting at each season was 100 N, 45 P and 85 K kg ha^{-1}. The rate of organic fertiliser was 20-t ha^{-1}. Liquid organic fertiliser was applied in treatments containing organic fertiliser as a supplement for the required NPK. Fertiliser and EM treatments were applied to the prepared beds one-week before planting. Sweet potato cuttings (var. Gendut) were first soaked with fungicide and later planted at a spacing of 33 cm by 100 cm. Harvesting was carried out three and half months after planting. Soil samples from all experimental plots were collected and analysed for selected physical and chemical characteristics.

Results and Discussion

Fertilisation improved soil aggregate stability from an average of 0.38 to 1.06 stability index and EM inoculation further enhanced this property. Reduction in bulk density was observed only slightly in treatment of organic with EM and lowest in organic+inorganic with EM. Fertilisation with and without EM had improved available water in the soil from an average of 7.10 to 9.23% (v/v). Yield of sweet potato was highly correlated with bulk density. Multiple regression analysis indicated that under optimum available water, the soil physical characteristics that contributed to the yield of sweet potato were bulk density and aggregate stability [Yield = 632 + 41(stability index) - 133 (bulk density)]. Addition of organic fertiliser reduced the Al concentration (1.21 - 1.63 cmol (+) kg^{-1}), increased the soil pH (4.72 - 5.54), organic carbon (18.14 - 21.84 g kg^{-1}) and CEC (5.21 - 8.68 cmol (+)kg^{-1}) of the acid soil. Application of EM to treatments having organic fertiliser also reduced the Al concentration, increased pH, organic carbon and CEC compared with the inorganic treatment with EM. However, when EM was introduced to various treatments, the pH, organic C and CEC tended to be lower than without EM indicating that EM tends to enhance decomposition. After three continuous seasons of planting, treatments with organic fertiliser were able to sustain the yield of sweet potato but treatments with inorganic fertiliser tend to be reduced with each season. Highest yield (645.87g $plant^{-1}$) was obtained with treatment of organic+inorganic inoculated with EM.

Conclusions

EM application affected the yield of sweet potato, selected physical (bulk density, aggregate stability and available water) and chemical (Al, pH, organic C and CEC) characteristics of acid soil. Continuous planting of sweet potato on highly weathered acid soils can be achieved through the addition of organic fertiliser and EM as part of the fertilisation programme.

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