Evaluation of Nitrogen, Phosphorus, Potassium and Magnesium availability in three soils by bioassay

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The availability of N, P, K and Mg in three widespread coconut growing soils, viz., Boralu series, Wariyapola series and Kurunegala series was studied by a pot experiment using *Panicum maximum* as the indicator plant. The treatments comprised of +All (0.16 g ($NH)_2SO_4$, 1.0 g TSP, 0.2 g KCl, 0.1 g Mg $SO_4.7H_2O$ per 2 kg soil in the pot), -All, -N, -P, -K and -Mg respectively. The experiment was in the Randomized Block Design with three replicates. Panicum cuttings were obtained at one month intervals for two years and dry weight was recorded. Panicum cuttings were analyzed for N, P, K and Mg and cumulative removal of those elements were calculated. Percent Relative Yield (%RY) increase was calculated as 100 (Dry matter weight with fertilizer – Dry matter weight without fertilizer) / Dry matter weight without fertilizer.

The %RY values obtained for N fertilizer were 81 %, 34 % and 32 % corresponding to Boralu series, Wariyapola series and Kurunegala series respectively. It showed that response of Panicum to N fertilizer was high on Boralu series while the response was low on other two soils. Panicum showed a low response to P fertilizer application (RY = 30% and 23% respectively) on Boralu series and Wariyapola series while it showed very low (RY = 4 %) response on Kurunegala series. Response of Panicum to K fertilizer application was very low (RY = 12 %, 16 % and 3 %) on Boralu, Wariyapola and Kurunegala series respectively. Response of Panicum to Mg fertilizer was also very low (RY= 16 %) for Wariyapola series and it was extremely low (RY < 1 %) for other two soils. For the *+All* treatment, Panicum showed a very high response (RY = 106 %) on Boralu series while it showed moderate to high response on Wariyapola and Kurunegala series (RY = 77 % and 55 % respectively). The removals of P and K per unit weight of dry matter from all three soils were significantly higher in response to application of respective fertilizers. There was a significant increase in N and Mg removal by Panicum in response to N and Mg fertilizer application only for Boralu series. The nutrient removal data showed that availability of all four nutrients was limiting in Boralu series by only P and K was limiting in other two soils. The results showed that fertility of all three soils in respect of N, P, K and Mg was low but that of Boralu series was much lower than the other two soils. The beneficial effects of application of N, P, K and Mg fertilizers to those three soils on crop improvement appears to be in the decreasing order of Boralu series > Wariyapola series > Kurunegala series.

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