Potassium and Magnesium Interaction in Coconut Growing Soils

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Introduction

Coconut is a perennial crop. Due to prolonged coconut cultivation, essential nutrients may get rapid depletion from the soil. Potassium and magnesium deficiency symptoms are common in coconut plantations than other major nutrients deficiency symptoms (Liyanage, 1999). Unavailability may be due to various factors. Antagonism of potassium and magnesium in the soil is one of the problems of balancing potassium and magnesium in the coconut cultivation. Muriate of potash can be used as the potassium source. Kieserite fertilizer is applied to overcome severe magnesium deficiencies in coconut plantations. Moreover, there is a time separation at least three months in between muriate of potash and kieserite application. However, no any significant impact on the production from this practice has been found. Therefore, this study was planned to study the interaction between potassium and magnesium doing simultaneous applications. The study was conducted as a pot experiment using an indicator plant.

Methodology

Research was carried out in a poly tunnel as a pot experiment using *Panicum maximum* as the indicator plant. Treatments were arranged in a poly tunnel in Complete Randomized Design (CRD). One level of potassium and three levels of magnesium were used in the experiment. Treatment levels were calculated by considering the amount of fertilizer application in the manure cycle.

Coconut growing Madampe soil series (S_1) was used for this study. Representative soil samples were taken from Bandirippuwa Estate, Lunuwila. The soil samples were taken to a depth of 0-10 cm (in top soil) from the centre of the four coconut palms and passed through 2 mm sieve before experiment arrangement. 7 kg of sieved soil was filled into pots. Pots were treated with six treatments as follows;

T1- control
T2 - K 5.6g
T3 - Mg 3.5g
T4 - K 5.6g+ Mg 3.5g
T5 - K 5.6g+ 7g
T6 - K5.6g+ Mg 10.5g

A basal dose at the rate of 2.8g of urea (46% N) and 1.4g of Triple Super Phosphate (46% P_2O_5) per pot had also been applied. Each fertilizer in the different treatments were dissolved in 1000 ml of deionized water and mixed with soil. After 24 hours of fertilizer applications, matured *Panicum maximum* cuttings were planted in each pot (four cuttings per pot).

Soil and leaf samples were taken at regular intervals during the studied period. Both leaf and soil samples were taken 4 weeks after regular intervals for chemical analysis of pH, EC Total K, Mg and Exchangeable K, Mg and Leaf K, Mg.

Results and discussion

The results showed that Exchangeable K and EC were high in all treatments except T_1 (control) and T_3 24 hrs after treatment applications and also decreased within 4-6 weeks (Figure 1). Furthermore, leaf K levels were gradually increased with the time (Figure 2). The lowest K levels of the leaf showed 4 weeks after treatment application. This indicates that availability of exchangeable K just after fertilizer application. Exchangeable Mg and EC were high in all treatments except control and T2 24 hrs after treatment applications. After that exchangeable Mg and EC levels rapidly decreased up to 4 weeks. Then exchangeable Mg again has decreased 8 weeks after fertilizer application except in T6 (Figure 3). Furthermore, Leaf Mg levels have gradually increased. The lowest Mg levels of the leaf showed 4 weeks after treatment application (Figure 4).

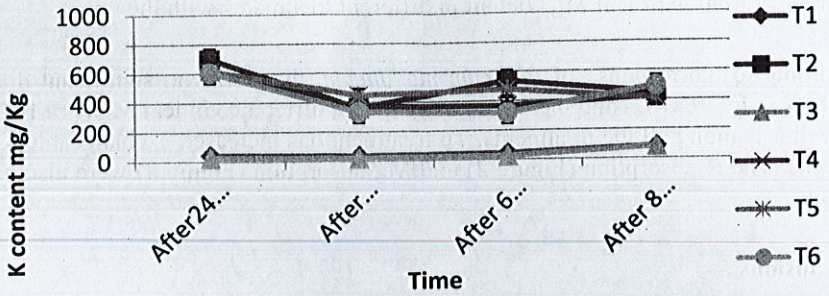

Figure 1: Variation of exchangeable K in different treatments with the time

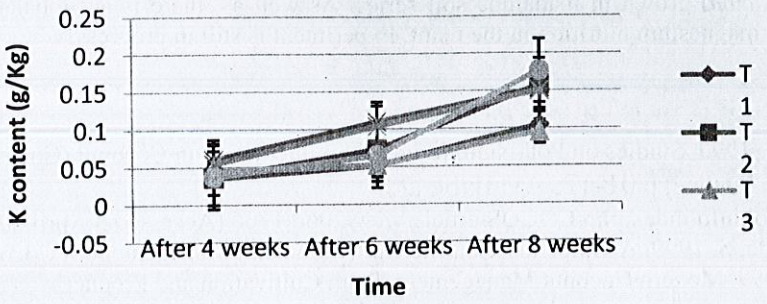

Figure 2: Variation of leaf K content in different treatments with the time

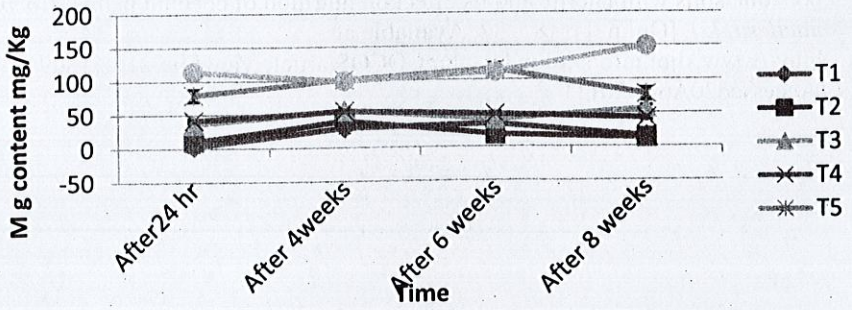

Figure 3: Variation of exchangeable Mg in different treatments with the time

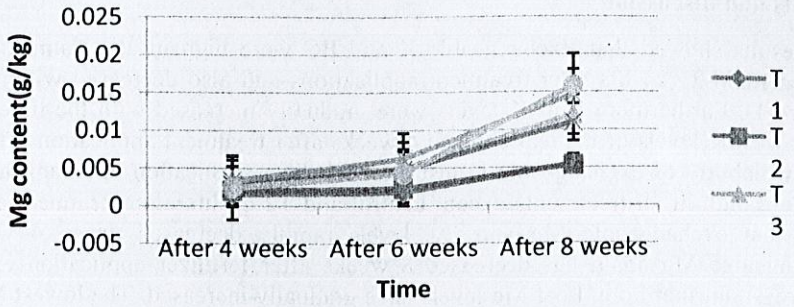

Figure 4: Variation of leaf Mg content in different treatments with the time

According to the response of *Panicum maximcum,* there was no significant difference in leaf K (Pr> F = 0.2762) and there was a significant difference in leaf Mg (Pr> F = 0.00120). As well as, among all the treatments, T6 treatment has increased exchangeable K, Mg after 8 weeks. The K absorption (Figure 2) and Mg absorption (Figure 4) were also high in that period.

Conclusions

It can be concluded that T6 is useful for certain period of time for the indicator plant (*Panicum maxicum*) grown in madampe soil series. As well as, there is an imbalance of potassium and magnesium nutrition in the plant. Experiment is still in progress.

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