ABSTRACT

Potassium is an essential nutrient for plant growth and 135,000 mt of Muriate of Potash was imported as K fertilizers to Sri Lanka in 1990 at a cost of Rs. 871 m. The part played by Potassium (K) in increasing water use efficiency of plants is of major importance for tropical countries. Many researchers have documented that the plants suffering from K deficiency are drought and frost susceptible and less resistance to salinity effects. The objective of this study was to study the effect of Potassium on drought tolerance of Ground Nuts and Chillies in the Noncalcic Brown soils (NCB) of the Mahaweli System B.

This field trial was conducted in the Welikanda Series (highland) of the NCB soils at the Regional Agricultural Research Center, Aralaganwila. Three levels of K (zero, recommended and 50% more than recommended rate) were used with three water regimes (at field capacity, at 50% and 25% depletion levels of available water capacity) in a randomized block design with three replicates. The initial and final exchangeable K content of soil, and plant K content at harvest time was analyzed. The leaf diffusion resistance, shoot water potential and final yield parameters were also measured.

The results indicated that the NCB soils could be categorized as soils having low available water (less than 120 mm/m depth) for irrigation suitability requiring high frequency and low amounts of water. The exchangeable K content of NCB soil was 0.2 me/100 g soil which is likely to show response to K fertilizers as documented for many other soils.

Exchangeable K increased with applied K fertilizers to 1.3 me/100 g soil for the highest level used at the beginning of the cropping cycle. When the final exchangeable soil K was estimated (at harvest) the field capacity moisture regime showed the lower values for all three K levels showing the higher uptake. When the plant K content was determined at harvest time the highest uptake for ground nut plants was at the highest K level and when the soil was at field capacity. This indicates that if ground nut plants are under water stress conditions K uptake will be effected even if the soil K levels are high. When chillie plants were considered the K uptake was high even when soil moisture was limiting showing its ability to absorb K even in water stress conditions when available in fair amounts. When leaf diffusion resistance was measured it increased in both plant species with high K levels under water stress conditions. This is an indication of improved stomatal response to water stress conditions with adequate K levels in plants. Plants supplied with high K content closed their stomatas immediately with imposed water stress which is a drought tolerance mechanism. The shoot water potentials increased with local time of the day from morning to evening but did not show any relation to K contents.

When final yields for ground nuts were analyzed the dry matter production, pod weight and 100 seed weight did not show any significant differences with moisture or potassium content. In chilli plants the dry weight of pods showed a significant difference with soil moisture regimes immaterial with K content. The pod yield was higher in the field capacity treatment than in the moisture stressed treatments. These results shows that

addition of more K improves the drought tolerance of ground nuts and chillies to some extent in NCB soils of Mahaweli System B but more experiments are needed to determine the critical soil and plant levels.