ABSTRACT

FERTILIZER STUDIES ON CARDAMOM (*Elettaria cardamomum* Maton)

H.A.Sumanasena, M.Dharmadasa, W.D.L.Gunarathne

Investigations on the effect of applied N, P and K fertilizers on growth, development and yield of cardamom grown under Sri Lankan conditions were the main objectives of these studies. Secondly, the investigation on the effect of applied fertilizer on the incidence level of cardamom stem and pod borer(*Dichocrocis punctiferalis*) was also an objective in this study. Initially two experiments were started at Kabaragala and Gammaduwa in late 1984. Three levels of N (0, 75 and 112kg), three levels of P_2O_5 (0, 75 and 112 kg) and four levels of K_2O (0, 150, 225 and 300 kg)per hectare per year were tested. Another field experiment was started at Dotal Oya in mid 1987 and testing levels were changed on the basis of findings from former experiments. In Dotal Oya experiment, 3 levels of N (0, 60 and 120 kg), 3 levels of P_2O_5 (0, 37.5 and 75 kg) and 4 levels of K_2O (0, 80, 160 and 240 kg) per hectare per year were tested. Experimental design was factorial in RCBD in each case. Fourth experiment was started in a new plantation at midland in 1989. The testing condition were all similar to that of Dotal Oya but only two levels of P_2O_5 (0, and 75 kg/ha/yr) were being tested. A pot experiment was also carried out in a green house at Matale to monitor any effect of applied fertilizer on the level of damage caused by stem and pod borer.

A numerical study carried out with various growth parameters revealed that the number of panicles per clump had the highest direct effect on yield (0.53). Furthermore, it was found that the total number of pseudostems per clump mainly contributes to the yield.

Important growth characteristics have been improved significantly at 112 kg of N/ha/yr($P \leq 0.05$). The response for phosphorus fertilizer was not clear in terms of growth inducement in the Kabaragala site. Growth performances of cardamom plants in the Kabaragala experiment did not show any consistent response for higher doses of K_2O beyond 150 kg of K_2O/ha/yr. The interaction effect of NxK on yield was significant at Kabaragala. Treatment effect on important growth parameters were significant at Dotal Oya.

Effect of applied P_2O_5 on yield at Kabaragala was negative and it was positive at Dotal Oya. However, available soil phosphorus at Kabaragala was comparatively higher.

Interaction of NxPxK was also significant ($P \leq 0.10$) on yield at Dotal oya experiment. The highest yield (173 kg/ha/yr) was observed at the fertilizer combinations of 120 kg of N, 75 kg of P_2O_5 and 0 kg of K_2O per hectare per year. However, applied K_2O has directly improved some important yield components such as number of panicles per clump, number of pseudostems per clump etc.

The yield and growth performances of cardamom at Kabaragala were substantially higher than that of both Gammaduwa and Dotal Oya irrespective of treatments. Soil N,P,K contents of each Gammaduwa and Kabaragala were similar but relatively low soil N and low soil organic matter contents were observed at Dotal Oya. However, total water holding capacity of kabaragala top soil (0-30 cm) is 41.07 mm. While Gammaduwa and Dotal Oya were having 30.02 mm and 33.75 mm respectively. Furthermore, soil profile is deep only at Kabaragala. According to the evaporative demands and soil physical properties of each location, 10 consecutive dry period seems to be effective for cardamom in both Gammaduwa and Dotal Oya.The longest growing season was observed at Kabaragala while both of other locations had shorter growing season in an year. This fact is responsible for great yield variations among locations.

The effect of P_2O_5 application was significant on the oil percentage of capsule and the highest mean oil percentage was observed at the level of 75kg of P_2O_5 /ha/yr at Kabaragala.

Treatment effect on the level of stem borer damage was not consistant in the greenhouse. In general, level of cardamom stem borer infestation was lower at combinations of high levels of K_2O with any level of other two nutrients but without zero. i.e...$N_2P_3K_4$, $N_3P_3K_4$ etc. overall observations on incidence of pest damage suggest that the application of balance fertilizer mixture could maintain a nominal damage level.

Application level of 120 kg of N, 75 kg of P_2O_5 and 80 kg of K_2O per hectare per year could be recommended as a suitable mixture on the basis of overall observations.Available soil potassium of each locations were equal and other soil properties were different. This leads us to reduce the recommended potassium level in the mixture for the time being.