

Response of cardamom (*Elettaria cardamomum* Maton) to NPK under uniform shade

S M SHANTHAVEERABHADRAIAH, H M CHANDRAPPA & B JAGANNATH

University of Agricultural Sciences (Bangalore)

Regional Research Station

AICRP on Spices, Mudigere - 577 132, Karnataka, India.

Abstract

Experiments conducted during 1987-94 at Mudigere (Karnataka, India) to study the response of different levels of N, P and K on the yield of cardamom (*Elettaria cardamomum*) under uniform shade indicated that increasing N up to 100 kg/ha resulted in a significant increase in capsule yield. Application of P at 50 kg/ha had a positive effect on yield; further increase of P up to 100 kg did not give significant results. In the case of K, significant increase in yield was observed up to 100 kg/ha. The effect of NPK levels on yield component factors such as suckers and panicles varied from year to year.

Key words: cardamom, *Elettaria cardamomum*, NPK, yield.

Introduction

Cardamom (*Elettaria cardamomum* Maton) is cultivated in the hill zone (high ranges) of Western Ghats in Karnataka, India in an area of 33,750 ha with a production of 1700 t. The productivity of the crop in Karnataka is only 66 kg/ha as against a national average of 120 kg/ha (Spices Board 1996). Inadequate supply of nutrients through fertilizers and leaching of nutrients due to heavy rainfall are major factors limiting the productivity of cardamom in Karnataka. Hence, fertilizer application is inevitable to increase cardamom yields. However, many of the fertilizer trials in cardamom were either

inconclusive or inconsistent since they were laid out under natural shade due to the addition of nutrients to the soils through leaf litter. Hence, experiments were undertaken to study the response of cardamom to different levels of N, P, K fertilizers on growth and yield under uniform artificial shade (nylon mat).

Materials and methods

The experiment was conducted at the Regional Research Station, Mudigere (Karnataka, India) during 1987 to 1994, under artificial shade (20 K lux). The soils were red loamy (pH 5.1) with a soil fertility status of: organic carbon 0.72%; P_2O_5 - 4.2 kg/ha and K_2O - 324 kg/ha. The treatments included three levels of

nitrogen, phosphorus and potassium (0 : 0 : 0 ; 50 : 50 : 100 ; 100 : 100 : 200 kg NPK/ha). The design was Randomised Block of Factorial Experiment with three replications (27 treatment combinations).

Mudigere-1, a high yielding variety (clone of cardamom) was used for planting at 1.8 m x 0.9 m spacing (6000 plants/ha). The planting was done in pits during *kharif* 1987. In each treatment six plants were maintained. Fertilizers were applied every year in two equal splits during pre monsoon (May) and post monsoon (October) periods as per treatment schedule. The

fertilizers were applied in the form of urea, rock phosphate and muriate of potash. The crop started yielding from 1989 onwards (2 years of planting). Data on production of suckers and panicles produced and yield were recorded for 6 years. The crop was irrigated during summer to overcome drought.

Results and discussion

The response of cardamom to NPK levels on sucker and panicle production was varied. The effect of N was significant during all the years, whereas P levels exhibited variable response year

Table 1. Effect of NPK fertilizer levels on production of suckers in cardamom

Treatment	Suckers/clump					Pooled mean	
	1989	1990	1991	1992	1993	1994	
N level (kg/ha)							
0	26.0	9.7	8.6	11.8	6.1	7.8	11.6
50	27.5	9.5	9.8	14.2	7.8	10.1	12.6
100	27.6	10.6	11.1	14.7	10.0	11.3	13.6
P level (kg/ha)							
0	26.8	10.4	9.5	13.1	7.3	9.0	11.1
50	27.3	9.4	9.8	13.6	7.9	9.8	12.5
100	27.5	10.0	10.2	14.0	8.6	10.4	12.9
K level (kg/ha)							
0	25.1	9.9	9.5	12.9	7.6	9.7	11.9
100	27.5	10.5	10.2	13.7	7.9	9.7	12.7
200	29.0	10.4	9.9	14.2	8.4	9.8	13.3
CD at 5 %	NS	NS	1.0	1.5	0.9	1.1	1.3
Interaction							
NP	-	-	-	-	-	-	-
NK	-	-	-	-	-	-	-
PK	-	-	-	-	-	-	-
NPK	-	-	-	-	-	-	-
CD at 5%	NS	NS	NS	NS	NS	NS	NS

NS = Non significant

Table 2. Effect of NPK fertilizer levels on production of panicles in cardamom

Treatment	Panicles/clump					Pooled mean	
	1989	1990	1991	1992	1993	1994	
N level (kg/ha)							
0	48.0	6.0	7.9	12.9	8.7	9.7	15.5
50	48.5	6.5	12.5	15.5	10.7	11.8	17.6
100	50.1	8.1	17.1	16.7	13.7	13.9	21.2
P level (kg/ha)							
0	48.1	7.1	10.2	14.2	10.0	11.4	16.8
50	53.3	7.2	12.5	15.0	11.0	11.7	18.4
100	53.2	6.4	14.9	15.9	11.7	12.4	19.1
K level (kg/ha)							
0	49.8	6.3	12.0	14.6	10.8	11.5	16.5
100	49.8	7.2	12.9	14.8	10.6	12.1	17.9
200	51.8	7.1	12.7	15.7	11.2	11.8	18.5
CD at 5%	NS	1.7	1.5	1.6	1.0	1.3	1.8
Interaction							
NP	-	-	20.3	-	NS	-	-
NK	-	-	-	-	-	-	-
PK	-	-	-	-	-	-	-
NPK	-	-	-	-	-	-	-
CD at 5%	NS	NS	2.6	NS	NS	NS	NS

NS = Non significant

to year. Regarding response of K levels, there was no significant effect during all the years to any of the levels probably due to higher K content in the soil (Tables 1 & 2).

The capsule yield of first years harvest was higher when compared to the successive years mainly due to the availability of more number of suckers per clump accumulated during the first 3 years of crop growth which resulted in more number of panicles and capsules.

The results obtained for the first two

years (1989 and 1990) were non significant to different levels of NPK on yield and yield contributing factors (suckers and panicles) probably due to the initial soil fertility status. During the remaining 4 years (1991-94), the response was significant for different NPK levels on the yield of cardamom. Increasing N up to 100 kg/ha resulted in marked increase in capsule yield (1030 kg/ha-wet weight). Application of P had positive effect on capsule yield up to 50 kg/ha and further increase up to 100 kg did not give significant results, both levels

Table 3. Effect of NPK fertilizer levels on yield of cardamom

Treatment	Yield* (kg/ha)					Pooled mean	
	1989	1990	1991	1992	1993	1994	
N level (kg/ha)							
0	2806.0	302.0	139.0	188.0	373.0	242.0	675.0
50	2817.0	346.0	412.0	329.0	580.0	339.0	804.0
100	3225.0	479.0	635.0	530.0	840.0	471.0	1030.0
P level (kg/ha)							
0	2965.0	379.0	372.0	297.0	527.0	303.0	726.0
50	2859.0	418.0	366.0	348.0	599.0	360.0	808.0
100	3024.0	330.0	448.0	401.0	667.0	389.0	877.0
K level (kg/ha)							
0	2776.0	351.0	398.0	320.0	552.0	321.0	777.0
100	2982.0	355.0	384.0	358.0	610.0	366.0	843.0
200	3088.0	421.0	405.0	368.0	631.0	365.0	880.0
CD at 5%	NS	NS	73.9	37.2	65.2	31.9	99.0
Interaction							
NP	-	-	-	675.0	-	557.0	-
NK	-	-	-	-	-	-	-
PK	-	-	-	-	-	428.0	-
NPK	-	-	-	-	-	-	-
CD at 5%	NS	NS	NS	64.4	NS	55.3	NS

* Fresh yield

NS = Non significant

of 100 and 50 kg/ha being at par (Table 3). According to Natarajan & Srinivasan (1989) application of N at 40 kg/ha and P_2O_5 at 80 kg/ha significantly increased the yield of cardamom. In case of K levels, the yield increase was observed only up to 100 kg ha; further incremental dose of 200 kg/ha did not give a significant response. Interaction effects on yield of cardamom between N and P were observed during 1991 and 1994 and between P and K during 1994.

References

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