https://doi.org/10.29321/MAJ.10.A03202

Madras agric. J. 64 (6) : 363—368, June, 1977

Effect of Application of Different Levels of Potash on the Yield of Dwarf Cavendish Banana

N. RAMASWAMY[1], S. SUNDARARAJAN[2] and MD. A. KADER[3]

The effect of increase in the level of soil application of potash to Dwarf Cavendish banana was found to be significant to the level of 450 g per plant for leaf area, sucker production, yield of the bunch, number of hands/bunch, number of fruits/bunch and size of the fruit at harvest. A significant correlation was obtained for the plant characters with yield. The results of the present studies suggest that application of 450 g of potash per plant may be optimum for increased production in Dwarf Cavendish banana in Tamil Nadu.

The fertilizer dose followed by the growers of Tamil Nadu for banana are 110:40:330 kg N, P, K, per acre per year, while in some banana growing tracts 750 kg of standard fertiliser mixture is used. The effects brought out by these fertilizers are not uniform since these fertilizer recommendations are not based on any trials. The variety Dwarf Cavendish (*Musa* AAA) is popularly grown in Tamil Nadu due to its heavy yield per unit area and ready market. Any attempt to improve the yield potential with the application of potash will be of value. Trials were undertaken to study the effect of different levels of potash on the yield and quality of fruits at the Agricultural College and Research Institute, Madurai during 1971-72 for two seasons.

MATERIALS AND METHODS

The trial was conducted on the variety Dwarf Cavendish banana planted at 2.4 m spacing adopting 5 X 5 Latin Square with five levels of potash treatments viz., 0, 250, 350, 450 and 550 g K_2O per plant, while the levels of nitrogen and phosphoric acid were kept constant, the levels being 170 g N and 86 g P_2O_5 per plant. Fifteen kg of FYM manure was applied uniformly to all the plants as a basal dose. The fertilizers were applied in two split doses viz., at the third and fifth month following planting.

Biometric observations were made for characters given in the Table I and II. The leaf nutrients were also analysed. The third leaf from the crown was selected for leaf analysis. The bulk samples were dried, powdered immediately and analyed for total N, P, K, Ca and Mg (Twyford and Coulter, 1964) using the conventional methods.

Analytical Procedures

1. Total Nitrogen - Bremner, (1960)

2. Phosphorus - Klett's Summerson colorimetric method

1—3 : Department of Horticulture, Agricultural College and Research Institute, Madurai.

Koeing and Johnson (1942)

3. Potassium - Flame Photometric method, Jackson (1958)

4. Calcium and Magnesium - Titration method, Jackson (1958)

RESULTS AND DISCUSSION

It was observed that the level of potash viz., 350 and 450 g per plant (Table I) have increased the pseudostem height, girth, leaf area and sucker production. The trend of earliness in bunch emergence was noted in the level of 250 and 350 g per plant, while the earliness in harvest was noted with 250 g per plant. Though there was variation in the results the level of 450 g per plant has shown significance in the yield components.

Such an earliness due to potash application has been reported by Ho (1969) and Steinhausen (1957). But Randhawa *et al.* (1973) have observed that there was no significant result due to the application of varying levels

TABLE I. Effect of Potash on Morphological Characters of Dwarf Cavendish Banana (Seven months following planting)

Treatment g/plant	Corm@ weight (kg.)	Pseudostem height (cm)	Pseudostem girth (cm)	Leaf area sq. cm	Sucker production (Nos.)	Leaf longivity (days)	No. of days from planting to flowering	No. of days from flowering to harvest
K_0 : 0	0.868	93.90	36.65	3421	3.20	152.80	252.60	106.5
K_1 : 250	1.405	102.65	38.45	4535	3.05	141.53	300.25	88.9
K_2 : 350	1.245	107.55	40.80	4626	3.60	145.75	300.75	94.0
K_3 : 450	1.095	99.20	39.80	49.52	5.10	150.15	305.45	93.9
K_4 : 550	0.963	106.70	38.90	4624	2.95	152.00	307.25	89.7
CD (P=0.01)	NS	2.08	1.17	179	0.44	NS	5.93	8.39

@—at the time of planting NS—Not Significant

TABLE II. Effect of Potash on the Yield and Fruit Characters of Dwarf Cavendish Banana

Treatment g/plant	No. hands per bunch	No. of fruits/ bunch	Bunch weight (kg)	Length of fruit at harvest (cm)	Mid circumference of fruit at harvest (cm)	Bunch length (cm)
K_0 : 0	5.60	71.25	6.245	10.59	9.15	26.81
K_1 : 250	5.45	52.25	5.875	8.97	9.87	31.35
K_2 : 350	5.15	48.00	5.515	10.53	9.91	32.00
K_3 : 450	8.15	98.95	12.525	15.78	11.48	30.57
K_4 : 550	4.40	43.75	4.800	10.93	10.08	29.95
CD (P=0.01)	1.15	8.91	1.685	2.29	NS	NS

NS—Not Significant

of potash. The results obtained in the present studies indicated that banana is a gross-feeder of potash and during the time of initiation and differentiation of flower bud, it needs heavy amount of potash (Summerville, 1944).

The results presented in Table II have clearly indicated the profound influence of 450 g potash per plant in increasing the bunch weight, number of hands per bunch, number of fruits per bunch and the length of the fruit. It is observed that the above level is adequate to enhance the yield potential of Dwarf Cavendish banana. Such results were reported by Ho, (1969), Yang and Rao (1962) and Steinhausen (1957).

From the data presented in Table III, it may be observed that the level of

TABLE III. Effect of Potash on N, P, K, Ca and Mg content of leaf (per cent)

(Dry weight basis - Seven months following planting)

Treatment (g/plant)	N	P_2O_5	K_2O	Ca	Mg
K_0 : 0	1.93	0.20	1.32	1.92	0.14
K_1 : 250	2.51	0.39	1.92	1.92	0.21
K_2 : 350	3.10	0.50	2.74	2.39	0.22
K_3 : 450	2.30	0.52	2.92	2.42	0.19
K_4 : 550	2.32	0.30	2.10	2.10	0.20

450 g per plant resulted in the accumulation of more leaf nutrients than the rest of the treatments. Twyford and Coulter (1964) recorded considerable increase in the leaf K level due to potash application. Bolond (1959), and Twyford and Coulter (1964) suggested an adequacy level for leaf K about 3.8

TABLE IV. Correlation Coefficients Between Bunch Weight and Plant Characters

Characters	Co-efficient of correlation	Prediction Equation
Pseudostem height	-0.2337*	Y=20.39-0 1315X
Pseudostem girth	0.07668 NS	
Leaf area	0.2923 *	Y= -0.36+0.0016X
Sucker production	0.6356 **	Y= -7.27+2.0511X
Leaf longivity	0.0698 NS	
Earliness of flowering (days)	0.1577 NS	
Earliness of harvest (days)	0.1561 NS	

* Significant at 1% level, ** 5% level
NS = Not significant.

to 4.0 per cent. In the present studies none of the levels have reached the adequacy levels reported by the previous workers. It may be attributed to the variation in climatic conditions and the poor fertility status of the soil.

It may be observed from the Table V that there was progressive increase in

TABLE V. Effect of Potash on quality of Dwarf Cavendish

Treatment (g per plant)	Total soluble solids	Percent Reducing sugar	Non-reducing sugar	Starch	Total carbohydrate	Acidity (N NaOH) to neutralised 100g. pulp
K_0 0	16.0	12.3	2.3	1.1	16.3	4.2
K_1 250	16.2	12.5	2.3	1.0	16.7	3.9
K_2 350	16.6	12.7	2.4	1.3	15.8	2.9
K_3 450	15.6	13.0	2.4	1.2	16.8	3.8
K_4 550	16.7	13.2	2.4	1.4	16.9	2.9

TABLE VI. Production Economics for Dwarf Cavendish for 1000 plants/acr

Particulars	Rupees K_0	K_1	K_2	K_3	K_4
I. Production :					
1. Preparatory cultivation					
a. Ploughing 3 times	50	50	50	50	50
b. Digging pits	75	75	75	75	75
2. Manures and Manuring					
a. Cost of 25 cart loads of Farm Yard manure	125	125	125	125	125
b. Cost of nitrogen	—	420	420	420	420
c. Cost of Phosphorus+potash	—	636	744	853	961
d. Labour for application	100	100	100	100	100
3. Planting material & planting					
a. Cost of 1200 suckers at Rs. 25/- per 100	300	300	300	300	300
b. Preparing & planting the suckers	50	50	50	50	50
4. After cultivation					
a. Four digging+Two surface weeding	100	100	100	100	100
b. Pruning the suckers	25	25	25	25	25
c. Plant Protection	75	75	75	75	75
5. Irrigation					
a. Guiding water	50	50	50	50	50
b. Water charges	150	150	150	150	150
6. Harvesting					
Harvesting charges	50	50	50	50	50
Total Expenditure	1150	2206	2214	2423	2531
II. Receipts :					
1. Cost of one bunch	3.00	5.00	7.5	7.5	7.00
2. Receipts from 1000 bunches	3000	5000	7000	7500	7000
3. Receipts from suckers	500	700	1000	1000	1000
4. Gross income	3500	5700	8000	8500	8000
DEDUCT					
5. Cost of cultivation	1150	2206	2214	2423	2530
6. Net profit per acre	2350	3494	5789	6077	5469

the percentage of total solids, reducing sugars, non reducing sugars, starch and carbohydrate with the increase of potash, while there was reduction in acidity in the treatment 450 g per plant. Freiberg and Steward (1960) and Bhangoo and Karon (1962) have also observed the influence of potash increasing the quality of banana.

The production economics with the levels of potash application revealed that the cost of K_2O (450 g) was economical compared to the other levels of potash. The additional income obtained through increased yields was Rs.6077/-. Thus the application of 450g per plant was found to be profitable and economical among the treatments.

It is apparent that a positive relationship between the yield and other plant characters was obtained. Reference to the curvilinear equation for yield with pseudostem height, leaf area and sucker production be further fitted up in the form of equations respectively thus:

1. $Y = 20.39 - 0.1315\,X$
2. $Y = -0.37 + 0.0016\,X$
3. $Y = -7.27 + 2.0511\,X$

where Y=yield of the bunch weight in Kg and X = the plant character viz., pseudostem height, leaf area and sucker production.

The present studies have indicated that the level of 450 g of potash in combination with 170 g of nitrogen and 85 g of potash/plant gave significant increase in the yield of banana.

The authors are graetful to Dr. C.V. Govindaswamy, Dean, Agricultural College and Research Institute, Madurai for his keen interest throughout the study and to the staff of the Department of Statistics, Tamil Nadu Agricultural University, Coimbatore for their help in analysing the data.

REFERENCES

BREMNER, J. M. 1960. Determination of nitrogen in soil by Kjeldahl method *J. agric. Sci.* **55** : 11-33.

FREIBERG, S. R. and F. C. STEWARD. 1960. Physiological investigations on the banana plant. iii. Factors which affect the nitrogen compounds of the leaves. *Ann. Bot. Lond.* **24** : 147-57.

BOLOND, D. 1959. Report of the analyst. *Ann. Rept.* 1960. *Banana Board Res. Dept.* Jamaica. p. 16.

BHANGOO, M. S. and M. L. KARON. 1962. Investigations on the Giant Cavendish banana. II. Effect of minor elements and dolomite lime on fruits yield. *Trop. Agr. Trin.* **39** : 203-310.

HO, C. T. 1969. Studies on correlation of Banana fruit yield with leaf K content. *Fertilite* **33** : 19-29.

JACKSON, M. L. 1958. *Soil Chemical Analysis.* Prentice Hall Inc. Englewood Cliffs, N. J.

KOEING, H. A. and C. R. JOHNSON. 1942. Colorimetric determination of Phosphorus in biological materials. *Industr. Eng. Chem. Chem.* (Anal. Ed) **14** : 155

BANDHAWA, G. S., C. B. SHARMA, R. R. KOHLI and E. K. CHACKO. 1973. Studies on nutrient concentration in leaf tissue and fruit yield with varying planting distances and nutritional levels in Robusta banana. *Indian J. Hort.* 30 : 467-74.

STEINHAUSEN, V. 1957. Die Banana Anba and Dunging. *Rutr. Stickstoff.* A. G. Bochum.

SUMMERVILLE, W. A. T. 1944. Studies on nutrition as qualified by development in *Musa cavendishii* Lambert. *Od. J. Agric. Sci. 1* : 1-127

TWYFORD, I. T. and J. K. COULTER. 1964 Foliar diagnosis in banana fertilizer trials. *Proc. 4th Collog. Pl. Anal.* and *Fertilizer Problems* 4 : 357.

YANG, P. S. and P. T. RAO. 1962. Studies on the effect of potash on banana. *Soils and Fert.* Taiwan 77-79.