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EFFECT OF N AND K IN COLEUS

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Abstract: The effect of N and K and their lime of application in coleus revealed that N at the rate of 60 kg/ha was sufficient to produce higher tuber yield, high dry matter yield, maximum bulking rate and maximum utilisation index. Highest yield of tuber and highest dry matter yield per ha were obtained at the rate of 120 kg foO/ha. Split application of nutrients was found to be the best method for obtaining higher weight of marketable tubers, higher tuber yield per plant, maximum dry matter yield and highest tuber yield.

INTRODUCTION

Coleus *(Coleus parviflorus),* an important minor tuber crop, is effectively cultivated as an intercrop in coconut gardens, in rabi season. It can be used as a substitute for potato and its food value compares favourably with most of the other tubercrops. In this study, an attempt is made to work out the requirements of N and K for this crop.

MATERIALS AND METHODS

The experiment was laid out in a factorial 5^2 x 2 RBD with two replications at the College of Agriculture, Vellayani, Trivandrum. The treatments included five levels each of N and K viz., 0, 30, 60, 90 and 120 kg/ha and two times of application viz., (1) entire dose as basal and (2) half N and K as basal and the other half 30 days after planting. P at the rate of 30 kg/ha was applied uniformly to all plots. Observations were recorded on morphological characters and yield and yield components. Bulking rate (increase in fresh weight of tubers (g) per plant per day) and utilisation index (ratio of the weight of tuber to top weight) were also assessed. Protein and starch contents in tubers were also estimated.

RESULTS AND DISCUSSION

In general, N application had significant influence on most of the morphological characters like plant height, number of branches, number of leaves and leaf area index whereas K did not influence these characters very much (Table 1). The nutrients had significant effect on yield and yield components. There was increase in yield of tubers per plant (both number and weight) with increasing levels of N application, the maximum being at 120 kg/ha. In the case of K, higher levels (60 to 120 kg K_2O/ha) were on par and superior to 30 kg and control in both aspects (Table 2).

There was in general an increasing trend in number, weight and percentage weight of marketable tubers by the application of N which indicated that N application helped in converting more numbers of roots into storage organs. With regard to K, application of 120 kg K_2O/ha produced maximum weight of marketable tubers.

There was increase in yield of tubers with increasing levels of N. For coleus it will be sufficient to apply 30 kg N/ha to give a substantial yield per kg of N after which the increase in yield was reduced. N

Table 1. Effect of N on morphological characters of coleus

Sl No.	N levels (kg/ha)	Plant height (cm)	No. of branches	No. of leaves	Leaf area Index
1	0	13.3	11.4	82.6	2.4
2	30	17.3	14.8	103.5	2.8
3	60	17.4	15.6	115.3	3.6
4	90	17.6	17.6	121.3	3.8
5	120	18.0	17.6	122.3	5.1
CD (0.05)		1.44	2.65	16.9	0.86

can be applied to a maximum of 60 kg/ha for total tuber yield which was on par with higher levels. Similar trend was noticed in bulking rate, utilisation index and number and weight of tubers also (Table 2).

The role of K in tuberization has been substantiated in this experiment by the uniform increase in tuber yield when the nutritional level was proportionately increased. Application of 120 kg K_2O/ha produced the maximum tuber yield and was significantly superior to the lower levels of K (Table 3).

In the presence of higher level of 120 kg K_2O/ha, levels of N viz., 60, 90 and 120 kg N/ha were found to influence the yield significantly compared to other combinations as well as control. So coleus crop was found to give substantially higher yields at higher levels of K in the presence of medium level of nitrogen.

Nitrogen had great influence on dry matter yield also. Application of 120 kg N/ha produced maximum dry matter yield which was on par with 90 and 60 kg N/ha (Table 2). An increasing trend in dry matter production was noticed by potassium application (Table 3).

With regard to bulking rate and utilisation index, N 60 kg/ha produced higher values which were on par with 90 and 120 kg/ha. The highest value of bulking rate was given by K at the rate of 120 kg/ha. For higher utilisation index 90 kg K_2O/ha was as good as 120 kg/K_2O. Highest N and K uptake was noticed when the nutrients were applied at the rate of 120 kg/ha (Tables 2 and 3). Dry matter accumulation was higher when N and K were applied in splits rather than in a single basal dose. Split application was found to increase the yield by 19.85% over basal application. The number of tubers was significantly increased by the split application of N and K over single basal application. The weight of tubers was also increased by the split application, though the increase was not significant. Number of marketable tubers was also increased significantly when N and K were applied in split (Table 4). Similar observations were made by Shukla and Singh (1975) in

Table 2. Effect of N on yield, yield components and N uptake in coleus

N levels (kg/ha)	No of tubers/ plant	Wt. of tuber/ plant (g)	No. of MTP	Wt. of MTP (g)	% wt. of MTP	Yield of tuber t/ha	Dry matter yield kg/ha	Bulking rate	Utilization index	N uptake kg/ha	Starch %	Protein %
0	45.4	106	21.3	43.1	42.2	9.3	2041	1.90	2.12	28.6	82.1	6.35
30	62.1	144	3.4	71.8	41.4	14.9	4800	2.86	2.61	48.7	85.4	8.09
60	88.8	182	4.2	96.9	51.7	16.2	4527	8.50	8.16	56.4	82.8	9.16
90	8.4	171	2.4.4	106.8	6.4	16.9	4400	8.50	8.23	64.7	88.9	9.20
120	96.8	196	58.3	121.3	61.4	17.8	4220	8.99	3.38	75.6	84.2	9.58
CD (0.05)	11.2	44	6.5	5.7	1.2	1.3		8.68	0.56	6.9	NS	0.81

MTP = Marketable tubers per plot

Table 3. Effect of K on yield, yield components and K uptake in coleus

N levels (kg/ha)	No. of tubers/ plant	Wt. of tuber/ plant (g)	No. of MTP	Wt. of MTP (g)	% wt. of MTP	Yield of tuber t/ha	Dry matter yield kg/ha	Bulking rate	Utililisation index	N uptake kg/ha	Starch %	Protein %
0	48.9	106	22.5	49.9	47.0	9.1	3021	1.7	1.68	24.4	26.0	7.8
30	63.9	120	32.9	62.5	49.2	13.6	3744	2.3	2.64	44.6	30.6	7.9
60	84.0	181	46.9	104.1	56.2	15.5	4379	3.0	2.95	53.9	33.7	8.2
90	81.7	209	45.9	106.7	56.9	17.1	4684	3.6	3.43	63.3	39.8	8.6
120	87.6	183	49.5	121.2	57.8	19.7	5134	4.4	3.79	73.3	38.3	8.7
CD (0.05)	11.2	44	6.5	5.7	1.22	1.3	443	0.68	0.56	5.4	2.8	0.81

MTP = Marketable tubers per plant

Table 4. Effect of split application of N and K on yield, yield components and uptake of N and K in coleus

Treatments	No. of tubers/ plant	No. of MTP	Weight of tubers/ plant (g)	Yield of tubers (t/ha)	Dry matter yield kg/ha	Bulking rate	Utilisation index	N uptake (kg/ha)	K uptake (kg/ha)	Protein %	Starch %
Full N and K as basal	66.6	35.5	13.7	3974	2.59	2.69	51.0	45.4	153.2	8.18	32.7
Half N and K as basal *	79.8	43.5	16.4	4411	3.52	3.11	58.6	58.4	167.1	8.39	34.7
CD (0.05)	7.1	4.1	0.85	280	0.432	NS	4.3	5.4	NS	NS	1.8

* Remaining half at 30 days after planting

MTP = Marketable tubers per plant

potato and Singh and Maini (1969) in coleus.

Bulking rate of tubers i.e., increase in weight of tuber per unit time was significantly higher with split application of N and K treatments. However, utilisation index (ratio of tuber weight to top weight) was not much affected by the time of application. N and K uptake was higher when the nutrients were applied in splits. The higher uptake and utilisation of N and K after the tuber initiation stage would have enhanced the bulking rate and carbohydrate synthesis, translocation and accumulation.

Nitrogen had no significant effect on starch content, though a negative correlation was observed with increasing levels of nitrogen application (Table 2). K levels had significant effect on starch content (Table 3). Application of 90 kg K_2O/ha substantially increased starch content in coleus. The maximum starch content was obtained with 30 kg N and 90 kg K_2O/ha. Split application has also been found to be efficient in the production of starch compared to basal application (Table 4).

In the case of protein content, significant difference was observed due to N levels (Table 2). Application of 120 kg N/ha produced maximum protein content which was on par with 90 kg N/ha and significantly superior to other levels. Similar observation was made by Singh and Maini (1969). K levels and split application of both N and K had no effect on protein content (Tables 3 and 4). Thus the study revealed that for economic production of coleus, a fertilizer dose of 60 kg N/ha and 120 kg K_2O/ha at 30 kg P_2O_5/ha can be recommended.

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