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NUTRIENT REQUIREMENTS OF PEPPER VINES TRAINED ON LIVE AND DEAD STANDARDS

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Kerala accounts for nearly 97% of the total area under Pepper in India. However, the per hectare production in the State is very low, the average being 229 kg/ha. One of the major reasons for this low productivity is the poor management of the gardens. The various technological yield constraints involved are use of improper standards and lack of manuring or imbalanced manuring (Nair, 1980) A sound fertilizer policy for pepper should be based on nutrient removal by the crop, crop size or yield per unit area and nutrient composition of leaf as indicated by chemical or foliar diagnosis (Raj, 1978). Based on the nutrient exhaust studies conducted by Nambiar *et al.* (1978), a manurial schedule of 100:40:140 g of N, P_2O_5 and K_2O per vine/year was formulated. But no systematic study has been made to find out the fertilizer requirement of the crop with different kinds of standards.

A wide variety of standards are used for growing pepper vines at present. Raj (1978) reported that in Sarawak, planters use dead standards which may last up to 50-100 years. In Lampung, trees such as coffee, mango etc, are used by a section of pepper growers. But most of those who depend on Pepper for the principal source of income, prefer trees such as *Erythrina indica, Ceiba pendandra, Garuga pinnata,* etc. which are of no economic importance. The present study was conducted with the objective of obtaining a comprehensive idea on nutrient requirement of pepper vines grown on different types of standards.

Materials and Methods

The experiment was conducted at the Kerala Agricultural University main campus, Vellanikkara during the year 1976 adopting the 3^3x2^2 Confounded Factorial design in which NP^2, NK^2, NPK and PK^2 were confounded in replication I, In replication II, NP^2, NK, PK and NPK^2 were confounded. The treatments constituted three levels each of N (75, 150 and 225 g/vine/year), P_2O_5 (25, 50 and 75 g/vine/vear) and K_2O (75, 150 and 225 g/vine/year). Two types of standards (live and dead) and two methods of application (single application in September—October or two splits in June—July and September—October) were the remaining variables, the test variety being Panniyur—1. The soil of the experimental site possessed 0.108 per cent N, 0.025 per cent P_2O_5 and 0.11 per cent K_2O with a pH of 5.86. The live standards tried were *Erythrina indica* while the dead ones were of teak poles and there were six standards in each plot. The vines were pot watered during summer.

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Table 1

Effect of fertilizers, supports and methods of application on growth and yield of pepper

Treatments	Green pepper yield (g/plot)	Plant height (m)	Number of spikes	Spike length (cm)
n_0 (75 g/vine/year)	880.5	3.28	118.14	10.08
n_1 (150 ,,)	772.3	3.33	98.68	9.60
n_2 (225 ,,)	790.0	3.17	105.68	9.44
CD (.05)	—	—	—	0.313
p_0 (25 g/vine/year)	751.0	3.29	99.43	9.62
p_1 (50 ,,)	920.0	3.32	120.46	9.89
p_2 (75 ,,)	772.0	3.18	102.62	9.63
CD (.05)	147.5	—	—	—
k_0 (75g/vine/year)	907.6	3.29	121.65	9.82
k_1 (150 ,,)	736.5	3.24	95.38	9.60
k_2 (225 ,,)	798.5	3.26	105.47	9.71
CD (0.05)	—	—	19.45	—
s_1 (living)	387	2.92	49.77	9.24
s_2 (dead)	1242	3.59	165.24	10.18
CD (0.05)	118.55	0.148	15.64	0.25
t_1 (single application)	785	3.22	109.24	9.77
t_2 (two splits)	844	3.30	105.76	9.64
CD (0.05)	—	—	—	—

Table 2

Interactions of nitrogen and phosphorus with standards on green pepper yield (g/plot)

	S_1 (living)	S_2 (dead)
n_0 (75 g M vine/year)	358	1403
n_1 (150 ,,)	469	1076
n_2 (225 ,,)	333	1247
Mean	387	1242
p_0 (25 g P_2O_5/vine/year)	420	1082
p_1 (50 g P_2O_5/vine/year)	372	1468
p_2 (75 g P_2O_5/vine/year)	368	1176
CD (0.05) for combinations	208.5	—

Table 3

Interaction between levels of phosphorus and potassium on plant height (m)

	P_0 (25 g)	P_1 (50 g P_2O_5/vine/year)	(P_2 75 g)
k_0 (75 g K_2O/vine/year)	3.20	3 44	3.22
k_1 (150 „)	3.44	3.15	3.12
k_2 (225 „)	3.22	3.36	3.21
Mean	3.29	3.32	3.18
CD (0.05; for combinations)	0.16	—	—

Table 4

Interaction between levels of phosphorus and standards on plant height (m)

	S_1 (living)	S_2 (dead)	Mean
p_0 (25g P_2O_5/vine/year)	3.00	3.57	3.29
p_1 (50g „)	2.83	3.81	3.32
p_2 (75g „)	2.93	3.42	3.18
Mean	2.92	3.59	—
CD (0.05) for combinations	0.13	—	—

Table 5

Interaction between levels of potassium and mode of application on plant height (m)

	t_1 (single application)	t_2 (two split)	Mean
k_0 (75g K_2O/vine/year)	3.35	3.22	3.29
k_1 (150 „)	3.05	3.42	3.24
k_2 (225 „)	3.26	3.26	3.26
Mean	3.22	3.30	
CD (0.05) for combinations	0,13	—	—

Table 6

Interactions of nitrogen and phosphorus levels with standards on spike number

	S_1 (livrng)	S_2 (dead)
n_0 (75g N/vine/year)	44.82	191.47
n_1 (150 ,,)	56.34	141.02
n_2 (225 ,,)	48.14	163.22
Mean	49.77	165.24
p_0 (25g P_2O_5/vine/year)	56.93	141.93
p_1 (50g ,,)	46.51	194 41
p_2 (75g ,,)	45.85	159.28
CD (0.05) for combinations	27.50	—

Some of the vines started bearing in the year 1977. However, Uniform flowering was obtained only in the succeeding year. The data discussed in this paper correspond to the 1978 flowering season,

Results and Discussion

The results of the experiment are presented in Tables 1 to 6. It is seen that application of P_2O_5 at the rate of 50 g/vine/year significantly increased the green pepper yield. However, there was no significant difference between 25 and 75 g P_2O_5/vine/year (Table 1). Regarding supports, the vines grown on dead standards were significantly superior to the live ones.

The interaction effects of nitrogen and phosphorus with standards were statistically significant (Table 2). With dead standards 75 g N/vine/year was found to produce the highest quantity of green pepper. However, there was no significant difference between this and 225 g N/vine/year. This is in agreement with the findings of the experiment conducted at the Pepper Research Station, Panniyur from which it was concluded that 60 g N/vine/year is the optimum (Anon. 1977-78). With regard to phosphorus–standard, interaction, it was found that the combination of 50 g P_2O_5/vine/year with dead standard was markedly superior to the remaining combinations. Neither the main effects of nitrogen, potash nor the method of application was significant with respect to yield.

From the above, it could be seen that for the pepper vines trained on dead standards, the nutrient requirement was adequately met when fertilized with 75 g N/vine/year and 50g P_2O_5 vine/year. The data on yield components indicated positive significant influence of these combinations on spike number also (Table 6). The marked superiority of the dead standard as compared to the live one is due to the

competition between the main crop and the standard for factors such as light, water and nutrients. The results perhaps suggest the effect of the nutrient competition. As evidenced *by* the significantly higher yield when dead standard is used even when nutrients are at the highest levels, marked competition due to the other two factor is evident. A similar trend was observed in the case of the various growth and yield components.

As regards the growth of vines also, the dead standard was markedly better than live one. The main effects of other factors did not register any major impact on plant height. However, the combined effect of 50 g P_2O_5 and 75g K_2O vine/year recorded maximum height of vines, yet, on par with the combination of 25g P_2O_5 and 150 g K_2O/vine/year (Table 3). Regarding the phosphorus-standard interacation of 50 g P_2O_5/vine/year to the dead standard registered the highest mean value for plant height. The interaction effect of potassium and mode of application was significant, establishing the superiority of the single application of 75 g K_2O/vine/year.

The effect of potash application on the number of spikes per plant was significant. 75 g K_2O/vine/year registered the maximum number of spikes per plant. A perusal of the data on yield also indicate a similar trend though the differences were statistically not significant.

Summary

A trial was conducted at the Kerala Agricultural University Main campus, Vellanikkara, in order to study the nutrient requirement of pepper vines grown on live and dead standards. It was found that dead standards significantly out-yielded the liveones. Also it was observed that for the dead standards, application of 75g N and 50g P_2O_5/vine/year would be the optimum.

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സംഗ്രഹം

കേരള കാർഷിക സർവ്വകലാശാലയുടെ വെള്ളാനിക്കര കേന്ദ്രത്തിൽ നടത്തിയ പരീക്ഷണങ്ങളിൽനിന്നും, കുരുമുളകുവള്ളി പടർത്തുന്നതിന് തെക്കിൻകാലുകളാണ് നല്ലതെന്നു കണ്ടു. കൂടാതെ ഇപ്രകാരം പടർത്തിയ കുരുമുളകുവള്ളി ഒന്നിന് വർഷംതോറും 75 ഗ്രാം പാക്യജനകവും 50 ഗ്രാം ഭാവഹവും നൽകിയാൽമതിയെന്നും കണ്ടു.

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