

Nutrient management in clove (*Syzygium aromaticum* L.) for sustainable production

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Abstract

An experiment was carried out to formulate nutrient management for sustainable production on 10 year old trees of clove. Both organic and NPK fertilizers were used in 6 combinations. Though no marked difference between treatments were observed the combination of 5 kg of vermicompost, 150:300:900 g NPK and a foliar spray of 2% panchkavya recorded the highest yield

Key words: Clove, *Syzygium aromaticum*, nutrient use efficiency

The clove of commerce is the dried unopened flower buds of the evergreen tree *Syzygium aromaticum*. The clove oil contains eugenol, eugenyl acetate and beta-caryophyllene, which are used in dentistry and in the preparation of throat sprays and mouth washes (Salzer, 1995). As it is mostly confined to a forest eco-system, improving the organic matter content of the soil help to sustain the productivity. To improve the nutrient use efficiency it is very important to apply nitrogen in a combination of both organic and inorganic sources. Moreover, clove is a perennial tree and hence for steady bearing the nutrient supply should be continuous. The surface plate of clove roots extends to a radius of 10m and to a depth of 7m. The roots of neighboring trees overlap and natural grafting may also occur (Purseglove, 1981). Keeping this in view the present investigation was carried out to optimize the nutrient requirement in clove.

An experiment was conducted for two years under the humid tropical agro-climatic conditions in the main farm of Horticultural Research Station, Pechiparai, and Tamil Nadu

Agricultural University. The ten year old uniform clove trees, maintained with the application of the recommended doses of inorganic fertilizers were selected for the study. The recommended dose is that one year old plant was applied with FYM 15 kg, NPK at the rate of 20:20:60 g/year. Every year the dosage was correspondingly increased and a bearing tree of seven years old received NPK @ 300:300:960 g/tree together with FYM 50 kg. Each treatment consisted of five trees. The nutrient status of the experimental field was available NPK of 207, 10, 122 kg/ha, respectively. The soil was acidic with a pH of 5.7 with an electrical conductivity of 0.06 d sm⁻¹. The experiment was laid out in randomized block design (RBD) with six treatments and three replications. The treatments were T1-control (without any fertilizer application), T2-No nitrogen, only phosphorus and potassium @ 300 and 960 g/tree, T3 - NPK 300:300:960g/tree T4 -75 kg FYM + NPK 150:300:960 g/tree, T5 - 5kg Vermicompost + NPK 150:300:960 g/tree) T6 - T5 + foliar spray of Panchakavya (2.0 per cent). The nutrients were applied in two splits

Table 1. Effect of different nutrient treatments on the yield of clove (2004-05)

Treatment	Tree height	Stem girth	No. of branches/tree	Leaf length (cm)	Leaf breadth (cm)	Yield kg/tree	Yield/ha	Cost benefit ration
T ₁	5.50	24.0	24.2	11.2	3.4	1.39	657.25	1:1.25
T ₂	6.09	24.8	26.5	11.4	2.6	3.15	866.20	1:2.27
T ₃	6.62	27.0	27.0	13.6	3.7	7.48	1848.00	1:2.37
T ₄	6.48	26.0	27.5	12.4*	3.9	5.10	1402.50	1:2.28
T ₅	6.56	29.2	28.0	13.2	3.5	6.98	1819.50	1:2.49
T ₆	6.72	30.5	28.6	13.5	4.9*	7.65	1983.75	1:2.51
S.Ed	0.49	1.84	1.83	0.77	0.38	0.76	41.47	
CD	1.27	4.74	4.71	1.99	10.59	1.96	106.63	

during June-July and September-October. The above doses of inorganic fertilizers were applied in the form of urea, single super phosphate and muriate of potash. The biometrical observations were recorded on the tree height, stem girth, number of branches, leaf length, leaf breadth and flower yield/tree.

The observations on biometric traits and the dry bud yield/tree were recorded. The analysed data revealed that there were significant differences among the various treatments. As it is a perennial tree there is no marked influence in the vegetative parameters for different fertilizer levels (Table 1 & 2). The maximum tree height was (7.12 m) observed in the treatment T6 in the second year. Significant variation was observed in vegetative characters in terms of leaf breadth. The leaf breadth was high in

T6 (5 kg vermicompost + NPK @ 150:300:960 g/tree and foliar spray of panchakavya 2.0%). Reports by earlier workers revealed that clove responds very well to organic manures like coconut meal (10 kg per tree) and (11 kg/tree) (Purseglove, 1981).

The treatment without Nitrogen (T2) had registered a lower yield (874.50 kg/tree) when compared to the treatment with the application of Nitrogen @ 300 g/tree. This might be because of the bigger drain of nitrogen taking place during the harvesting process where even breaking of branches takes place. The earlier workers had reported that in Madagascar and Seychelles, where the leafy branches are cropped regularly for distillation of leaf oil, a much bigger drain of fertility takes place, particularly of nitrogen, as well as greatly reducing the clove crop.

Table 2. Effect of different nutrient treatments on the yield of clove (2005-06)

Treatment	Tree height	Stem girth	No. of branches/tree	Leaf length (cm)	Leaf breadth (cm)	Yield kg/tree	Yield/ha	Cost benefit ration
T ₁	5.85	25.03	24.6	11.24	3.41	1.24	863.50	1:2.27
T ₂	6.39	25.9	26.7	9.31	2.56	3.18	874.50	1:2.34
T ₃	6.96	28.12	27.3	13.70	3.90	7.67	1936.00	1:2.38
T ₄	6.78	27.04	27.8	12.51	4.01	5.25	1443.75	1:2.31
T ₅	6.91	30.7	28.4	13.00	3.71	7.02	1930.50	1:2.50
T ₆	7.12	31.9	28.9	13.24	4.99*	7.84	2156.00*	1:2.54
S.Ed.	0.21	1.63	1.99	1.20	0.26	0.61	57.63	
C.D.	0.53	4.20	5.11	3.07	0.66	1.58	148.17	

The highest yield/tree (7.84 kg) was recorded in T6 followed by T3 (7.67 kg/tree) showed the beneficial effect of 5 kg vermicompost + 150:300:960 g NPK + foliar spray of panchakavya 2.0% in increasing the yield/tree. Though the yield/tree is on par with the inorganic treatment (T3) when compared with per hectare yield, it is significant in the second year. The combined application of vermicompost and panchakavya had a synergistic effect, as vermicompost had higher nitrogen content of 1.94% as compared to FYM (0.80%). Besides, vermicompost also has valuable growth hormones, enzymes and proteinaceous biomass (Sharma, 2001), which might have helped in interesting the growth & yield.

So the results of the present study revealed that there is no marked difference between the treatments and 5 kg vermicompost and 150:300:960 g NPK combined with a foliar spray of panchakavya 2.0% that recorded higher yield. This treatment schedule can be adopted to clove plantations as the substitution of nitrogen in the form of vermicompost improve the soil properties and

enrich the soil waterholding capacity, besides resulting in sustainable production.

An experiment was conducted with the main objective of optimizing the nutrient requirement for sustainable production in clove (*Syzygium aromaticum* L.) Now a days the depletion of soil nutrients is a serious concern. The results of the study revealed that the highest yield of 7.84 kg/tree was recorded in the treatment that received 5 kg vermicompost, NPK at the rate of 150:300:960 g/tree and a foliar spray of panchakavya 2.0%. The above treatment gave the highest yield during the assessment period with higher cost benefit ratio (1:2.54).

References

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