

EFFECT OF GRADED DOSES OF NITROGEN, PHOSPHORUS AND POTASSIUM ON YIELD OF BRINJAL (*SOLANUM MELONGENA* LINN.)

Brinjal (*Solanum melongena* Linn., Family : Solanaceae), one of the commercially important vegetable crops in Kerala, is now being cultivated successfully as an intercrop in the coconut gardens of Kuttanad, the rice bowl of Kerala. There is no location specific fertilizer recommendation for this crop. Therefore, the present investigation was undertaken with a view to study the effect of graded doses of N, P and K on yield and yield attributes of brinjal and to work out an economic optimum dose of these nutrients for the crop.

The experiment was conducted at the Regional Agricultural Research Station, Kumarakom, Kerala for three years from 1987-88 to 1989-90 during August to January. The crop was grown as intercrop in a 45 year old coconut garden. The soil of the experimental area was a reclaimed riverine alluvium with an organic carbon content of 2.09 per cent. The pH of the soil was 5.5. The soil had, on an average, 0.209 per cent total N, 56 kg available P_2O_5 and 205 kg available K_2O ha^{-1} . The water table in the experimental area ranged from 0.5 to 1.0 m during the rainy season and from 1.0-1.5 m during summer season.

The experiment was laid out in a 3^3 partially confounded factorial design with two replications. The treatment comprised of three levels each of nitrogen (50, 75 and 100 kg ha^{-1}), phosphorus (20, 40 and 60 kg P_2O_5 ha^{-1}) and potassium (10, 25 and 40 kg K_2O ha^{-1}) in all possible combinations plus one absolute control $N_0P_0K_0$ in each sub-block. Urea, mussuric rock phosphate and muriate of potash were used as the sources of N, P and K respectively. The full dose of P_2O_5 and one third of N and K_2O were applied as basal at the time of transplanting. One third of N and K_2O were applied 25 days after transplanting and the remaining one-third of N and K_2O were applied one month after. Farmyard manure at 25 t ha^{-1} was applied uniformly at the time of land preparation. The seedlings (8-10 cm height) of brinjal var. Surya (SM-6/7) were transplanted

in the main field at a spacing of 60 cm x 75 cm in raised beds of 15 cm height with a gross area of 4.2 m x 2.6 m. The plants were irrigated by pot watering at weekly intervals during the dry spell periods. All the recommended cultural operations including timely plant protection measures were adopted as per the package of practices recommendations of the Kerala Agricultural University (KAU, 1989). Observations were recorded on yield parameters viz., percentage of fruit set, number of fruits per plant, mean weight of fruit, yield of fruits per plant and per hectare and fruit borer infested fruits. The data over the three years of study were pooled and analysed statistically following the method suggested by Panse and Sukhatme (1961).

The pooled data, on statistical analysis (Table 1), revealed that the yield and yield parameters of brinjal viz., number of fruits per plant, percentage of fruit set, mean weight of fruit and yield of fruits were significantly influenced by the application of graded doses of NPK. All the treatment combinations of NPK were found to be significantly superior to the absolute control $N_0P_0K_0$ in their effect on yield (Table 1). The application of graded doses of NPK had no significant effect on fruit borer (*Leucinodes orbonalis*) infestation which varied from 36.5 to 60.7 per cent.

Among the nutrient combinations of NPK, the treatment receiving 75 kg N, 20 kg P_2O_5 and 25 kg K_2O per ha (T11) recorded the maximum number of fruits per plant (12.9), percentage of fruit set (32.5), mean weight of fruit (68.8 g), yield of fruits per plant (845 g) and fruit yield per ha (11.62 t). This nutrient combination was significantly superior to all the other combinations except $N_{75}P_{20}K_{40}$ (T12) in its effect on yield of fruits.

All the treatment combinations of NPK (Table 2) registered benefit/cost ratios higher than one as against a benefit/cost ratio of 0.93 in the case of absolute control $N_0P_0K_0$. This

Table 1. Effect of graded doses of nitrogen, phosphorus and potassium on the yield of brinjal (*Solanum melongena* Linn.) grown in the garden lauds of Kuttanad (Pooled data for 3 years)

Treatments		Fruit set	No. of fruits per plant	Mean weight of fruit, g	Yield of fruits per plant, g	Yield of fruits per ha, t	Fruit borer infected fruit, %
T1	N ₅₀ P ₂₀ K ₁₀	29.5	9.7	59.7	585	8.04	47.3
T2	N ₅₀ P ₂₀ K ₂₅	29.0	11.2	61.8	694	9.55	53.0
T3	N ₅₀ P ₂₀ K ₄₀	26.0	9.6	53.0	495	7.40	48.3
T4	N ₅₀ P ₄₀ K ₁₀	28.1	10.6	57.7	599	8.24	48.8
T5	N ₅₀ P ₄₀ K ₂₅	26.5	8.2	60.2	466	6.81	47.3
T6	N ₅₀ P ₄₀ K ₄₀	27.0	9.7	61.2	571	7.86	45.8
T7	N ₅₀ P ₆₀ K ₁₀	26.4	8.5	60.8	519	7.15	53.3
T8	N ₅₀ P ₆₀ K ₂₅	23.5	7.8	63.3	494	6.80	52.7
T9	N ₅₀ P ₆₀ K ₄₀	27.7	7.0	64.5	448	6.17	41.7
T10	N ₇₅ P ₂₀ K ₁₀	28.7	9.8	62.5	606	8.34	46.5
T11	N ₇₅ P ₂₀ K ₂₅	32.5	12.9	68.8	845	11.62	45.3
T12	N ₇₅ P ₂₀ K ₄₀	25.2	10.7	65.5	705	9.70	57.5
T13	N ₇₅ P ₄₀ K ₁₀	26.6	8.2	64.2	521	7.16	36.5
T14	N ₇₅ P ₄₀ K ₂₅	25.4	9.7	61.0	594	8.18	53.5
T15	N ₇₅ P ₄₀ K ₄₀	22.4	7.8	62.2	466	6.41	53.0
T16	N ₇₅ P ₆₀ K ₁₀	25.6	7.6	59.7	457	6.28	53.7
T17	N ₇₅ P ₆₀ K ₂₅	27.2	9.3	61.8	580	7.98	39.3
T18	N ₇₅ P ₆₀ K ₄₀	24.0	9.2	63.7	584	8.03	46.2
T19	N ₁₀₀ P ₂₀ K ₁₀	24.3	9.4	66.8	636	8.75	51.5
T20	N ₁₀₀ P ₂₀ K ₂₅	24.4	11.1	58.7	633	8.72	57.8
T21	N ₁₀₀ P ₂₀ K ₄₀	31.6	10.1	64.5	645	8.87	60.7
T22	N ₁₀₀ P ₄₀ K ₁₀	26.9	8.3	67.3	557	7.66	52.2
T23	N ₁₀₀ P ₄₀ K ₂₅	25.5	9.2	61.8	543	7.75	52.8
T24	N ₁₀₀ P ₄₀ K ₄₀	24.5	8.7	62.8	547	7.53	47.7
T25	N ₁₀₀ P ₆₀ K ₁₀	30.8	10.9	59.8	651	8.96	51.5
T26	N ₁₀₀ P ₆₀ K ₂₅	25.4	8.5	61.5	530	7.29	52.3
T27	N ₁₀₀ P ₆₀ K ₄₀	26.9	8.9	62.7	551	7.59	55.7
T28	N ₀ P ₀ K ₀ (Control)	21.0	4.7	52.1	246	3.39	51.7
CD (0.05)		4.9**	2.1**	7.9**	140**	2.02**	NS

** Significant at 1 per cent level

indicates that the cultivation of brinjal without fertiliser application is not economic under Kuttanad conditions. The nutrient combination of N₇₅P₂₀K₂₅ which registered the maximum yield of fruits (11.62 t ha⁻¹) also recorded the highest benefit/cost ratio of 2.88. The results

of the study revealed that the application of N, P₂O₅ and K₂O at 75, 20 and 25 kg per ha is the economic optimum dose of NPK for the brinjal crop grown as intercrop in coconut gardens of Kuttanad where the soil is a reclaimed riverine alluvium.

Table 2. Economics of fertiliser application for brinjal grown in the garden lands of Kuttanad

Treatments NPK kg ha ⁻¹		Additional cost of the treatment* Rs ha ⁻¹	Total cost of cultivation Rs ha ⁻¹	Yield of fruit Rs ha ⁻¹	Value of produce Rs ha ⁻¹	Benefit/cost ratio
T1	50:20:10	1635	19835	8.04	40200	2.03
T2	50:20:25	1755	19955	9.53	47750	2.39
T3	50:20:40	1875	20075	7.40	37000	1.84
T4	50:40:10	1805	20005	8.24	41200	2.06
T5	50:40:25	1925	20125	6.81	34050	1.69
T6	50:40:40	2045	20245	7.86	39300	1.94
T7	50:60:10	1975	20175	7.15	35750	1.77
T8	50:60:25	2095	20295	6.80	34000	1.67
T9	50:60:40	2215	20415	6.17	30850	1.51
T10	75:20:10	1828	20028	8.34	41700	2.08
T11	75:20:25	1948	20148	11.62	58100	2.88
T12	75:20:40	2068	20268	9.70	48500	2.39
T13	75:40:10	1998	20198	7.16	35800	1.77
T14	75:40:25	2118	20318	8.18	40900	2.01
T15	75:40:40	2238	20438	6.41	32050	1.56
T16	75:60:10	2168	20368	6.28	31400	1.54
T17	75:60:25	2288	20488	7.98	39900	1.95
T18	75:60:40	2408	20608	8.03	40150	1.95
T19	100:20:10	2020	20220	8.75	43750	2.16
T20	100:20:25	2140	20340	8.72	43600	2.14
T21	100:20:40	2260	20460	8.87	44350	2.17
T22	100:40:10	2190	20390	7.66	38300	1.88
T23	100:40:25	2310	20510	7.75	38750	1.89
T24	100:40:40	2430	20630	7.53	37650	1.82
T25	100:60:10	2360	20560	8.96	44800	2.18
T26	100:60:25	2480	20680	7.29	36450	1.76
T27	100:60:40	2600	20800	7.59	37950	1.82
T28	0 : 0 : 0	0	18200	3.39	16950	0.93

Cost of cultivation excluding the treatment : Rs 18200 ha⁻¹

Cost of 1 kg N as urea: Rs 7.70

Cost of 1 kg K₂O as muriate of potash : Rs 8.00Cost of fertiliser application : Rs 1000 ha⁻¹Cost of 1 kg P₂O₅ as mussurie rock phosphate : Rs 8.50

Value of 1 kg fruits of brinjal : Rs 5.00

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