

EFFECT OF SOIL AND FOLIAR APPLICATION OF NITROGEN ON THE GROWTH AND YIELD OF BRINJAL (*Solanum melongena* L.) UNDER RAINFED CONDITIONS*

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Brinjal is one of the most popular vegetable crops of India. As in other crops, judicious application of nitrogenous fertilisers play a vital role in the successful cultivation of brinjal. It has been reported that nitrogen supplied as foliar spray stimulated plant growth in dry seasons as compared to the nutrient applied to soil which is rendered ineffective for want of adequate moisture. Foliar application is useful in rapidly making available the applied nutrients to plants (Sastry and Appaji Rao, 1958). The present trial was to find out the comparative efficiency of soil and foliar application of nitrogen on the vegetative characters, flowering and yield of brinjal.

Materials and Methods

The field experiment was laid out in Randomised block design with ten treatments and three replications at the SV Agricultural College Farm, Tirupati, during the year 1975. The soil was sandy-loam and slightly alkaline (pH 7.8). Analysis of the soil indicated that it contained 0.324% organic carbon, 20 kg P_2O_5 /ha and 150 kg K_2O /ha. The variety 'Egg white' was chosen for the study. The various treatments were control (no nitrogen- T_1), 100 kg N basal (T_2), 50 kg N basal (T_3), 50 kg N basal+50 kg N at flowering (T_4), 50 kg N basal+25 kg N at flowering+25 kg N one month after flowering (T_5), 50 kg N basal+distilled water sprays from transplanting+distilled water sprays from flowering (T_6), 50 kg N basal+25 kg N as 1% urea sprays from flowering+25 kg N one month after flowering (T_7), 25 kg N basal+25 kg N as 1% urea sprays from flowering+25 kg N one month after flowering (T_8), 50 kg N basal+25 kg N as 1% urea sprays from transplanting+25 kg N as 1% urea sprays from flowering (T_9), 25 kg N basal+25 kg N as 1% urea sprays from transplanting+25 kg N as 1% urea sprays from flowering (T_{10}).

All plots received a basal dressing of P_2O_5 , K_2O and FYM at the rate of 50, 50 and 20,000 kg per hectare respectively.

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Nitrogen in the soil was supplied as ammonium sulphate, phosphorus as super phosphate and potash as muriate of potash. Nitrogen supplied through foliage was in the form of 1% urea sprays in split doses to supply the required quantity. Urea was sprayed on 7th, 14th and 21st day after transplanting as well as at first flowering and on 7th and 14th day of first flowering in the treatments concerned.

Results and Discussion

Data on number of days to first flowering, days from fruit-set to maturity leaf area, number of flowers and percentage of fruit-set at the time of peak flowering, plant canopy spread, number of branches, plant height, thickness of main stem at the time of final harvest, total yield by weight and number of fruits were recorded and these are presented in Table 1. At 30, 60, 90 and 110 (final harvest) days, one whole plant per treatment per replication was uprooted washed and dried at 105°C. After recording the dry weight, the plants were separately powdered for the estimation of total nitrogen and total phosphorus following the methods suggested by Jackson (1967).

Application of 100 kg N, half through soil and half through foliage significantly enhanced flowering as well as the number of days from fruit-set to harvestable maturity in T_9 (Table 1). It seems that higher doses of nitrogen supplied at the early stage of growth have caused the effect. Findings of Gnana-kumari and Satyanarayana (1971) and James *et al.* (1952) support this result.

Number of flowers and percentage of fruit-set were maximum in T_9 and minimum in T_1 . A combined effect of soil and foliar application of nitrogen might have caused this. Results obtained by Chandrasekharan and George (1970) and Ravisankar (1973) are also on similar lines.

In respect of leaf area, plant spread, number of branches and diameter of main stem, T_9 was found to be superior. Maximum plant height was recorded in T_6 . Tiwari and Chhonkar (1967) also obtained maximum thickness of main stem and maximum branching in brinjal following nitrogen application, especially in plants which received the nutrient through foliage. As a result of increased plant growth, T_9 plants yielded significantly higher amount of dry matter (Table 2).

In increasing the plant nitrogen level also, T_9 was found to be the most efficient. Anand and Muthukrishnan (1964) also reported an increase in leaf nitrogen with a corresponding increase in applied N dose.

Maximum yield of fruits by weight and number were recorded by T_9 and minimum by T_1 . The treatments that received nitrogen through foliage responded well compared to the treatments that received the same dose of nitrogen through soil alone. Results of trials conducted by Mukherjee (1967) on potatoes, Ramu and Muthuswamy (1964) on brinjal and Tiwari and Chhonkar (1967) on tomatoes corroborate these observations.

Table 1

Number of days to first flowering, days from fruitset to harvestable maturity, number of flowers, fruit-set (%), leaf area (cm^2), plant spread (cm^2), number of branches, plant height (cm) and diameter of mainstem (cm) as influenced by amount and method of nitrogen applications.

Treatments	Characters								
	Days to first flowering	Days from fruit-set to harvestable maturity	Number of flowers	Fruit set (%)	Leaf area (cm^2)	Plant spread (cm^2)	Number of branches	Plant height (cm)	Diameter of main stem (cm)
T ₁	48.3	13.3	3.0	25.0	408	515	7.1	36.1	0.87
T ₂	40.3	10.7	7.7	26.2	68.4	1624	17.0	45.8	1.43
T ₃	42.7	11.3	6.3	25.7	64.6	1333	13.0	54.9	1.17
T ₄	43.3	12.0	9.0	27.3	88.4	1739	19.6	46.2	1.73
T ₅	42.3	11.3	8.7	26.8	80.0	1760	19.9	46.9	1.67
T ₆	42.3	11.7	6.7	25.9	60.3	1255	12.8	56.0	1.13
T ₇	43.0	11.7	9.3	26.9	87.3	1892	24.3	51.5	1.97
T ₈	45.0	12.3	7.3	25.5	67.4	1715	17.4	44.7	1.47
T ₉	40.0	10.8	12.3	29.1	99.9	2015	26.9	50.4	2.13
T ₁₀	43.7	11.3	10.3	27.7	90.0	1656	18.0	45.1	1.63
CD {p=0.05}	1.5	0.9	1.1	0.9	7.7	102	2.8	1.7	0.22

Table 2

Dry weight (g) of whole plant, nitrogen content (%) and phosphorus content (%) of the plant samples at four stages of growth as influenced by amount and method of nitrogen application.

Treatments	Dry weight (g/plant)				Nitrogen content (%)				Phosphorus content (%)			
	30 days	60 days	90 days	110 days	30 days	60 days	90 days	110 days	30 days	60 days	90 days	110 days
T ₁	41.2	55.7	63.2	68.2	1.12	0.93	0.89	0.70	0.207	0.263	0.233	0.201
T ₂	76.4	90.6	102.6	107.4	1.97	2.01	1.82	1.54	0.397	0.540	0.473	0.437
T ₃	57.8	78.7	92.1	97.4	1.35	1.68	1.51	1.31	0.367	0.527	0.433	0.397
T ₄	66.2	91.1	113.1	117.4	1.63	2.28	2.01	1.73	0.463	0.623	0.540	0.480
T ₅	66.4	91.5	113.8	118.9	1.59	2.33	2.01	1.73	0.437	0.633	0.533	0.501
T ₆	55.5	79.0	92.6	97.8	1.40	1.73	1.63	1.35	0.382	0.533	0.417	0.407
T ₇	70.3	105.8	138.6	146.3	1.77	2.89	2.48	2.19	0.480	0.640	0.545	0.513
T ₈	57.7	95.5	125.3	134.4	1.31	2.52	2.24	1.91	0.433	0.577	0.463	0.433
T ₉	82.8	112.9	148.2	158.9	2.09	3.30	2.60	2.36	0.502	0.662	0.598	0.538
T ₁₀	70.2	96.2	126.2	133.8	1.82	2.66	2.19	1.96	0.463	0.637	0.577	0.527
CD (p=0.05)	2.2	3.2	4.8	5.2	0.13	0.29	0.18	0.18	0.064	0.068	0.092	0.096

The various treatments showed a negative trend with regard to final mean weight of fruits as compared to that of total yield by weight and number. T₁ was superior to all the other treatments in this character, whereas it was least in the case of T₉. More number of fruits per plant evidently reduced the individual fruit size, Neuberft (1959) also has reported that average weight of fruits decreased at higher levels of nitrogen,

T, which received no inorganic nitrogen at all, recorded minimum yield. T₉ which received 100 kg N/ha, through soil alone failed to stand with T₉ which also received the same dose, half the quantity of which was supplied as foliar spray. T₁₀ though received 50 kg N/ha as foliar spray, failed to perform as good as T₉, probably because it received a lesser quantity of N as basal dose.

The increased efficacy shown by all treatments that received foliar application of nitrogen may also be due to the source of nitrogen wherein the nitrogen applied as urea might have created an added effect. Results obtained by Singh and Singh (1968) are similar to this trend.

It appears that supply of half the recommended dose of nitrogen through soil and the other half through foliage as urea would be most effective as far as the growth of plants, uptake of nutrients, flowering and yield are concerned in brinjal under rainfed conditions.

Summary

In studies on the comparative efficacy of soil and foliar application of nitrogen on growth and yield of brinjal, it was found that the application of 50 kg nitrogen through soil in the form of ammonium sulphate and 50 kg through foliage in them form of 1 % urea sprays proved to be the most efficient.

സംഗ്രഹം

മണ്ണിൽക്കൂടിയും പർണ്ണപോഷണമായും പാക്യജനക പ്രധാനമായി രാസവളങ്ങൾ വഴുതനയ്ക്കു നൽകുന്നതു oxoബന്ധിച്ച പരീക്ഷണങ്ങളിൽ മണ്ണിൽക്കൂടി 50 കി. ഗ്രാം പാക്യജനകം അമോണിയം സൾഫേറ്റ് രൂപത്തിലും, പർണ്ണപോഷണമായി 50 കി. ഗ്രാം പാക്യജനകം fffff ശതമാനം വീര്യമുള്ള യൂറിയ ലായനി രൂപത്തിലും നൽകിയപ്പോൾ, പുഷ്പിക്കാനും വിളവെടുക്കാനുമുള്ള കാലയളവ് ചുരുങ്ങിയതായും, ഇലകളുടെ വിസ്തീർണ്ണം, പുഷ്പങ്ങളുടെ എണ്ണം, തായ്തടിയുടെ വണ്ണം, ശുഷ്കദ്രവ്യം, പാക്യജനകത്തിന്റെയും ഭാവഹത്തിന്റെയും ഉപയോഗം, ആകെ ലഭിച്ച കായ്കളുടെ തൂക്കം എന്നിവ വർദ്ധിച്ചതായും കാണുകയുണ്ടായി.

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