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EFFECT OF FERTILITY LEVELS AND WATER SOLUBLE FERTILIZER ON GROWTH AND YIELD OF BRINJAL (*Solanum melongena* L.)

Nirali B. Sabhaya[1*] and M. V. Patel[2]

[1]Department of Horticulture, B. A. College of Agriculture, Anand Agricultural University, Gujarat, India, 388110
[2]Department of Horticulture, C. P. College of Agriculture, Sardarkrushinagar Dantiwada Agricultural University, Dantiwada, Gujarat, India, 385506
*Corresponding author E-mail: sabhayanirali26@gmail.com
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ABSTRACT

Brinjal (*Solanum melongena* L.) is one of the principal crops of India and is widely grown throughout the year in various parts of the country. The brinjal hybrids are high yielding and more responsive to fertilizer application. Method of nutrient application plays an important role in supplying nutrients to plants. At present, water soluble fertilizers with different ratios of N, P and K having high solubility have been introduced and are found to be highly effective for foliar application. Hence, field investigation was carried out to study the effect of fertility levels and water soluble fertilizers on growth and quality parameters of brinjal. The experiment was laid out in Factorial Randomized Block Design with total twelve treatments and replicated thrice. The observations on various growth and quality parameters were recorded and subjected to statistical analysis. The results showed that among the different concentrations of foliar applied nutrients, 1.0 % WSF at 20 days' interval along with 80 per cent recommended dose of fertilizer (100:50:50 kg/ha) recorded the maximum plant height at 60 DAT and at last harvest, number of branches per plant at last harvest, days taken to last picking, number of fruits per plant, fruit yield per plant, fruit yield per plot and fruit yield per hectare.

Keywords **:** Brinjal, RDF, Water soluble fertilizer, Growth, Yield.

Introduction

Brinjal or Eggplant (*Solanum melongena* L.) is a member of Solanaceae family and having the chromosome number is 2n = 24. It is also known as 'Aubergine' or 'Guinea squash' an economically important vegetable crop widely cultivated in the tropics and sub tropics regions. There are approximately 2000 varieties of brinjal. Brinjal is named as "Poor man's vegetable" because of its low cost of production, ease of culture and availability throughout the year. The brinjal hybrids are more responsive to fertilizers application. But the efficiency of soil applied nutrients is poor due to various losses like fixation and immobilization. Generally major nutrients *viz*., N, P and K are supplied to the crop through soil application. Foliar application reduces fertilizer input by avoiding losses by soil fixation, immobilization, leaching and through runoff, correction of observed deficiencies can be seen in lesser time as compared to soil application.

Hence, foliar nutrition is recognized as an important method of fertilization in modern agriculture. (Karpagam *et al*., 2004). Water soluble fertilizers play an important role in preventing the flower and fruit drop and improves crop yield and quality (Valavan and Kumaresan, 2006). Foliar applications of water soluble fertilizers play a vital role in supplying the nutrients at critical stages of flowering and fruit development. Today the demand for specialty fertilizers is increasing in most of the horticultural segments. Therefore, the present investigation was undertaken to find out the effect of foliar feeding of water soluble fertilizers in addition to recommended dose of fertilizer on growth and quality of brinjal compared to normal recommended fertilizers alone.

Materials and Methods

The field experiment carried out under open field condition during *Late* Kharif – 2022 at the College farm, College of Horticulture, S. D. Agricultural University, Jagudan, Dist. Mehsana, Gujarat to study the effect of fertility levels and water soluble fertilizer on growth and yield of brinjal (*Solanum melongena* L.). The experiment was laid out in Factorial Randomized Block Design and replicated thrice. Four weeks old seedlings of Gujarat Junagadh Long Brinjal 4 (GJLB 4) are transplanted in the field at a spacing of 90 cm × 60 cm. Intercultural operations and harvesting were done as per the recommendation. The required quantity of manures and fertilizers and foliar application of WSF (NPK 19:19:19) were applied according to treatment. Foliar application of required quantity of 19:19:19 NPK were given in twenty and forty days intervals starting from twenty days after transplanting. The inorganic fertilizers were applied in form of urea, single super phosphate and murate of potash as per the treatments. 50 % urea applied as basal application and remaining urea applied in two equal split at 45 and 60 days after transplanting. The full dose of SSP and MOP were applied as basal application at the time of transplanting. Treatment details given below:

Factor - I: NPK Fertilizer (F)	**Factor - II: Foliar Spray of Water Soluble Fertilizer (WSF) at different interval (S)**
f_1 – 80 % RDF (80:40:40 kg/ha) f_2 – 60 % RDF (60:30:30 kg/ha)	s_1 – 0.5 % WSF at 20 days interval s_2 – 0.5 % WSF at 40 days interval s_3 – 1.0 % WSF at 20 days interval s_4 – 1.0 % WSF at 40 days interval s_5 – 1.5 % WSF at 20 days interval s_6 – 1.5 % WSF at 40 days interval
Note: In factor S_1, S_3 and S_5 six sprays were done at 20, 40, 60, 80, 100 and 120 DAT While, in factor S_2, S_4 and S_6 three sprays were done at 40, 80 and 120 DAT.	

Result and Discussion

Growth parameters

The data on growth attributing characters were significantly influenced with different fertility levels and spray interval of various concentration of water soluble fertilizer. Significantly highest plant height at 60 DAT (68.79 cm) and at last harvest (76.43 cm) was recorded with T_3 which received 80 % RDF along with 1.0 % WSF at 20 days interval. This might be due to the increased cell division and elongation at higher levels of Nitrogen. Similar findings were reported by Prabhu *et al.* (2003), Karpagam *et al.* (2004) in hybrid brinjal. The increase in plant height due to water soluble fertilizers used as foliar spray contain all the three major nutrients and nitrogen played an important role in increasing the plant height noted by Jilani *et al.* (2008), Vasanthi *et al.* (2016) and Anburani (2018) in brinjal.

Highest of branches per plant at last harvest (6.73) was noted by 80 % RDF along with 1.0 % WSF at 20 days interval. Higher levels of N and P at early crop stage could have encouraged a greater number of axillary buds and ultimately resulted in a greater number of branches. Similar results of better branching with foliar application of nutrients and inorganic fertilizers have been reported by Karpagam *et al.* (2004), Narayanamma *et al.* (2006) in brinjal, Chaurasia *et al.* (2005), Premsekhar and Rajashree (2009) in tomato; Deepadevi and Shanthi, (2013) in chilli.

Maximum days taken to last picking (143.67) was recorded with treatment which received 80 % RDF along with 1.0 % WSF at 20 days interval. Availability of nutrients at early stage affects the reproductive growth of plant. Further, nutrient availability at right time with proper concentration is favorable to the crop vegetative growth as well as reproductive growth. These may be the reason behind maximum days taken to last picking even though it has taken maximum days for first picking. Also, minimum days taken to flower initiation (39.87) was observed in T_8 60 % RDF along with 0.5 % WSF at 40 days interval. It is indicated that the added nutrients influenced on days taken to flower initiation in brinjal, but further increase in concentration and number of sprays delayed the earliness in flowering of the plants. The result was in accordance with Jilani *et al.* (2008) in brinjal. Similar findings were also reported by Narayan *et al.* (2012) and Trivedi *et al.* (2017) wherein application of N delayed flowering and fruiting in tomato. Delayed flowering may be resulted to delay fruiting.

Table 1 : Effect of fertility levels and water soluble fertilizer on growth parameters of brinjal

Treatments	**Plant height at 60 DAT (cm)**	**Plant height at last harvest (cm)**	**Number of branches per plant at last harvest**	**Days taken to flower initiation**	**Days taken to first picking**	**Days taken to last picking**
f_1s_1	62.34	67.99	3.93	42.53	71.93	137.47
f_1s_2	61.81	67.51	4.40	42.47	71.73	137.27
f_1s_3	68.79	76.43	6.73	44.73	72.73	143.67
f_1s_4	61.68	68.76	5.07	42.20	71.33	137.73
f_1s_5	66.14	73.08	4.60	43.93	72.40	141.60

f_1s_6	62.71	69.25	4.20	42.47	71.60	135.80
f_2s_1	61.97	67.66	4.13	42.00	70.60	139.80
f_2s_2	60.25	66.84	3.40	39.87	68.07	132.93
f_2s_3	65.34	71.40	4.13	41.53	70.47	137.47
f_2s_4	63.99	69.88	4.27	40.53	70.60	139.20
f_2s_5	61.76	69.27	4.20	41.33	70.67	138.47
f_2s_6	61.03	67.34	4.20	41.53	71.27	139.27
S.Em.±	0.97	0.93	0.42	0.39	0.39	0.85
CD @ 5 %	2.77	2.63	1.20	1.11	1.10	2.41
CV %	2.67	2.30	16.46	1.61	0.94	1.06

In respect to that first fruit picking (68.07) was observed early in treatment T_8 which received 60 % RDF along with 0.5 % WSF at 40 days interval. This result was parallel to the research of Narayan *et al*. (2012) who explained that foliar spray of water soluble fertilizers also affected the first fruit bearing in tomato. This was due to early availability of fertilizers to plants. Maximum days taken for first picking of brinjal fruits may be due to the delayed flower initiation causes delayed fruit bearing.

Yield parameters

The observation on yield characters was significantly influence with fertility levels and water soluble fertilizer. Significantly maximum number of fruits per plant (23.27) was observed in treatment T_3 which received 80 % RDF along with 1.0 % WSF at 20 days interval. An optimum level of synthesis of cytokinin at high levels of N and P would have resulted in a favourable sink, *i.e.* production of a greater number of productive flowers, which might have resulted in setting of a greater number of fruits per plant. It may be due to supply of more nutrients at the critical growth stages, *i.e.* flowering and fruit set (Krishnan *et al.*, 2014) in tomato. Narayanamma *et al.* (2006) and Anburani *et al.* (2019) also reported similar findings in brinjal.

Table 2 : Effect of fertility levels and water soluble fertilizer on yield parameters of brinjal

Treatments	Fruit weight (g)	Number of pickings	Number of fruits per plant	Fruit yield per plant (kg)	Fruit yield per hectare (q)
f_1s_1	88.37	11.60	15.20	1.59	267.29
f_1s_2	86.96	11.73	15.00	1.61	256.90
f_1s_3	98.29	12.00	23.27	2.45	346.61
f_1s_4	90.48	11.40	15.60	1.68	277.47
f_1s_5	93.69	11.53	17.53	1.80	316.19
f_1s_6	90.48	11.47	14.87	1.65	272.06
f_2s_1	90.32	11.33	15.13	1.73	257.54
f_2s_2	83.11	11.40	13.87	1.55	234.55
f_2s_3	91.59	11.47	15.93	1.67	269.62
f_2s_4	89.82	11.47	16.40	1.76	284.99
f_2s_5	90.38	11.33	15.93	1.65	276.84
f_2s_6	89.80	11.53	14.87	1.64	272.30
S.Em.±	2.32	0.21	1.26	0.09	10.77
CD @ 5 %	NS	NS	3.59	0.26	30.64
CV %	4.45	3.11	13.53	9.30	6.71

Maximum fruit yield per plant (2.45 kg) and fruit yield per hectare (346.61q) were also observed in same treatment (f_1s_3). The balanced nutrition throughout the crop growth period helped in increasing the photosynthetic efficiency and source of plant, thereby increasing the yield. These results are in close conformity with the finding of Manjunatha (2004) in okra. The probable reason for increase in yield might be due to easy assimilation of nutrients and balance in NPK ratio which affects the crop productivity reported by Batra *et al.* (2006) in brinjal. The present findings are found in agreement with Chaurasia *et al.* (2005) and Premsekhar and Rajashree (2009) in tomato; Narayanamma *et al.* (2009) in okra.

Conclusion

Based on the result of the study, it is concluded that 80 % recommended dose of fertilizer along with six foliar sprays of 1.0 % water soluble fertilizer

(19:19:19) starting from 20 days after transplanting at twenty days interval was found superior in terms of growth and yield in brinjal.

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