



EFFECT OF DIFFERENT LEVELS OF WATER SOLUBLE FERTILIZERS ON YIELD AND QUALITY PARAMETERS IN BRINJAL HYBRIDS (*SOLANUM MELONGENA* L.)

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Abstract

Brinjal (*Solanum melongena* L.) is one of the principle 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. Generally, major nutrients viz., N, P and K are supplied to the crop through soil application. 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 water soluble fertilizers on yield and quality parameters of brinjal hybrids due to application of various levels of water soluble fertilizer in the University Orchard, Department of Horticulture, Faculty of Agriculture, Annamalai University, Annamalai Nagar. Foliar feeding of water soluble fertilizer NPK (19:19:19) at 0.5 per cent and 1% along with 100 and 75 per cent recommended dose of NPK (200:150:100 kg ha⁻¹) with 5 and 7 sprays, each starting from 30 DAT at 10 days interval, formed twenty treatments in two hybrids. The experimental plots were laid out in Randomized Block Design and replicated thrice. The observations on various yield and quality parameters were recorded and subjected to statistical analysis. The results obtained showed that among the two different concentrations of foliar applied nutrients, 7 sprays of 1% NPK (19:19:19) along with 100 per cent recommended dose of fertilizer (200:150:100 kg ha⁻¹) recorded the earlier days to 50% flowering, highest number flowers per plant, fruit girth, fruit weight, yield per plant and yield per hectare. The highest quality parameters were also recorded in the same treatment.

Key words : Water soluble fertilizers, yield parameter, quality parameters.

Introduction

Brinjal is a as egg plant or aubergine. Generally, brinjal hybrids are known for their higher yield potential, early maturity and uniform fruit size, attractive and uniform colour of fruits. The brinjal hybrids are more responsive to fertilizer application. Since, hybrids have high yield potential, it needs uninterrupted supply of nutrients both during vegetative and reproductive stage of growth (Ranjith Kumar, 2009). Water soluble fertilizers also plays an important role in preventing the flower and fruit drop and improves crop yield and quality. (Sendhil Valavanan and Kumaresan, 2006). Water soluble fertilizers can advantageously be utilized for foliar feeding and fertigation, thus helping in precision agriculture. Foliar spray is the modern method of fertilizer in vegetable crops

due to nature of heavy feeder of nutrients (Vibute, 1998). An application of nutrients through foliar spray has several advantages in supplementing the nutritional requirement of crops. Hence, the present investigation was undertaken to study the effect of water soluble fertilizers on yield and yield parameters of chilli hybrid.

Materials and Methods

A field experiment was carried out at University Orchard, Department of Horticulture, Faculty of Agriculture, Annamalai University, Annamalai Nagar, Tamil Nadu to study the “Effect of water soluble fertilizer on yield and quality parameters of brinjal (*Solanum melongena* L.)”. Two brinjal hybrids viz., Mahyco No. 39 (Ravaiya) produced by Mahyco Seed Innovation P. Ltd Maharashtra and Indam Supriya produced by Indo-

American Hybrid Seeds (India) P. Ltd Bengaluru were used in the present study. The experiment was laid out in Factorial Randomized Block Design and replicated thrice. The treatments consisted of application of two levels of inorganic fertilizer (100% and 75% Recommended Dose Fertilizer @ 200:150:100 kg NPK) along with the two concentrations of water soluble fertilizers *viz.*, NPK (19:19:19) at 0.5% and 1% as in five and seven sprays. Seeds were sown in raised beds at a spacing of 5 cm across the beds and at a depth of 0.25 cm. Thirty five days old healthy seedlings were transplanted in the main field. The seedlings were planted in a uniform spacing of 90 cm × 60 cm in the plot and immediately after transplanting. Intercultural operations and harvesting were done as per the recommendation. The required quantity of manures and fertilizers were applied as per the treatment. The inorganic fertilizers were applied in the form of urea, superphosphate and murate of potash as per the treatments. N was applied in two split doses, first dose was given as a basal application and the remaining N was given thirty days after sowing. The full dose of phosphorus and potassium were applied as basal application at the time of transplanting. Foliar application of required quantity of 19:19:19 NPK were given in five and seven sprays starting from thirty days after transplanting at ten days intervals. The observations on various yield parameters *viz.*, days to 50% flowering, number of fruits per plant, fruit length, fruit girth, fruit weight, yield per plant, yield per hectare and quality parameters *viz.*, TSS, ascorbic acid content and phenol content were recorded and statistically analysed as given by Panse and Sukhatme (1978).

Treatment details

Factor – I(H)		Factor – II(F)	
I	Hybrids –H	II	Treatments -T
H ₁	Hybrid-1 (Ravaiya)		F ₁ - 75% RDF (150:112.5:75 kg NPK ha ⁻¹)
H ₂	Hybrid-2 (Indam Supriya)		F ₂ - 100% RDF (200:150:100 kg NPK ha ⁻¹)
			F ₃ - 75% RDF + WSF 0.5% (5 Sprays)
			F ₄ - 75% RDF + WSF 0.5% (7 Sprays)
			F ₅ - 75% RDF + WSF 1.0% (5 Sprays)
			F ₆ - 75% RDF + WSF 1.0% (7 Sprays)
			F ₇ - 100% RDF + WSF 0.5% (5 Sprays)

		F ₈ - 100% RDF + WSF 0.5% (7 Sprays)
		F ₉ - 100% RDF + WSF 1.0% (5 Sprays)
		F ₁₀ - 100% RDF + WSF 1.0% (7 Sprays)

Results and Discussion

Yield parameters

In the present study, application of various levels of water soluble fertilizers significantly influenced the yield and quality parameters. Among the hybrids that tested H₂ the early flowering (37.11 days), the highest number of fruits per plant (63.35), fruit length (7.25 cm) fruit girth (17.30 cm) and single fruit weight (72.32 g) was recorded in treatment T₁ H₂, which received 100% RDF + WSF 1.0% NPK 19:19:19 and the least was recorded in 75% recommended dose of fertilizers.

The study revealed that the number of fruits per plant, fruit length, girth and fruit weight were recorded in the treatment which received the 100% RDF + WSF 1.0% NPK 19:19:19. These are the important attributes having direct bearing on the yield of brinjal fruit. Similar findings of increase yield attributes due to combined application of inorganic fertilizers and foliar application of nutrients were reported by Palaniappan *et al.* (1999) in chilli.

In the present study, application of various levels of inorganic and water soluble fertilizers significantly influenced the fruit yield. Among the various hybrids that tested H₂ the highest fruit yield per plant (3.93 kg), yield per plot (35.37 kg) and per hectare (72.78 t) was recorded in T₁₀, which received 100% recommended dose of fertilizer + WSF 1.0% NPK @ 19:19:13, and the least fruit yield per plant (1.36), yield per plot (12.24 kg) per hectare (25.19 t) was recorded in the treatment T₁ that received 75% recommended dose of fertilizers alone.

The increase in fruit yield in the best treatment could be due to the foliar applied N, P and K would have brought about a favorable status, both assimilate and hormonal wise for production of more number of flowers, which are capable of setting fruits. An optimal level of synthesis of cytokinin at higher level of N and P would have resulted in a favorable sink to produce more number of productive flowers, which would have led to setting of more number of fruits per plant. Similar finding of increase number of fruits due to foliar application of nutrients was reported by Kamal Narayan *et al.* (2011) in brinjal. In the present study, application of various levels of inorganic and water soluble fertilizers significantly influenced the fruit yield per plant. Among the various treatments that tested

Table 1 : Influence of water soluble fertilizers on yield and quality parameters in brinjal hybrid.

Treatments	Days to 50% flowering	Number of fruits plant ⁻¹	Fruit length (cm)	Fruit girth (cm)	Fruit weight (g)	Fruit yield per plant (kg)	Fruits yield plot ⁻¹ (kg)	Fruit yield ha ⁻¹ (t)	Ascorbic acid (mg/100 g ⁻¹)	TSS (°Brix)	Total phenol (g)
F ₁ H ₁	45.33	35.23	6.46	12.91	38.74	1.36	12.24	25.19	0.46	3.88	0.10
F ₂ H ₁	43.88	39.13	6.50	13.27	43.80	1.71	15.39	31.67	0.63	4.00	0.11
F ₃ H ₁	43.66	40.26	6.59	13.48	47.48	1.91	17.19	35.37	0.71	4.04	0.11
F ₄ H ₁	42.22	41.35	6.60	14.07	51.16	2.11	18.99	39.07	0.67	4.06	0.12
F ₅ H ₁	40.44	43.28	6.77	14.16	55.32	2.39	21.51	44.26	0.75	4.09	0.13
F ₆ H ₁	39.66	45.16	6.89	14.63	59.66	2.69	24.21	49.81	0.67	4.36	0.12
F ₇ H ₁	39.35	46.34	7.01	14.71	62.13	2.87	25.83	53.13	0.73	4.39	0.11
F ₈ H ₁	38.88	48.26	7.12	14.75	66.24	3.19	28.71	59.07	1.38	4.47	0.12
F ₉ H ₁	38.40	50.25	7.21	14.88	68.32	3.43	30.87	63.52	1.68	4.51	0.13
F ₁₀ H ₁	37.11	54.45	7.25	15.78	72.32	3.93	35.37	72.78	1.98	4.52	0.14
F ₁ H ₂	47.88	39.05	4.27	15.12	35.74	1.39	12.51	25.74	1.30	4.57	0.10
F ₂ H ₂	46.33	44.26	4.50	16.5	37.80	1.67	15.03	30.93	1.76	5.12	0.10
F ₃ H ₂	45.11	43.01	4.68	16.85	38.46	1.64	14.76	30.37	1.98	5.24	0.10
F ₄ H ₂	43.44	45.21	4.81	16.27	38.16	1.66	14.94	30.74	1.89	5.29	0.11
F ₅ H ₂	43.60	46.36	4.91	16.49	39.32	1.82	16.38	30.70	2.10	5.33	0.12
F ₆ H ₂	42.55	48.23	4.99	16.51	41.46	1.99	17.91	36.86	1.91	5.41	0.11
F ₇ H ₂	41.66	50.03	4.07	16.66	43.13	2.15	19.35	39.81	2.04	5.45	0.11
F ₈ H ₂	41.22	53.49	5.05	16.93	45.24	2.52	22.68	46.67	2.13	5.49	0.10
F ₉ H ₂	40.44	55.46	5.18	17.12	49.32	2.72	24.48	50.37	2.19	5.52	0.14
F ₁₀ H ₂	39.22	63.35	5.36	17.30	55.11	3.49	31.41	64.63	2.56	5.55	0.13
S.Ed	0.75	2.67	0.29	0.46	2.08	0.21	1.27	2.05	0.05	0.17	0.12
CD (P=0.05)	1.50	5.34	0.58	0.95	4.17	0.42	1.42	4.13	NS	NS	NS

maximum TSS content was recorded in T₁₀ (5.03 B°) which received 100% RDF + WSF 1.0% + 7 sprays and the minimum was recorded in 75% recommended dose of fertilizers in T₁ (4.22°B). The interaction effect did not show significant variation.

The TSS content constitutes the organic and inorganic substances present in cell sap. They also contribute to the osmo-regulation function. The turgidity maintenance is governed by the osmoregulatory mechanism. The increased TSS content evidently shows that the stored food materials undergo either partial or complete hydrolysis and provide substrate for respiration. Being an essential component of many respiratory enzymes like catalase cytochrome A, B and C, which are involved in the respiratory process in the cell and plant system, this could have naturally resulted in the conversion of reserved food material to soluble simple sugar. This might be the probable cause for the increase in TSS content (Tamilselvi *et al.*, 2004).

In the present study, among the various treatments that tested the phenol and ascorbic acid contents were not significantly influenced by the treatment and their interaction effect.

Conclusion

Among the different grades of water soluble fertilizers, foliar application of 7 sprays of NPK (19:19:19) along with recommended dose fertilizer (200:150:100) recorded the fruits per plant with the highest fruit weight

and yield. Thus, foliar application of sprays NPK (19:19:19) along with the recommended dose of 200:150:100 kg NPK ha⁻¹ is found to be highly beneficial for maximizing the yield and quality of brinjal hybrid.

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