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Effect of foliar spray of water soluble fertilizer on growth and yield of chilli hybrid (*Capsicum annuum* L.)

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ABSTRACT : Field experiment was carried out in the Department of Horticulture, Pandit Jawaharlal Nehru College of Agriculture and Research Institute, Karaikal during the year 2009. Among the 16 treatments, the combination of 100 per cent RDF + 1.0 per cent water soluble fertilizer + 5 spray produced maximum plant height, number of branches per plant, fruit length, fruit girth, individual fruit weight, number of fruits per plant, yield per plant and yield per hectare when compared to water spray and other treatments.

KEY WORDS : Chilli hybrid, Water soluble fertilizer, Foliar spray, Growth, Yield

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Vegetables are important in the human diet as protective food. India is a leading vegetable producing country in the world but the current per capita consumption of vegetable in our country is only 135 g as against 300 g of vegetable required per day per adult for maintaining good health (Verma *et al.*, 2002). Chilli is one of the most important vegetable crop grown all over the country during summer. Application of adequate amount of fertilizers is a prerequisite for exploiting the yield potential of any hybrid vegetable. Soil application of fertilizers is a general method practiced by the farmers, in which fertilizers are placed near the root zone, but the efficiency of soil applied nutrients is poor due to various losses like volatilization, immobilization and fixation in soil. As an alternative, foliar nutrition using water soluble fertilizer can eliminate the above problems. Foliar nutrients usually penetrate the cuticle of the leaf or stomata, enter the cells rapidly and fulfill the nutrient demand of the growing plant and thus ameliorate nutrient deficiencies rapidly. With this back ground, the present investigation was carried out to study and optimize the

dose of foliar feeding of water soluble fertilizer on growth and yield.

RESEARCH METHODS

Field experiment was carried out in the Department of Horticulture at Pandit Jawaharlal Nehru College of Agriculture and Research Institute, Karaikal to study the effect of foliar feeding of water soluble fertilizer on growth and yield of chilli hybrid 'Sierra' (Mahyco Company) during January – July 2009. The experiment was laid out in Factorial Randomized Block Design and replicated thrice. The treatments imposed were 2 levels of RDF (100 % and 75%) along with 2 number of foliar spray (5 times and 7 times) and four concentrations of water soluble fertilizer *viz.*, 0.0% (control), 0.5 per cent, 1.0 per cent and 2.0 per cent. The blanket recommended dose of fertilizer (RDF) was 120:80:80 kg NPK per hectare and for foliar spray water soluble fertilizer polyfeed 19:19:19 was used for this study. Foliar spray was started from 30 days after transplanting (DAT) at 15 days interval *viz.*, 30, 45, 60, 75 and 90 DAT for 5

Treatment details			
Treatments	RDF	Concentration of polyfeed 19:19:19	No of sprays
T ₁ (F ₁ C ₁ S ₁)	100.00%	0.00%	5 sprays at 30, 45,60,75 and 90 DAT
T ₂ (F ₁ C ₂ S ₁)	100.00%	0.50%	5 sprays at 30, 45,60,75 and 90 DAT
T ₃ (F ₁ C ₃ S ₁)	100.00%	1.00%	5 sprays at 30, 45,60,75 and 90 DAT
T ₄ (F ₁ C ₄ S ₁)	100.00%	2.00%	5 sprays at 30, 45,60,75 and 90 DAT
T ₅ (F ₁ C ₁ S ₂)	100.00%	0.00%	7 sprays at 30, 45,60,75,90,105 and 120 DAT
T ₆ (F ₁ C ₂ S ₂)	100.00%	0.50%	7 sprays at 30, 45,60,75,90,105 and 120 DAT
T ₇ (F ₁ C ₃ S ₂)	100.00%	1.00%	7 sprays at 30, 45,60,75,90,105 and 120 DAT
T ₈ (F ₁ C ₄ S ₂)	100.00%	2.00%	7 sprays at 30, 45,60,75,90,105 and 120 DAT
T ₉ (F ₂ C ₁ S ₁)	75.00%	0.00%	5 sprays at 30, 45,60,75 and 90 DAT
T ₁₀ (F ₂ C ₂ S ₁)	75.00%	0.50%	5 sprays at 30, 45,60,75 and 90 DAT
T ₁₁ (F ₂ C ₃ S ₁)	75.00%	1.00%	5 sprays at 30, 45,60,75 and 90 DAT
T ₁₂ (F ₂ C ₄ S ₁)	75.00%	2.00%	5 sprays at 30, 45,60,75 and 90 DAT
T ₁₃ (F ₂ C ₁ S ₂)	75.00%	0.00%	7 sprays at 30, 45,60,75,90,105 and 120 DAT
T ₁₄ (F ₂ C ₂ S ₂)	75.00%	0.50%	7 sprays at 30, 45,60,75,90,105 and 120 DAT
T ₁₅ (F ₂ C ₃ S ₂)	75.00%	1.00%	7 sprays at 30, 45,60,75,90,105 and 120 DAT
T ₁₆ (F ₂ C ₄ S ₂)	75.00%	2.00%	7 sprays at 30, 45,60,75,90,105 and 120 DAT

times spray and for 7 spray, the days were extended upto 120 DAT. Biometric observations like growth attributes, yield characters and fruit yield were recorded.

RESEARCH FINDINGS AND DISCUSSION

The findings of the present study as well as relevant discussion have been presented under following heads :

Growth attributes :

The dose of inorganic fertilizer and level of foliar spraying of water soluble fertilizer exhibited significant influence on all the growth attributes of chilli hybrid 'Sierra' (Table 1). Though the number of spray didn't influence the growth attributes, 100 per cent RDF recorded significant higher growth attributes *viz.*, plant height, number of branches, days to 50 per cent flowering and dry matter production than the lower dose of 75 per cent RDF. Among the different concentration of foliar applied nutrients, 1.0 per cent foliar spray recorded similar growth attributes than 2.0 per cent foliar spray and was significantly superior than water spray and 0.5 per cent spray.

As the interaction effect was more predominant in the production of number of branches a combination of 5 sprays with 1.0 per cent polyfeed NPK 19:19:19 along with 100 per cent RDF (120:80:80kg ha⁻¹) significantly recorded the highest values for most of the plant growth parameters. The increased plant height is due to increased

uptake of primary nutrients, and fast movements of photosynthates within the plant system. A Similar observation of increase in plant height, due to foliar application of water soluble fertilizers was reported by Ananthi *et al.* (2007) in chilli. Similar results were also obtained by Sundaram and Kanthaswamy (2005) and Venkataraman (2007) in okra, Pithankar *et al.* (2004) and Yadav *et al.* (2004) in tomato.

Yield characters :

The dose of inorganic fertilizer, number and level of foliar spray of water soluble fertilizer showed significant influence on all the yield attributes and yield in chilli hybrid (Table 2 and 3). Application of 100 per cent RDF recorded significantly higher yield characters *viz.*, fruit length, fruit girth, fruit weight, number of seeds per fruit, 1000 seed weight, number of fruit per plant, yield per plant and yield per hectare than the lower dose of 75 per cent RDF. Among the foliar spray, 7 sprays registered significantly higher yield characters than 5 spray except for fruit weight. Among the different concentrations of foliar spray, 2.0 per cent water soluble fertilizers produced significantly higher yield attributes than that of 1.0 per cent spray. The interaction effect clearly indicated that combination of 100 per cent RDF along with 5 sprays of water soluble fertilizer at 1.0 per cent concentration further increased most of the yield attributes.

Table 1 : Effect of foliar spray of water soluble fertilizer on growth of chilli hybrid

Treatments	Plant height (cm)		No. of branches		Days to 50% flowering		DMP		
Fertilizers (F)									
F ₁ – 100% RDF	77.71		11.08		28.75		3.09		
F ₂ – 75% RDF	73.37		9.88		29.54		2.80		
	S.E.±	0.78	S.E.±	0.14	S.E.±	0.26	S.E.±	0.07	
	C.D. (P=0.05)	1.59	C.D. (P=0.05)	0.29	C.D. (P=0.05)	0.52	C.D. (P=0.05)	0.15	
Concentration (C)									
C ₁ – 0.0% (control – water Spray)	65.75		8.25		30.00		2.36		
C ₂ – 0.5% Foliar Spray	75.25		10.17		29.33		2.77		
C ₃ – 1.0% Foliar Spray	80.22		11.50		28.83		3.18		
C ₄ – 2.0% Foliar Spray	80.95		12.00		28.41		3.47		
	S.E.±	1.10	S.E.±	0.20	S.E.±	0.36	S.E.±	0.10	
	C.D. (P=0.05)	2.21	C.D. (P=0.05)	0.42	C.D. (P=0.05)	0.52	C.D. (P=0.05)	0.21	
No. of spray (S)									
S ₁ – 5 times	74.88		10.45		29.13		2.89		
S ₂ – 7 times	76.20		10.50		29.17		2.99		
	S.E.±	0.78	S.E.±	0.14	S.E.±	0.26	S.E.±	0.07	
	C.D. (P=0.05)	NS	C.D. (P=0.05)	NS	C.D. (P=0.05)	NS	C.D. (P=0.05)	NS	
Interaction									
	S.E.±	C.D. (P=0.05)	S.E.±	C.D. (P=0.05)	S.E.±	C.D. (P=0.05)	S.E.±	C.D. (P=0.05)	
C x S	1.56	NS	0.28	0.58	0.51	NS	0.15	NS	
S x F	1.10	NS	0.20	NS	0.36	NS	0.10	NS	
C x F	1.56	3.19	0.28	0.58	0.51	NS	0.15	0.30	
C x S x F	2.21	NS	0.40	0.82	0.72	NS	0.21	NS	

NS=Non-significant, RDF – Recommended Dose of Fertilizer

Table 2 : Effect of foliar spray of water soluble fertilizer on the yield of chilli hybrid

Treatments	Fruit length (cm)		Fruit girth (cm)		Fruit weight (g)		Number of seeds per fruit		
Fertilizers (F)									
F ₁ – 100% RDF	11.64		4.94		8.99		114.54		
F ₂ – 75% RDF	10.13		4.57		7.79		98.33		
	S.E.±	0.03	S.E.±	0.02	S.E.±	0.27	S.E.±	0.71	
	C.D. (P=0.05)	0.07	C.D. (P=0.05)	0.05	C.D. (P=0.05)	0.55	C.D. (P=0.05)	1.46	
Concentration (C)									
C ₁ – 0.0% (control–water spray)	8.46		4.09		6.57		90.58		
C ₂ – 0.5% Foliar Spray	10.80		4.76		8.05		102.75		
C ₃ – 1.0% Foliar Spray	11.54		4.99		9.09		113.75		
C ₄ – 2.0% Foliar Spray	12.73		5.18		9.85		116.92		
	S.E.±	0.05	S.E.±	0.03	S.E.±	0.38	S.E.±	1.01	
	C.D. (P=0.05)	0.10	C.D. (P=0.05)	0.07	C.D. (P=0.05)	0.78	C.D. (P=0.05)	2.06	
No. of spray (S)									
S ₁ – 5 times	10.67		4.70		8.23		105.00		
S ₂ – 7 times	11.09		4.80		8.56		107.00		
	S.E.±	0.03	S.E.±	0.02	S.E.±	0.27	S.E.±	0.71	
	C.D. (P=0.05)	0.07	C.D. (P=0.05)	0.05	C.D. (P=0.05)	NS	C.D. (P=0.05)	1.46	
Interaction									
	S.E.±	C.D. (P=0.05)	S.E.±	C.D. (P=0.05)	S.E.±	C.D. (P=0.05)	S.E.±	C.D. (P=0.05)	
C x S	0.07	0.14	0.05	0.09	0.54	NS	1.43	2.92	
S x F	0.05	0.10	0.03	0.07	0.38	NS	1.01	NS	
C x F	0.07	0.01	0.05	0.09	0.54	1.10	1.43	2.92	
C x S x F	0.10	0.20	0.07	0.13	0.76	NS	2.02	NS	

NS=Non-significant, RDF – Recommended Dose of Fertilizer

Table 3 : Effect of foliar spray of water soluble fertilizer on yield of chilli hybrid

Treatments	1000 seed weight (g)		Number of fruits per plant		Fruit yield per plant (g)		Yield per hectare (t)		
Fertilizers (F)									
F ₁ – 100% RDF		5.88		95		930.63		21.54	
F ₂ – 75% RDF		5.35		88.66		810.58		19.70	
	S.E.±	0.03		0.44		3.80		0.16	
	C.D. (P=0.05)	0.05		0.90		7.76		0.32	
Concentration (C)									
C ₁ – 0.0% (control – water Spray)		4.73		78.17		714.75		16.61	
C ₂ – 0.5% Foliar Spray		5.48		91.92		805.58		19.31	
C ₃ – 1.0% Foliar Spray		5.99		97.50		947.33		22.15	
C ₄ – 2.0% Foliar Spray		6.25		99.75		1,014.75		24.03	
	S.E.±	0.04		0.63		5.37		0.22	
	C.D. (P=0.05)	0.07		1.28		10.97		0.45	
No. of spray (S)									
S ₁ – 5 times		5.52		91.00		865.50		20.18	
S ₂ – 7 times		5.71		92.67		875.71		20.87	
	S.E.±	0.03		0.44		3.80		0.16	
	C.D. (P=0.05)	0.05		0.90		7.76		0.32	
Interaction									
	S.E.±	C.D. (P=0.05)	S.E.±	C.D. (P=0.05)	S.E.±	C.D. (P=0.05)	S.E.±	C.D. (P=0.05)	
C x S	0.05	NS	0.89	1.81	7.60	15.51	0.31	0.64	
S x F	0.04	0.07	0.63	NS	5.37	NS	0.22	NS	
C x F	0.05	0.11	0.89	1.81	7.60	15.51	0.31	0.64	
C x S x F	0.07	0.15	1.25	2.56	10.74	21.94	0.44	0.91	

NS=Non-significant, RDF – Recommended Dose of Fertilizer

The higher yield attributes recorded, using 1.0 per cent water soluble fertilizer sprayed five times was due to adequate supply of required nutrients in the correct proportion as and when needed by the crop compared to soil application. The balanced nutrition throughout the growth period has helped in increasing the photosynthetic efficiency and source of the plant thereby increasing the yield attributes like fruit length, fruit weight and number of fruits per plant. These results are in close conformity with the finding of Palaniappan *et al.* (1999) in chilli; Batra *et al.* (2002) and Karpagam *et al.* (2004) in brinjal and Manjunatha (2004) in okra, who also observed higher yield attributes with the foliar application of polyfeed.

Conclusion :

Studies revealed that combination of 100 per cent RDF + 1.0 per cent water soluble fertilizer + 5 spray significantly recorded the highest values for most of the plant growth parameters and yield attributes when compared to water spray and rest of the treatments.

REFERENCES

Ananthi, S., Veeraragavathatham, D. and Srinivasan, K.

(2007). Comparative efficiency of MOP and SOP on yield attributes and economics of chilli. *South Indian J. Hort.*, **52**(1-6): 158-168.

Batra, V.K., Singh, B. and Singh, V. (2002). Response of brinjal to foliar feeding of water soluble fertilizers. International Conference on Vegetables, p. 11-14.

Karpagam, R., Kannan, M., Natarajan, S. and Srinivasan (2004). Studies on the efficacy of foliar feeding of water soluble fertilizers on growth parameters and yield of brinjal (*Solanum melongena* L.) hybrid COBH-1. *South Indian J. Hort.*, **52** (1-6): 139-145.

Manjunatha, G. (2004). Effect of foliar nutrition of water soluble fertilizers in bhendi (*Abelmoschus esculentus*) hybrid. M.Sc. (Hort.) Thesis, Tamil Nadu Agricultural University, Coimbatore, T.N. (INDIA).

Palaniappan, S.P., Jeyabal, A. and Chelliah, S. (1999). Response of tomato and chilli to foliar application of water soluble fertilizers. *Veg. Sci.*, **23** (1): 9-15.

Pithankar, D.H., Sadawarte, K.T., Mahorkar, V.K. and Dipali Deo (2004). Effect of foliar application of boron and DAP fertilization on quality of tomato (*Lycopersicon esculentum*, Mill). *J. Soils & Crops*, **14** (1): 46-49.

Sundaram, V. and Kanthaswamy, V. (2005). Response of okra to foliar feeding of water soluble fertilizers. *Veg. Sci.*, **32** (1): 92-93.

Venkataraman, R. (2007). Response of okra [*Abelmoschus esculentus* (L.) Moench] to foliar feeding of water soluble fertilizers. M.Sc. (Hort.) Thesis. Pandit Jawaharlal Nehru College of Agriculture and Research Institute, Karaikal, PUDUCHERRY

(INDIA).

Verma, A., Kallo, G., Singh, K.P. and Banerjee, M.K. (2002). Production, productivity and export of vegetables. *Technical bulletin-7, IIVR, Varanasi*- pp.6.

Yadav, B.D., Khandelwal, R.B. and Sharma, Y.K. (2004). Response of tomato to foliar feeding of water soluble fertilizers. *Veg. Sci.*, **31** (1): 98-100.

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