

Effect of fertigation on growth parameters in Coriander(*Coriandrum sativum* L.)

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ABSTRACT

The correct quantity of fertilizers application not only increases the yield but also improve the quality. Fertigation allows applying the nutrients exactly and uniformly only to the root volume, where the plants active roots are concentrated. Hence, the present investigation was taken up to find out the influence of fertigation on growth of leafy types coriander. Two genotypes (Co CR-4, CS 11) were selected for this study. higher doses of water soluble fertilizer (125 per cent) through fertigation in variety Co CR-4 resulted in better growth parameters than that of other levels of fertigation compared to CS 11. It also resulted in increased plant height, No of branches, No of leaves and root length etc

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Key words : Coriander, Fertigation, Growth

INTRODUCTION

Coriander (*Coriandrum sativum* L.) is a annual herb with several branches and lacy leaves with jagged edges belonging to the family Apiaceae. It is native of Mediterranean region. This aromatic herb is found in many parts of the world. In India, coriander is mainly cultivated in Rajasthan and Gujarat with a sizeable acreage in Madhya Pradesh, Haryana, Punjab, Uttar Pradesh, Andhra Pradesh, Tamil Nadu and Bihar. The correct quantity of fertilizers application not only increases the yield but also improve the quality. Fertigation allows applying the nutrients exactly and uniformly only to the root volume, where the plants active roots are concentrated. Hence, the present investigation was taken up to find out the influence of fertigation on growth of leafy types coriander

MATERIALS AND METHODS

The field experiment was conducted at the University orchard of Horticultural College and Research Institute, Tamil Nadu Agricultural University, Coimbatore. Two genotypes (Co CR-4, CS 11) were selected for this study, as the genotypes proved well for use as leafy type.

The experiment was laid out in FRBD design with 4 treatments replicated thrice. Drip fertigation with water soluble fertilizer at 75 %, 100 %, 125 % RDF along with the recommended normal fertilizer applied to soil with furrow irrigation. The experiment was laid out in FRBD design with 4 treatments replicated thrice. The statistical

analysis was done as per Panse and Sukatme (1985).

RESULTS AND DISCUSSION

In case of Plant height at 35 DAS, application of nutrients through fertigation significantly influenced the plant height. Application of 125% RDF (T_1) recorded 19.03 and 18.06 cm in first and second season, respectively. With regard to variety, Co CR-4 (V_1) had taller plants than CS 11 (V_2).

At 45 DAS, application of 125 per cent RDF (T_1) recorded the highest plant height of 33.93 and 34.22 cm during first and second season, respectively (Table 1). The plant height showed an increasing trend of growth during different stages of observation. This is in confirmation with Tumbare and Nikam (2004) and Rajasekeran (2006). The availability of auxin might have increased the stem elongation coupled with apical dominance, which eventually would have increased the plant height.

The coriander has responded to more synthesis of hormones such as auxin which would have encouraged the apical dominance that ultimately could have resulted in increased plant height (Table 1).

The effect of fertigation on number of branches at different growth stages of coriander in two different varieties are furnished in the Table 2. The treatments had a significant influence on number of branches at all stages of observation.

Application of 125 per cent RDF (T_1) recorded more number of branches per plant viz., 12.03 and 12.25 during first and second season, respectively, at 45 DAS. The

Table 1 : Effect of fertigation on plant height (cm) at different growth stages in coriander

Treatments	35 DAS						45 DAS					
	Season I			Season II			Season I			Season II		
	V ₁	V ₂	Mean	V ₁	V ₂	Mean	V ₁	V ₂	Mean	V ₁	V ₂	Mean
T ₁	19.78	18.28	19.03	19.06	17.06	18.06	35.50	32.37	33.93	34.60	33.84	34.22
T ₂	18.63	15.28	16.96	17.15	13.25	5.20	29.64	27.70	28.67	27.54	25.81	26.67
T ₃	17.33	14.30	15.81	15.06	12.49	13.78	26.55	23.56	25.05	21.25	20.14	20.70
T ₄	15.39	11.50	13.45	10.73	8.15	9.44	18.31	17.34	17.83	18.46	17.42	17.94
Mean	17.78	14.84		15.50	12.74		27.50	25.24		25.46	24.30	
	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)	
V	0.11365	0.24378		0.01762	0.03779		0.10952	0.23492		0.05717	0.12263	
T	0.16073	0.34476		0.02492	0.05345		0.15488	0.33222		0.08085	0.17342	
V x T	0.22730	0.48756		0.03524	0.07558		0.21903	0.46983		0.11434	0.24526	

Note : DAS = Days after sowing

lowest number of branches was registered in the treatment applied with recommended NPK applied to soil with furrow irrigation (T₄) with values of 5.46 and 5.35 during first and second season, respectively.

The interaction effect showed that the maximum number of branches in Co CR-4 with 125 per cent of fertigation (T₁V₁) in all the stages of the crop growth followed by the variety CS11 combined with 125 per cent of fertigation T₁V₂ in both two seasons. The effect of fertigation on number of leaves at different growth stages of coriander in two different varieties are furnished in the Table 3. The treatments had a significant influence on number of leaves at all stages of observation. At 35 DAS, application of nutrients through fertigation significantly influenced the number of leaves. Application of 125% RDF (T₁) recorded 22.57 and 22.39 in first and second season, respectively. With regard to the variety Co CR-4 (V₁) had more number of leaves than CS 11(V₂).

At 45 DAS, application 125 per cent RDF (T₁) recorded the more number of leaves of 46.90 and 45.74

during first and second season, respectively. The lowest number of leaves was registered in the treatment applied with recommended NPK applied to soil with furrow irrigation (T₄) with values of 20.90 and 20.99 during first and second season, respectively. Values have exhibited similar trend as that of observations at 35 DAS. The number of branches and leaves per plant was significantly increased by the application of water soluble fertilizers through fertigation. Number of branches and leaves produced per plant directly influenced the yield of coriander since more number of branches contributed more yield. In the present investigation, application of 125 per cent water soluble fertilizer in the variety Co CR-4 resulted in maximum number of branches and leaves per plant. Prabhu (2007) also observed similar results that the number of branches per plant was highest with the application of 125 per cent water soluble fertilizer plus micronutrients through fertigation in paprika. The increased number of branches might be due to better sink developed by axillary branches due to a large amount of available nutrients as reported by Maya (1996) in sweet

Table 2 : Effect of fertigation on number of branches at different growth stages in coriander

Treatments	35 DAS						45 DAS					
	Season I			Season II			Season I			Season II		
	V ₁	V ₂	Mean	V ₁	V ₂	Mean	V ₁	V ₂	Mean	V ₁	V ₂	Mean
T ₁	6.48	4.29	5.38	6.54	4.33	5.43	13.3	10.67	12.03	13.16	11.33	12.25
T ₂	5.49	3.62	4.55	5.25	3.53	4.39	11.52	9.32	10.42	11.35	9.23	10.29
T ₃	4.67	2.48	3.58	3.45	3.06	3.25	9.63	8.31	8.97	10.48	8.54	9.51
T ₄	2.32	1.95	2.13	2.13	1.73	1.93	6.61	4.31	5.46	6.35	4.35	5.35
Mean	4.74	3.09		4.34	3.16		10.29	8.15		10.33	8.36	
	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)	
V	0.09844	0.21115		0.01654	0.03549		0.09076	0.19469		0.01485	0.03185	
T	0.13921	0.29861		0.02340	0.05019		0.12836	0.27533		0.02100	0.04505	
V x T	0.19687	0.42230		0.03309	0.07098		0.18152	0.38937		0.02970	0.06371	

Note : DAS = Days after sowing

pepper cv. CALIFORNIA WONDER. Meenakshi and Vadivel (2003) reported similar results that the number of branches per plant was the highest in the treatment of application of 125 per cent water soluble fertilizer with micronutrients compared to 100 per cent straight fertilizers in soil coupled with surface irrigation. Similar results were also reported by Kavitha (2005). This is in accordance with the study conducted in tomato by Sharma (1995) and Pandey *et al.* (1996). The combined effect of variety Co CR-4 with 125 per cent of fertigation (T_1V_1) was significant and observed maximum number of leaves in all the stages of the crop growth followed by T_1V_2 in both two seasons.

The effect of fertigation on root length at different growth stages of coriander in two different varieties are furnished in the Table 4.

Significant influence on root length at all stages of observation was recorded. Application of nutrients through fertigation significantly influenced the root length at 35 DAS. Application of 125% RDF (T_1) recorded 6.34 and 6.95 cm in first and second season, respectively. Among the varieties Co CR-4 (V_1) had maximum root length than CS 11(V_2).

Regarding the interaction effect, the maximum root length was recorded in Co CR-4 with 125 per cent of fertigation (T_1V_1) in all the stages of the crop growth followed by T_1V_2 in both two seasons. The root system is the link between the plant and the soil. It is responsible for the absorption of water and nutrients, anchorage, synthesis of some plant hormones and storage (Batna and Rao, 1993 ; Chawla and Narda, 2000). Drip fertigation in variety Co CR-4 with 125 per cent water soluble fertilizer produced longer roots than other levels of fertigation and also with soil application with furrow irrigation.

In fertigation with surface wetting, the production of lengthier roots clearly indicated that the plant tried hard to extract water from deeper layers to meet its water requirements. Growth of the root, in general, is stimulated by phosphorus and applied P would have encouraged early root growth. Similar results were reported by Ahmed and Saha (1986) and Pandey *et al.* (1996).

Different levels of fertigation had significantly influenced the growth characters in coriander. In the present investigation, the growth parameters of coriander

Table 3 : Effect of fertigation on number of leaves at different growth stages in coriander

Treatments	35 DAS						45 DAS					
	Season I			Season II			Season I			Season II		
	V_1	V_2	Mean	V_1	V_2	Mean	V_1	V_2	Mean	V_1	V_2	Mean
T_1	23.74	21.40	22.57	22.94	21.83	22.39	48.51	45.30	46.90	46.35	45.13	45.74
T_2	20.55	17.50	19.02	19.35	18.10	18.72	38.43	36.83	37.63	35.41	34.12	34.77
T_3	18.58	15.38	16.98	18.82	17.72	18.27	29.40	27.40	28.40	25.33	24.14	24.73
T_4	14.52	10.41	12.47	11.22	10.54	10.88	22.52	19.27	20.90	21.83	20.15	20.99
Mean	19.35	16.17		18.08	17.05		34.71	32.20		32.23	30.88	
	S.E. \pm	C.D. (P=0.05)		S.E. \pm	C.D. (P=0.05)		S.E. \pm	C.D. (P=0.05)		S.E. \pm	C.D. (P=0.05)	
V	0.11105	0.23820		0.05264	0.11292		0.10487	0.22497		0.01750	0.03754	
T	0.15705	0.33687		0.07445	0.15969		0.14830	0.31811		0.02475	0.05309	
V x T	0.22210	0.47641		0.10528	0.22583		0.20973	0.44988		0.03500	0.07508	

Note : DAS = Days after sowing

Table 4 : Effect of fertigation on root length (cm) at different growth stages in coriander

Treatments	35 DAS						45 DAS					
	Season I			Season II			Season I			Season II		
	V_1	V_2	Mean	V_1	V_2	Mean	V_1	V_2	Mean	V_1	V_2	Mean
T_1	7.42	5.27	6.34	7.54	6.35	6.95	11.65	9.82	10.74	11.64	9.25	10.44
T_2	6.58	4.30	5.44	6.73	4.34	5.53	9.73	8.23	8.98	9.47	7.35	8.41
T_3	4.58	3.06	3.82	4.93	4.03	4.48	7.75	6.27	7.01	7.92	6.33	7.12
T_4	2.74	1.89	2.31	2.83	2.24	2.54	3.89	2.66	3.27	3.64	2.80	3.22
Mean	5.33	3.63		5.51	4.24		8.25	6.74		8.17	6.43	
	S.E. \pm	C.D. (P=0.05)		S.E. \pm	C.D. (P=0.05)		S.E. \pm	C.D. (P=0.05)		S.E. \pm	C.D. (P=0.05)	
V	0.02545	0.05460		0.01633	0.03502		0.06211	0.13324		0.01689	0.03623	
T	0.03600	0.07722		0.02309	0.04953		0.08784	0.18843		0.02389	0.05124	
V x T	0.05091	0.10920		0.03265	0.07004		0.12423	0.26647		0.03378	0.07246	

Note : DAS = Days after sowing

as influenced by fertigation treatments have been elucidated through plant height, number of branches number of leaves and root length.

All the growth attributes were found to be increased with increasing level of nutrients (N, P and K) application by fertigation. The results of the experiment clearly indicated that fertigation markedly increased the growth parameters of the crop compared to soil application with furrow irrigation. The interaction between higher doses of water soluble fertilizer (125 per cent) through fertigation in variety Co CR-4 resulted in better growth parameters than that of other levels of fertigation compared to CS 11. Meenakshi and vadivel(2003) responded well to higher fertilizer doses. The enhancement of growth parameters might be due to the restricted wetting area and root zone application of nutrients through drip system coupled with constant and continuous availability of optimum soil moisture, which provide the plants to absorb more nutrients .

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