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SHORT COMMUNICATION

Chlorophyll content in leaves of coriander as influenced by sowing dates, nitrogen and plant growth regulators

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Coriander *(Coriandrum sativum* L.) is one of the important leafy-green vegetable as well as seed spices crop grown in almost all states of India. Rajasthan occupies the first position both in production and acreage of coriander. The production of coriander in Rajasthan is 2.86 lakh tonnes from 2.41 lakh hectare land with the productivity of 1190 kg per hectare (Anonymous, 2004). At present, India is exporting only 5 per cent of the total produce. This is due to inability to withstand international quality standards of the produce. Therefore, there is an urgent need to increase the productivity and to upgrade quality so that it can withstand competition in the international market (Singhal, 1999). The important limiting factors are poor package of practices, untimely sowing, lack of adoption on judicious nutrients and also lack of knowledge on the use of plant growth regulators.

It is, therefore, necessary to identify optimum time of sowing, nitrogen doses, which will ensure a balance between vegetative growth and reproductive phase of coriander so that chlorophyll content in leaves can be enhanced. The use of Naphthalene acetic acid (NAA) and Gibberellic acid (GA_3) have been found to increase the economic yield of several crops, but very little work has been reported for coriander. Keeping in view the present investigation was carried out to study the effect of sowing dates, nitrogen and plant growth regulators on chlorophyll content in leaves of coriander.

The experiment was conducted at Instructional-Cum-Research Farm, Department of Horticulture, Rajasthan College of Agriculture, MPUAT, Udaipur, situated at 24°.35 N latitude and 24°42 E longitude at an elevation of 579.5 meter above mean sea level. The climate of this zone is typically semi-arid and subtropical. The average rainfall of this tract ranges from 650 –750 mm of which 90 per cent is received during the period of July to September. The soil of experimental site was clay loam in texture, slightly alkaline in reaction and medium in nitrogen and phosphorus and potassium status. The experiment was laid out in Spilt Plot design with four replications. Three sowing dates (15 th Oct, 31st Oct. and 15 th Nov.) and two levels of nitrogen (N @ 60 kg ha^{-1} and N @ 75kg ha^{-1}) in main plots and five levels of plant growth regulators (NAA 25 ppm at 30, 75 DAS, GA_3 at 30,75 DAS and control) treatments were allocated in sub- plots. Before sowing the seeds were splitted into two halves and seed treatment was given with 2 gm Bavistin per kg of coriander seeds. As per treatment the sowing was done manually on 15th Oct., 30 th Oct and 15 th Nov. during the year 2003-04 and 2004-05. After sowing, the seeds were covered with soil by partially dismantling the lines. A uniform doses of 45 kg P_2O_5 ha^{-1} through single super phosphate and 1/3 rdnitrogen as per treatment was drilled basally 10 cm deep at the time of sowing. Remaining dose of nitrogen through urea was applied in two equal splits before irrigation at 30 and 75 days after sowing (DAS) during both the years. The plant growth regulator solutions were prepared by dissolving in small quantity of dilute alcohol, then the desired stock solution were prepared by adding 1000 ml distilled water. Few drops of teepole were added two each solution before spray and untreated plots were sprayed with water twice.

The leaf samples from different treatment combinations were collected and analysed for chlorophyll a, b and total chlorophyll content in leaves at 45 and 90 days after sowing. Data analysed statistically as suggested by Panse and Shukhatmae (1995)

Effect of Sowing Dates

A perusal of data in Table 1 reveals that chlorophyll content in leaves of coriander were influenced by date of sowing in both the years. The results exhibited that the maximum chlorophyll a, b and total chlorophyll content in leaves at 45 and 90 days after sowing (10.87, 2.26, 13.13, 11.19, 2.44 and 13.63 mg/g) respectively, were recorded when coriander crop was sown on 15th October. The chlorophyll a,b and total chlorophyll content was reduced in the later date of sowing. This might be due to the fact that reduction in chlorophyll content under delayed sown could be attributed to the reduction in span of reproductive growth phase. The present study is inclosing conformity with the findings of Bhati (1991), Jat (1995) and Naghera *et al* (2000).

Effect of nitrogen

The results indicated that increasing leaves of nitrogen fertilization did not show any significant effect on chlorophyll content in leaves.

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Table 1. Effect of sowing dates, nitrogen levels and plant growth regulators on chlorophyll content in leaves of coriander (Pooled data of two years)

Treatments	Chlorophyll 'a' (mg g^{-1})		Chlorophyll 'b' (mg g^{-1})		Total chlorophyll (mg g^{-1})	
	45 DAS	90 DAS	45 DAS	90 DAS	45 DAS	90 DAS
A. Date of sowing						
15th October	10.87	11.19	2.26	2.44	13.13	13.63
30th October	10.78	11.06	2.24	2.41	13.02	13.47
15th November	9.57	9.85	2.00	2.18	11.57	12.03
SEm ±	0.07	0.07	0.02	0.02	0.08	0.08
CD at 5 %	0.20	0.21	0.05	0.05	0.23	0.24
B. Nitrogen levels						
N @ 60 kg/ha	10.36	10.63	2.15	2.32	12.51	12.95
N @ 75 kg/ha	10.45	10.77	2.18	2.36	12.64	13.13
SEm ±	0.05	0.06	0.01	0.01	0.06	0.07
CD at 5 %	NS	NS	NS	NS	NS	NS
C. Plant growth regulators						
Control (Water spray)	9.47	9.76	1.95	2.13	11.41	11.89
NAA 25 ppm at 30 days after showing	11.71	12.01	2.41	2.59	14.12	14.58
NAA 25 ppm at 75 days after showing	9.70	10.03	2.06	2.24	11.76	12.24
GA_3 50 ppm at 30 days after showing	11.54	11.82	2.39	2.56	13.93	14.40
GA_3 50 ppm at 75 days after showing	9.62	9.88	2.03	2.20	11.65	12.11
SEm ±	0.08	0.09	0.02	0.02	0.09	0.10
CD at 5 %	0.23	0.24	0.06	0.06	0.27	0.27

Effect of plant growth regulators

Chlorophyll a,b and total chlorophyll content in leaves of coriander were also found to be influenced significantly as a result of plant growth regulators application (Table 1). The maximum chlorophyll a,b and total chlorophyll content in leaves at 45 and 90 days after sowing (11.71,2.41,14.12,12.01,2.59 and 14.58 mg/g) respectively with 25 ppm NAA at 30 DAS treatments over control. However, it was found at par with application of 50 ppm GA_3 at 30 DAS. The increase in the peroxidase and catalase activity as a result of application of plant growth regulators might have led to the increased chlorophyll content and its metabolism (Vijaylakshmi and Srinivasan,1999). The present result on chlorophyll content in leaves are inclose agreement with those of Dharmender *et al* (1996) in cabbage, Sumeriya *et al* (2000) in mustard and Medhi (2000) in french bean, who, reported the higher chlorophyll content a result of auxin application which strongly support the present findings.

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