

Original Research Article

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## Influence of Bio-Fertilizers on Morphological, Yield and Quality of Coriander cv. (*Coriandrum sativum* L.)

Roshan Lal Sahu<sup>1\*</sup> and Hansa Sahu<sup>2</sup>

<sup>1</sup>KVK, Anjora (Durg), IGKV Raipur, India

<sup>2</sup>Department of Plant Physiology, IGKV Raipur, India

\*Corresponding author

### ABSTRACT

#### Keywords

Coriander, PSB, AzospirillumAzotobacter, Morphology, yield

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A field study was carried out in Horticulture Research Farm, I.G.K.V. Raipur (C.G.) during *rabi* season 2007-08. The results indicated that vegetative growth contributing characters (leaf area index, fresh and dry weight per plant) were influenced by combination of 100%K and 75% NP along with *Azotobacter*, *Azospirillum* and PSB (T<sub>8</sub>). Yield contributing characters (like number of seed per umbellet, 1000-seed weight (g), total no of seed per plant (g) and seed yield (q/ha) maximum in (T<sub>8</sub>) were given better performance respectively over all the treatments. Hence it is concluded that the treatment (T<sub>8</sub>) 75% NP+100%K+Azotobacter, Azospirillum and PSB was found economically B: C ratio (1:4.9) best than all the treatments studied in this investigation.

### Introduction

Coriander (*Coriandrum sativum* L.) is an annual herb, generally called “Dhania” belongs to family Apiaceae (Umbelliferae) with diploid chromosome number (2n =22). Coriander is one of the major seed spices grown in India. It is one of the earliest spices known to mankind for its intrinsic and fragrant qualities of both seed and leaves.

Biofertilizers are less expensive, eco-friendly and sustainable likely to assume greater

significance as a compliment or supplement to inorganic fertilizers (Malhotra *et al.*, 2006). Biofertilizers are the products which contain living cells of different types of microorganisms that have an ability to convert nutritionally important elements from unavailable to available form through biological processes.

### Materials and Methods

The experiment was carried out during Rabi season 2007-08 at the Horticulture Research

Farm, Department of Horticulture, Indira Gandhi Krishi Vishwavidyalaya (I.G.K.V.) Raipur. Raipur is situated in the central eastern part of Chhattisgarh and lies at 21°16' N latitude and 81°26'E longitudes with an altitude of 289.59 m above the mean sea level. The total rainfall of the season was about 24.0 mm of rainfall during its growth period. The temperature ranges during the crop growth period varied between 18.0°C - 26.67°C.

The texture of experimental soil was loamy sand and with subsurface sandy clay loam, the experiment was planted in Randomized Block Design (RBD) with the three replications. There were fifteen treatments comprising of different bio-fertilizers with and without inorganic fertilizers (NPK).

Pant Haritama an improved variety of coriander developed through intensive selection from Bulgarian material by G.B. Pant Agriculture University Pantnagar, was used in the present investigation.

## Results and Discussion

### Morphological characters

Morphological characters such as leaf area index, fresh weight and dry weight of plants (table 1) showed significant variation with different biofertilizers. Treatment (T<sub>8</sub>) *i.e.*, combination of recommended K and 75% NP along with *Azospirillum*, *Azospirillum* and PSB recorded highest leaf area index (0.19, 0.89 and 0.33 at 45, 90 DAS and at harvest), fresh weight (9.75, 25.95 and 47.48 at 45, 90 DAS and at harvest) and dry weight of plants (4.06 g, 7.42 g and 17.83 g at 45, 90 DAS and at harvest). Wange *et al.*, (1995) in garlic Treatment (T<sub>1</sub>) with 60:40:40 kg/ha NPK

recorded the minimum leaf area index per plant, (0.15, 0.84 and 0.07 at 45, 90 DAS and at harvest), fresh weight (6.85, 15.76 and 38.23 at 45, 90 DAS and at harvest) and dry weight of plants (2.39 g, 5.37 g and 11.45 g at 45, 90 DAS and at harvest). Some results were also observed by Valadabadi (2011) in *Nigella sativa*.

### Quality characters

Essential oil content was also showed significant variation among the different biofertilizers. The treatment (T<sub>8</sub>) recorded the maximum essential oil content in seeds (0.96 %) and followed by the treatment (T<sub>9</sub>) (0.91 %) and T<sub>6</sub>, T<sub>7</sub> and T<sub>10</sub> treatments were also *at par* with each other (0.91% each). However, the lowest essential oil content (0.84 %) was recorded in the T<sub>2</sub> and T<sub>14</sub> treatments were also *at par* with each other

Similar observation was recorded by Rahimi *et al.*, (2009), Shivalingappa (1998) also reported that plants inoculated with *Azospirillum*, *Azospirillum* and VAM along with NPK 75: 37.5: 50 kg per hectare was recorded more concrete yield in tuberose.

### Yield and yield attributes

The yield and yield attributing characters, such as number of seed per umbellet (74.25), total number of seeds per plant (1720.36), weight of 1000 seeds (8.50 g) and seed yield (23.78 q/ha) (Table 2) were also showed significant variation among the different biofertilizers.

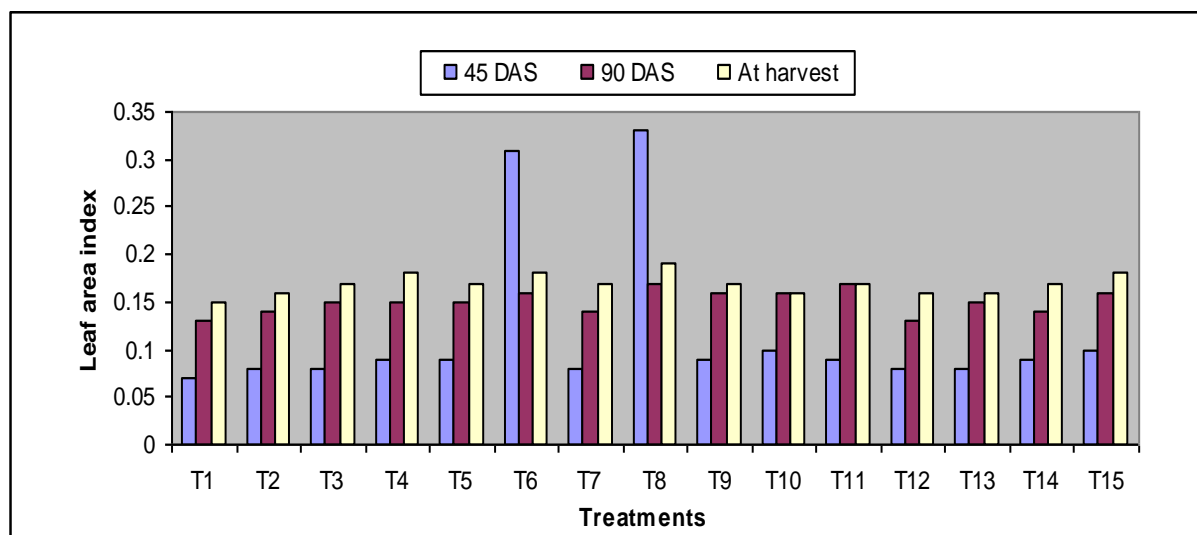
The treatment (T<sub>8</sub>) was recorded maximum and it significantly different from other treatments. Ali *et al.*, (2009), in coriander and Belimov *et al.*, (1995) in barley.

**Table.1** Influence of bio-fertilizers with graded levels of fertilizers on leaf area index, Fresh weight of plant and Dry weight of plant in coriander cv. Pant Haritama

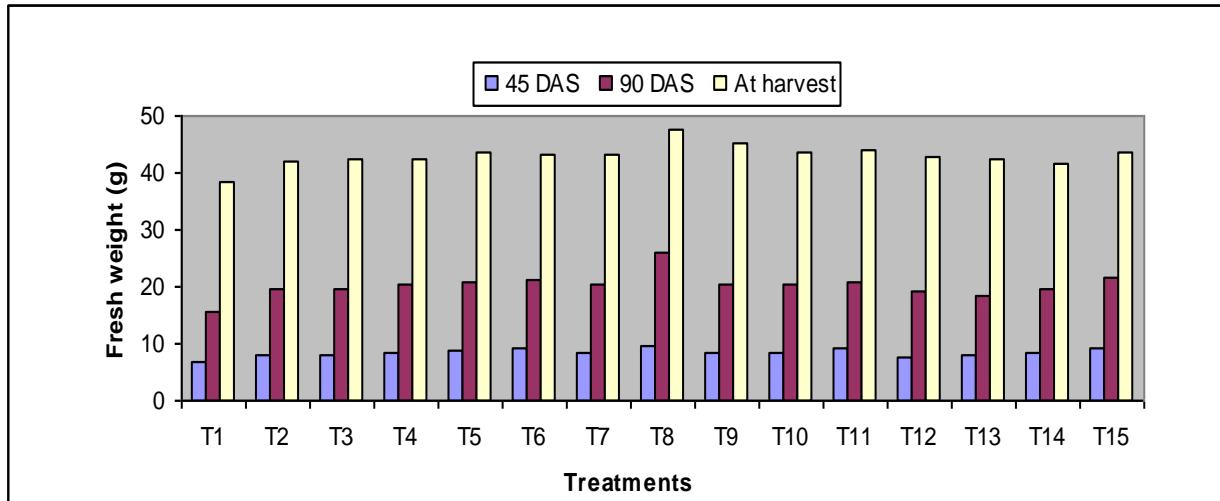
Treatments	Average leaf area index			Fresh weight of plant (g)			Dry weight of plant (g)		
	45 DAS	90 DAS	At harvest	45 DAS	90 DAS	At harvest	45 DAS	90 DAS	At harvest
<b>T1 60:40:40 (RDF) (control)</b>	0.15	0.84	0.07	6.85	15.76	38.23	2.39	5.37	<b>11.45</b>
<b>T2 75%N +100% PK +Azospirillum</b>	0.16	0.86	0.08	7.87	19.54	42.05	2.91	6.40	<b>14.32</b>
<b>T3 75% N + 100% PK + Azospirillum</b>	0.17	0.89	0.08	8.14	19.79	42.41	2.95	6.56	<b>14.44</b>
<b>T4 75% P +100% NK + PSB</b>	0.18	0.91	0.09	8.38	20.28	42.59	3.02	6.55	<b>14.46</b>
<b>T5 75% N 100% PK + Azospirillum +Azospirillum</b>	0.17	0.89	0.09	8.73	20.71	43.51	3.23	6.75	<b>14.79</b>
<b>T6 75% NP + 100% K + Azospirillum + PSB</b>	0.18	0.85	0.31	9.13	21.03	43.12	3.61	6.82	<b>14.58</b>
<b>T7 75% NP + 100% K + Azospirillum +PSB</b>	0.17	0.96	0.08	8.53	20.47	43.22	3.16	6.65	<b>14.74</b>
<b>T8 75% NP + 100%K + Azospirillum + Azospirillum + PSB</b>	0.19	0.89	0.33	9.73	25.95	47.48	4.06	7.42	<b>17.83</b>
<b>T9 50% N + 100% PK + Azospirillum</b>	0.17	0.90	0.09	8.27	20.55	45.26	3.21	6.55	<b>14.66</b>
<b>T10 50 %N +100% PK +Azospirillum</b>	0.16	0.91	0.10	8.59	20.54	43.79	3.33	6.64	<b>14.98</b>
<b>T11 50% P + 100% NK + PSB</b>	0.17	0.89	0.09	9.24	20.81	43.81	3.30	6.71	<b>14.86</b>
<b>T12 50% N + 100% PK + Azospirillum + Azospirillum</b>	0.16	0.89	0.08	7.52	19.27	42.86	2.64	6.24	<b>13.65</b>
<b>T13 50%NP +100% K + Azospirillum + PSB</b>	0.16	0.84	0.08	8.04	18.58	42.57	2.93	6.41	<b>13.3</b>
<b>T14 50% NP + 100% K + Azospirillum + PSB</b>	0.17	0.85	0.09	8.30	19.66	41.74	3.14	6.59	<b>13.4</b>
<b>T15 50% NP +100% K + Azospirillum + Azospirillum + PSB</b>	0.18	0.882	0.1	9.26	21.47	43.61	3.56	6.94	<b>14.38</b>
<b>Mean</b>	0.169	0.034	0.118	8.44	20.29	43.08	3.169	6.57	<b>14.389</b>
<b>SEm ±</b>	0.009	0.096	0.079	0.152	0.137	0.82	0.031	0.028	<b>0.032</b>
<b>CD at 5%</b>	<b>0.027</b>	<b>BB</b>	<b>0.22</b>	<b>0.427</b>	<b>0.38</b>	<b>2.28</b>	<b>0.087</b>	<b>0.079</b>	<b>0.08</b>

**Table.2** Influence of bio-fertilizers with graded levels of fertilizers on essential oil content of seeds, Weight of 1000seeds (g), No. of seed per umbellet, Total no. of seeds per plant, seed yield per hectare in coriander cv. Pant Haritama

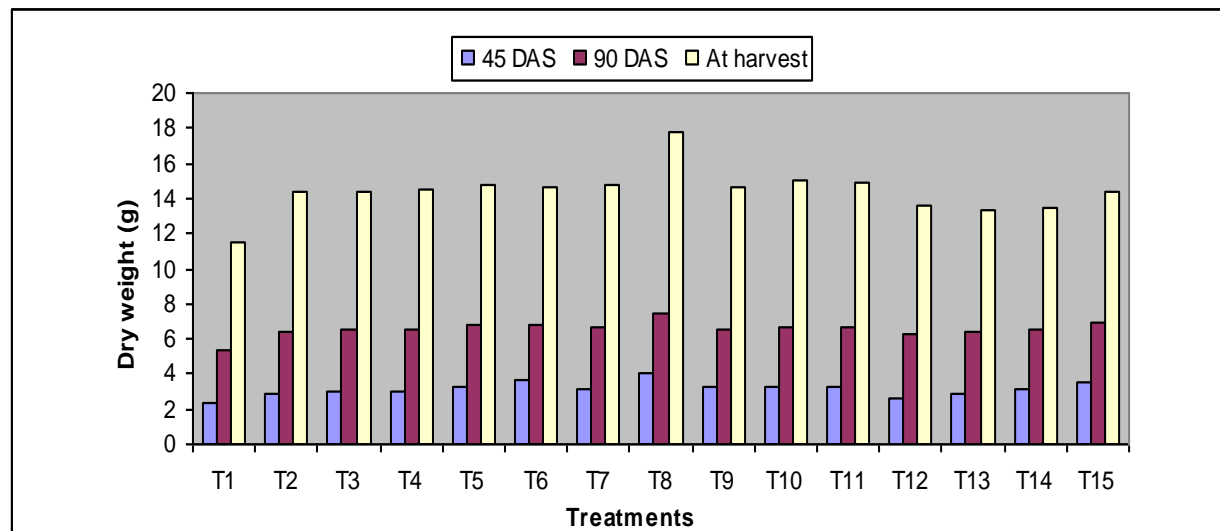
Treatments	Essential oil content in seeds (%)	Weight of 1000seeds (g)	No. of seed per umbellet	Total no. of seeds per plant	Seed yield/hect are
<b>T1 60:40:40 (RDF) (control)</b>	0.85	7.64	56.21	842.32	<b>10.27</b>
<b>T2 75%N +100% PK +Azospirillum</b>	0.84	7.71	58.02	1194.25	<b>15.18</b>
<b>T3 75% N + 100% PK + Azospirillum</b>	0.86	7.82	59.21	1296.73	<b>17.52</b>
<b>T4 75% P +100% NK + PSB</b>	0.89	7.71	64.03	1303.72	<b>16.82</b>
<b>T5 75% N 100% PK + Azospirillum +Azospirillum</b>	0.91	8.01	60.39	1426.37	<b>19.04</b>
<b>T6 75% NP + 100% K + Azospirillum + PSB</b>	0.89	7.80	60.12	1545.70	<b>20.04</b>
<b>T7 75% NP + 100% K + Azospirillum +PSB</b>	0.85	8.07	58.93	1298.99	<b>17.44</b>
<b>T8 75% NP + 100%K + Azospirillum + Azospirillum + PSB</b>	0.96	8.50	74.25	1720.36	<b>23.78</b>
<b>T9 50% N + 100% PK + Azospirillum</b>	0.89	7.72	61.81	1562.94	<b>20.00</b>
<b>T10 50 %N+100% PK +Azospirillum</b>	0.90	7.73	66.28	1601.26	<b>20.00</b>
<b>T11 50% P + 100% NK + PSB</b>	0.91	8.00	61.94	1545.36	<b>19.51</b>
<b>T12 50% N + 100% PK + Azospirillum+ Azospirillum</b>	0.89	7.71	64.25	1126.41	<b>14.45</b>
<b>T13 50%NP +100% K + Azospirillum + PSB</b>	0.89	7.50	61.64	1341.36	<b>17.7</b>
<b>T14 50% NP + 100% K + Azospirillum + PSB</b>	0.84	7.74	62.04	1403.89	<b>18.0</b>
<b>T15 50% NP +100% K + Azospirillum + Azospirillum + PSB</b>	0.85	7.83	69.09	1599.21	<b>20.4</b>
<b>Mean</b>	0.882	7.83	62.61	1388.77	<b>18.01</b>
<b>SEm ±</b>	0.034	0.019	0.028	22.26	<b>0.248</b>
<b>CD at 5%</b>	<b>0.096</b>	<b>0.052</b>	<b>0.078</b>	<b>61.71</b>	<b>0.688</b>



**Fig.1** Influence of bio-fertilizers with graded levels of fertilizers on leaf area index of coriander cv. Pant Haritama



**Fig.2** Influence of bio-fertilizers with graded levels of fertilizers on fresh weight of coriander cv. Pant Haritama



**Fig.3** Influence of bio-fertilizers with graded levels of fertilizers on dry weight of plants of coriander cv. Pant Haritama

However, the minimum number of seed per umbellet (56.21), total numbers of seeds per plant (842.32), weight of 1000 seeds (7.50 g) and seed yield (10.27 q/ha). Roy and Singh, (2006) in barley and Darzi *et al.*, (2001) in Fennel.

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