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RESEARCH PAPER

Effect of different date of sowing and growing conditions on coriander (*Coriandrum sativum* L.) cv. Gujarat coriander-2

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Abstract : The present investigation on the effect of different date of sowing and growing conditions on coriander (*Coriandrum sativum* L.) cv. Gujarat Coriander-2 as leafy vegetable, was conducted at Horticulture Instructional Farm, Department of Horticulture, Collage of Agriculture, Junagadh during the year 2010. Seed germination, growth parameters and yield attributes were influenced by different sowing dates. Among them dry weight of plant (2.11 g), green yield (23.52 tonne/ha) and TSS (5.44^{o}Brix), were found maximum in treatment T_5 (sowing at 22nd June). Whereas, minimum mortality percentage (3.48 %), width of leaf (2.04 cm) and maximum fresh weight of plant (6.85 g) and germination percentage (77.71 %) were found in treatment T_1 (sowing at 25th April). The number of leaves per branch (4.06) and length of leaf (2.29 cm) were found maximum in treatment T_3 and T_4, respectively (sowing at 08th June). Among various growing conditions the germination percentage (76.30 %), length of leaf (2.26 cm), dry weight of plant (2.11 g), green yield (21.82 tonne/ha) and TSS (5.36^{o}Brix) were found maximum, but mortality percentage was found minimum (3.73 %) in C_2 condition (natural ventilated poly house). The number of leaves per branch (3.98) was found maximum in condition C_3 (net house (low-cost). The width of leaf (2.00 cm) and fresh weight of plant (6.61 g) per plant were found maximum in condition C_1 (fan pad poly house).

Key Words : Date of sowing, Growing condition, Coriander

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INTRODUCTION

Coriander (*Coriandrum sativum* L.) is an annual aromatic herb, grown for its green fresh leaves, seed, essential oil and oleoresin. Coriander, also known as cilantro and Chinese parsley, is a member of family Apiaceae (Umbelliferae). Its name is derived from the Greek world '*Koris*' meaning bedbug, because of the unpleasant fetid bug-like odour of the green herb and unripe fruits. It is commonly known as "Dhania" or "Dhana". India has been known as the "home of the spices" from very ancient times. Spices play important role in human dietary, as they give an agreeable flavour and aroma to food and add greatly to the pleasure of eating. It is probably the first spice to be used by man as common flavoring substance. The stem, leaves and fruits have a pleasant aromatic odour. The pleasant aroma of the fruits is due to the linalool containing essential oil (Pruthi, 1976). Which is used for medicinal and flavoring beverages and its residues are used for cattle feed. The entire young plant is used in preparing "Chutney".

One of the important factors responsible for low yield of any crop is improper time of sowing, which exerts a distinct effect on growth, severe competition of weeds and to some extent powdery mildew and aphid infestation.

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Successful commercial cultivation of any crop is possible only if, the temperature and other climatic condition are favorable for its growth and development.

In the present scenario of perpetual demand of vegetable' and shrinking land holding drastically, protected cultivation is the best alternative and drudgery-less approach for using land and other resources more efficiently. In protected environment (Greenhouse, net house, glasshouse), the natural environment is modified to suitable condition for optimum plant growth, which ultimately provides quality vegetables (Sirohi and Behera, 2000). From greenhouse crop yield is several time more, than the yield obtain from outdoor cultivation. Because of environmental control, any crop can be grown at any time of the year, and even one type of crop can be raised round the year, if needed.

In view of the above consideration and adequate research evidences, the study was carried out with the following objective: to study the effect of different date of sowing and growing conditions on growth, green yield and quality of coriander.

MATERIAL AND METHODS

The present investigation on the effect of different date of sowing and growing conditions on coriander (*Coriandrum sativum* L.) cv. Gujarat Coriander-2 as leafy vegetable was carried out, during late summer season, of the year 2010, at the Instructional Farm, Department of Horticulture, Junagadh Agricultural University, Junagadh. The experimental material comprised of genetically pure seeds of coriander cv. 'Gujarat Coriander-2' was used. The seeds of this cultivar were obtained from vegetable research station. Junagadh Agriculture University, Junagadh. The experiment was carried out in Split Plot Design (SPD) and comprised with five levels of date of sowing *viz.*, T_1 (25th April), T_2 (10th May), T_3 (25th May), T4 (8th June) and T_5 (22nd June) and four levels of growing conditions *viz.*, C_1 (Fan pad poly house), C_1 (Natural ventilated poly house), C_1 (Net house (low-cost)) and C_1 (Open field condition) with three replications.

RESULTS AND DISCUSSION

During the course of presenting the results of investigation carried out to ascertain the effect of different date of sowing and growing conditions on coriander (*Coriandrum sativum* L.) cv. GUJARAT CORIANDER-2 as leafy vegetable, many significant variations due to different treatments were observed. Certain experimental results need possible explanation, reasoning, support and or contradiction as they are presented below :

Influence of date of sowing :

The results in Table 1 revealed that, the germination percentage was found maximum (77.71 %) in treatment T_1 sowing at (25th April), and mortality percentage was found minimum (3.48 %) in treatment T_1 sowing at (25th April). April sowing concives hot temperature, so germination percentage comes maximum in treatment T_1, whereas mortality percentage

Table 1 : Effect of date of sowing and growing conditions on growth parameters of coriander (*Coriandrum sativum* L.) CV. GUJARAT CORIANDER-2

Treatments	Germination (%)	Mortality (%)	Number of leaves per branch	Length of leaf (cm)	Width of leaf (cm)
Date of sowing					
T_1 25 April	77.71	3.48	3.74	1.67	2.04
T_2 10 May	69.80	3.79	3.55	2.02	1.74
T_3 25 May	67.83	4.06	4.06	2.24	1.98
T_4 08 June	70.28	3.98	3.78	2.29	1.81
T_5 22 June	74.65	3.96	3.77	2.23	1.69
S.E. ±	1.20	0.11	0.09	0.12	0.07
C.D. (P=0.05)	3.93	0.37	0.28	0.39	0.23
C.V.%	5.79	10.27	7.93	19.53	13.37
Different growing conditions					
C_1 Fan pad poly house	70.13	3.74	3.62	2.05	2.00
C_2 Natural ventilated poly house	76.30	3.73	3.84	2.26	1.80
C_3 Net house (low-cost)	73.92	3.77	3.98	2.18	1.90
C_4 Open field condition	67.87	4.17	3.67	1.88	1.70
S.E. ±	0.91	0.10	0.07	0.08	0.06
C.D. (P=0.05)	2.63	0.28	0.21	0.23	0.16
C.V.%	4.89	9.61	7.58	15.00	11.79
Interaction					
T x C	NS	NS	NS	NS	NS

NS=Non-significant

comes minimum in treatment T_1, due to maximum temperature and dry atmosphere. This finding is supported by Carrubba *et al.* (2006) in coriander.

It is clear from the data (Table 1) that, the significant difference in number of leaves per branch, was observed in respect of various dates of sowing. The treatment T_3 (25th May) date of sowing, produced maximum number of leaves per branch (4.06), due to the fact that, this treatment was encountered by favorable meteorological conditions, for vegetative growth over late sowing date and probably development of the plant, as observed during early sowing, which might have yielded better growth. The lowest number of leaves (3.55) per branch was produced under treatment T_2 (10th May) date of sowing. This may be due to less favorable climatic conditions involving maximum range of temperature coupled with incidence of pest and diseases, whereas, difference in length of leaves per plant were observed in respect of various dates of sowing. The treatment T_4 (08th June) date of sowing, produced significantly maximum length of leaf (2.29 cm) as compared to rest treatments of date of sowing. Due to the fact that, this treatment was encountered by favorable meteorological conditions for vegetative growth, over late sowing date. This might have yielded better growth. The lowest length of leaf (1.67 cm) was produced under treatment T_1 (25th April) date of sowing. This may be due to less favorable climatic conditions, involving maximum range of temperature coupled with incidence of pest and diseases. These finding are supported by Nandal *et al.* (2007) and Meena and Malhotra (2006) in coriander.

The result in Table 1 indicated significant difference on the width of leaf observed in respect of various dates of sowing. The treatment of T_1 (25th April) date of sowing produced significantly maximum width of leaf (2.04 cm), as compared to other treatments of date of sowing. Due to the fact that, this treatment was encountered by favorable meteorological conditions for vegetative growth and sowing date, which might have yielded better growth. The lowest width of leaf (1.69 cm) was produced under treatment T_5 (22nd June) date of sowing. This may be due to less favorable climatic conditions. This finding is supported by Dixit (2007) and Meena and Malhotra (2006) in coriander.

The result in Table 2 indicated significant difference on the fresh weight per plant in respect of various dates of sowing. Date of sowing had a significant effect on fresh weight per plant. The maximum fresh weight of plant (6.85 g) was recorded from treatment T_1 (25th April) date of sowing, while it was minimum (5.13 g) from T_3 (25th May) date of sowing. The greater plant height and width might have helped in the production of more number of branches per plant and number of leaves per plant, which ultimately resulted in the maximum fresh weight of plant. This finding is supported by Dixit (2007) and Meena and Malhotra (2006) in coriander.

The results in Table 2 revealed that, the date of sowing had a significant effect on dry weight of plant. The maximum dry weight of plant (2.11 g) was recorded from treatment T_5 (22nd June) date of sowing, while it was minimum (1.63 g) from

Table 2 : Effect of date of sowing and growing conditions on yield and quality parameters of coriander (*Coriandrum sativum* L.) cv. GUJARAT CORIANDER-2

Treatments	Fresh weight of plant (g)	Dry weight of plant (g)	Green yield kg/ha	Total soluble solid (°Brix)
Date of sowing				
T_1 25 April	6.85	1.63	21166.67	4.23
T_2 10 May	6.23	1.82	19150.00	4.73
T_3 25 May	5.13	1.86	17375.00	4.76
T_4 08 June	5.22	1.94	16833.33	5.05
T_5 22 June	5.93	2.11	23525.00	5.44
S.E. ±	0.36	0.08	1105.00	0.23
C.D. (P=0.05)	1.18	0.27	3604.00	0.73
C.V.%	20.62	15.35	19.51	16.09
Different growing conditions				
C_1 Fan pad poly house	6.61	1.89	18133.33	4.75
C_2 Natural ventilated poly house	5.47	2.11	21820.00	5.36
C_3 Net house (low-cost)	6.52	1.60	19600.00	4.83
C_4 Open field condition	4.88	1.89	18886.67	4.43
S.E. ±	0.30	0.06	911.00	0.17
C.D. (P=0.05)	0.85	0.19	2631.00	0.49
C.V.%	18.87	13.26	17.99	13.65
Interaction				
T x C	NS	NS	NS	NS

NS=Non-significant

treatment T_1 (25th April) date of sowing. The greater plant height might have helped in the production of more number of branches per plant and number of leaves per plant, which ultimately resulted in the production of dry weight of plant. Whereas green yield (Table 2) observed that, sowing of treatment T_5 (22nd June) date of sowing produced the highest green yield (23.52 tonne/ha), which was superior over early dates, indicating the progressive increasing in green yield, with successive increasing in sowing dates. Sowing of treatment T_4 (08th June) date of sowing resulted in lowest green yield. Poor vegetative growth may be attributed due to, availability of minimum temperature for shorter period in late sowing dates, and maximum rain fall as well as, high humidity in atmosphere. Total leaf area affects the amount of photosynthesis available. In coriander longer the days of low temperature, vegetative phase is diverted to reproductive phase even in absence of adequate growth. The results are in line with those reported by Carrubba *et al.* (2006) and Ghobadi and Ghobadi (2010) in coriander.

The results in Table 2 revealed that, the quality attributes such as TSS, was significantly influenced by varying date of sowing. Significantly the highest TSS in treatment T_5 (5.44 ^{O}Brix) content was observed with sowing at (22nd June). This result is in close conformity with the findings of Hazarika and Phookan (2005).

Influence of different growing conditions :

The results in Table 1 revealed that, the germination percentage found maximum (76.30 %) in condition C_2 (natural ventilated poly house), while mortality percentage was found minimum (3.73 %) in condition C_2 (natural ventilated poly house). It was due to minimum temperature and humid atmosphere in natural ventilated poly house, This finding is supported by Jeeva and Sathiyamurthy (2001) in coriander.

It is clear from the data Table 1 that, there was significant difference in the number of leaves per plant in respect of various growing conditions. The condition C_3 (net house low-cost) produced maximum number of leaves per branch (3.98), due to the fact that, this condition was encountered by favorable meteorological conditions for vegetative growth over late sowing date, and probably development of the plant as observed during early sowing, which might have yielded better growth. The lowest numbers of leaves per branch (3.62) were produced under condition C_1 (fan pad poly house). This may be due to less favorable climatic conditions, involving maximum range of temperature and humidity coupled with incidence of pest and diseases. Whereas difference in length of leaf were observed in respect of various growing conditions. The condition C_2 (natural ventilated poly house) growing conditions produced maximum length of leaf (2.26 cm). Due to the fact that, this treatment was encountered by favorable meteorological conditions for vegetative growth over late sowing date. This might have yielded better growth. The lowest length of leaf (1.88 cm) was produced under condition C_4 (open field condition). This may be due to less favorable climatic conditions involving maximum range of temperature coupled with incidence of pest and diseases. This finding is supported by Pan *et al.* (2003) in coriander.

The results in Table 1 revealed that, the width of leaves observed significant in respect of various growing conditions. The condition C_1 (fan pad poly house) produced maximum width of leaf (2.00 cm), due to the fact that, this treatment was encountered by favorable meteorological conditions for vegetative growth and growing conditions. This might have yielded better growth. The lowest width of leaf (1.70 cm) was produced under condition C_4 (open field condition) growing conditions. This may be due to less favorable climatic conditions. This finding is supported by Dixit (2007) and Prabhu *et al.* (2009) in coriander.

The results in Table 2 revealed that, the fresh weight of plant was observed significant in respect of various growing conditions. The growing conditions had an effect on fresh weight of plant. The maximum fresh weight of plant (6.61 g) was recorded from C_1 (fan pad poly house) growing conditions, while it was minimum (4.88 g) from C_4 (open field condition) growing conditions. The greater plant height might have helped in the production of more number of branches per plant and number of leaves per plant, which ultimately resulted in the production of fresh weight of plant. This finding is supported by Pan *et al.* (2003) in coriander.

The results in Table 2 revealed that, the growing conditions had an effect on dry weight of plant, the maximum dry weight of plant (2.11 g) was recorded from C_2 (natural ventilated poly house) growing conditions, while it was minimum (1.60 g) from condition C_3 (net house (low-cost) growing conditions. The greater plant height might have helped in the production of more number of branches per plant and number of leaves per plant, which ultimately resulted in the production of dry weight of plant. About green yield it was observed that, C_2 (natural ventilated poly house) growing condition produced the highest green yield (21.82 tonne/ha), which was superior over late and early dates, indicating the progressive increasing in green yield, with successive increasing in sowing dates. C_1 (fan pad poly house) growing condition resulted the lowest green yield. Poor vegetative growth may be attributed due to availability of high temperature for longer period in late sowing dates and maximum rain fall as well as high humidity in atmosphere. The increased leaf area might be due to better vegetative growth of aerial parts. Total leaf area affects the amount of photosynthesis available. In coriander longer the days of low temperature vegetative phase is diverted to reproductive phase even in absence of adequate growth. The results are in line with those reported by Nandal *et al.* (2007) in coriander.

The results in Table 2 revealed that, the quality attributes such as TSS was significantly influenced due to varying

growing conditions. Significantly the highest TSS (5.36 ^{0}Brix) content was observed with growing in natural ventilated poly house. This result is in close conformity with the findings of Hazarika and Phookan (2005).

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