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Effect of Leaf Cutting on Seed Yield of Coriander (*Coriandrum sativum* L.)

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Authors' contributions

This work was carried out in collaboration among all authors. All authors read and approved the final manuscript.

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ABSTRACT

The experiment was conducted with two genotypes of coriander (Azad Coriander-1 and Azad Coriander-2) in factorial Randomized Block Design with 8 treatments and 3 replications at the experimental farm of Department of Horticulture, College of Agriculture, Chandra Shekhar Azad University of Agriculture & Technology, Kanpur- 208002 U.P. India, during Rabi, season 2014-2015. Phenotypic data were recorded for eight characters *viz*. Plant height, Number of Primary and Secondary Branches per plant, Number of umbels per plant, Seed yield per plant, Test weight and Yield per plant. The foliage cutting was taken to create treatments e.g. C_0 (No Cutting), C_1 (One Cutting) C_2 (Two cuttings) and C_3 (Tree cuttings). It was found that zero cutting (control)

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showed highest growth and three cuttings showed lowest growth among treatments. It is the clear indication of reduction in the growth number of primary and secondary branches, no. of umbels per plant, seed yield per plant and plot yield per plant. It has been concluded that leaf cutting in coriander gradually reduces the growth and other parameters (studied in this) as number of cutting increases.

Keywords: Coriander; cutting; treatment (variety X cuttings); growth.

1. INTRODUCTION

Coriander, scientifically known as *Coriandrum sativum*, is a versatile annual herb belonging to the family Apiaceae with chromosome number 2n=22, widely cultivated across the globe, it serves dual roles as both an herb and a spice. While its delicate green leaves are popularly referred to as cilantro, the dried seeds are known as Coriander. Its plant has been cherished for centuries not only for its culinary applications but also for its medicinal and cultural significance. Coriander is a soft, feathery plant that typically grows up to 50 cm in height. Its leaves are distinctly shaped—broad and lobed near the base, and slender and finely divided on the upper stems. The plant produces small, pale pink or white flowers arranged in flat-topped clusters called umbels. These flowers eventually give rise to round, dry fruits known as schizocarps, which contain the aromatic seeds used in cooking (Anonymous, 2006).

Native to regions spanning the Mediterranean and the Middle East, coriander thrives in temperate climates and well-drained soils. It is a fast-growing plant, often cultivated as a cool-season crop in tropical and subtropical regions (Anonymous, 2024).

It is a staple in kitchens worldwide. Its fresh leaves (cilantro) are used extensively in Latin American, Indian, Chinese, and Southeast Asian cuisines. They add a refreshing, citrusy flavour to dishes like salsa, chutneys, curries, and soups. The seeds, on the other hand, are warm, nutty, and slightly spicy (Chadwick, 1976). They are commonly ground into powder or used whole in spice blends such as garam masala, curry powder, and pickling spices beyond its culinary appeal, coriander has long been valued in traditional medicine. Its seeds contain essential oils rich in compounds like linalool, which contribute to its distinctive aroma and therapeutic properties. Coriander is believed to aid digestion, reduce inflammation, and possess antimicrobial effects. It contains 16.1% fatty oil, 14.1% protein 21.6% carbohydrate 32.6% fibre,11.2% moisture and 4.4% mineral matters and also coriander leaves are very rich in Vitamin A and Vitamin C that's why it is used to treat ailments ranging from indigestion and nausea to skin conditions and anxiety (Baboo and Rana, 1995).

Modern research continues to explore its potential benefits, including antioxidant activity and blood sugar regulation. The plant's polyphenols and terpenes are of particular interest in pharmacological studies. Coriander's history dates back thousands of years. Archaeological evidence suggests its use in ancient Egyptian tombs, and it is mentioned in Sanskrit texts and the Bible (Zohary and Hopf, 2002). The Greeks and Romans used it for flavouring and preserving food, while medieval Europeans incorporated it into love potions and medicinal concoctions (Chadwick, 1976).

India produces more than 700,000 metric tonnes of coriander each year. It meets huge domestic needs and also exports to Malaysia, the UAE, Sri Lanka, the UK, and the USA. Indian coriander has a high value of aroma and oil content. Top coriander producing countries in the world are- India 700,000+ MT, Iran 40,000, China 35,000, Moracco 30,000 and Russia 25,000. (Anonymous, 2024; Chandel, 1999).

It is typically grown from seeds and requires full sun and moderate watering. It prefers cool weather and can be harvested multiple times during its growth cycle. The leaves are picked when tender, while the seeds are collected once the plant matures and the fruits turn brown. Farmers often rotate coriander with other crops to maintain soil fertility and reduce pest infestations. It is also grown organically in many regions, contributing to sustainable agricultural practices. Leaf cutting affect the plant growth as number of leaf

cuttings increases gradually. For better grain yield, leaf cutting should be limited to 1-2. Besides seed production leaf cutting gives extra income to the farmers [Zohary and Hopf, 2002, Singh et al (2021) and Singh et al (2000)]

Keeping the above in view of the "Effect of leaf cutting on seed yield of Coriander (*Coriandrum sativum* L.) are conducted with the following objectives:

1. To study the growth and green leaves yield response to leaf cuttings.
2. To evaluate the number of leaf cutting and yield attributing characters of coriander.
3. To study the yield attributing characters and grain yield response to leaf cuttings.

2. MATERIALS AND METHODS

The experiment under relevance was c onducted during Rabi 2015-16 at experimental field of, Department of Horticulture, College of Agriculture, Chandra Shekhar Azad University of Agriculture & Technology, Kanpur (U.P.) India (geographical coordinates 26.49N and 80.30E). The experimental materials (treatments) are composed of 2 genotypes (varieties) of Coriander e.g. Azad Dhaniya-1 and Azad Dhaniya-2, two control (V_1C_0 and V_2C_0) and interaction between Genotype X No. of cuttings (V_1C_1, V_1C_2, V_1C_3, V_2C_1, V_2C_2 and V_2C_3) total 8 treatments were in the study and the trial was sown in Factorial Randomized Block Design with three (3) replications. The cutting practiced at different time e.g. first cutting (C_1) at the 45 days after sowing, second cutting (C_2) at 60 days after sowing and third cutting(C_3) at 75 days after sowing. Seeds were sown during the first fort-night of November in plots size of 3.0 m × 1.5 m at a spacing of 50 cm × 20 cm. Sowing and other cultural operation were done using recommended practices. The genotypes were obtained from the Department of Horticulture, College of Agriculture, Chandra Shekhar Azad University of Agriculture & Technology, Kanpur 208002 (U.P.) India. The data were recorded for the following characters. Plant height, Number of Primary and Secondary Branches per plant, Number of umbels per plant, Seed yield per plant, Test weight and Yield per plant. We randomly selected five plants from each plot for recording of data on all the eight characters. Average of the data from selected plants of each plot in respect to different characters were used for various statistical analysis.

2.1 Statistical Analysis

The data obtained on different aspects were subjected to statistical analysis as suggested by Chandel (1999).

Where, 'f' test of the treatments, it further tested at 5% and 1% level of significance. The analysis of variance (ANOVA) was under:

Table 1. Results of ANOVA

Sl.	Source of variation	Degree of freedom	Sum of square	F- calculated
1.	Replication	r-1	-	-
2.	Treatment	ab-1	-	-
	(i)Variety (a)	a-1	-	F(a)=$\frac{MSa}{MSerror}$
	(ii)Leaf cuttings (b)	b-1	-	F(b)=$\frac{MSb}{MSerror}$
	(iii)Interaction (a x b)	(a-1).(b-1)	-	F(ab)=$\frac{MSab}{MSerror}$
3.	Error	(r-1).(ab-1)	-	-
4.	Total	(rab-1)	-	-

Standard error (SE) = $\sqrt{\frac{2VE}{r}}$

Where,

VE = Error Variance
R = No. of Replications

Fig. 1. While, tagging of harvested bundles of Coriander plants

3. RESULTS AND DISCUSSION

The data was recorded on various characters plant height, primary branches/plant, secondary branches/ plant, number of umbels/ plant, seed yield/plant (g), test weight (g), seed yield (kg/h) and leaf yield (q/h) and analysed which gave the effect of leaf cuttings on various growth parameters presented in Table 2.

The analysed data showed that maximum plant height (123.94 cm) was recorded when no cutting condition was applied followed by single cutting (121 cm) and minimum plant height (113 cm) was recorded when three cuttings were taken among the treatments irrespective of genotypes. The overall genotypic mean irrespective of treatments (cuttings) resulted that Azad Dhaniya-2 was found maximum plant height (118.48 cm) followed by Azad Dhaniya-1 (117.45cm). These results also revealed by some earlier researchers like Bhapkar et al (2019), Tehlan & Thakral, (2008), Yadav et al (2013) and Yadav et al (2025) in coriander.

The number of primary branches per plant significantly affected by the leaf cuttings. The maximum number of primary branches found at single cutting (6.36) followed by two cuttings (6.14). The total genotypic mean in relation to treatments (cuttings) was found for Azad Dhaniya-2 (5.31) followed by Azad Dhaniya-1 (3.93). These findings also revealed by Maheriya, (2015), Singh et al (2017), Nandal (2007), Malik and Tehlan (2013), Kumar S. (2010), Kaur et al (2024) and Datta et al (2008) while worked on coriander.

The analysed data showed that secondary branches per plant slightly affected by leaf cuttings. The maximum number of secondary branches per plant found at single cutting (10.75) followed by two cuttings (10.19). The total genotypic mean in relation to treatments (cuttings) was found for Azad Dhaniya-2 (9.28) followed by Azad Dhaniya-1 (8.18). Such findings also calculated/demonstrated by Kumar, Verma, Duhan and Malik while worked on coriander.

The analysed data revealed the effect of leaf cuttings on number of umbels/plant. The maximum number of umbels/ plant found at single cutting (18.95) followed by two cuttings (17.85). The total genotypic mean in relation to treatments (cuttings) was found for Azad Dhaniya-2 (17.58) followed by Azad Dhaniya-1 (16.54). These results also revealed by some researchers e.g. Bhapkar et al (2019), Tehlan & Thakral, (2008), Yadav et al (2013) and Yadav et al (2025).

The pooled data gave the information about the effect of leaf cuttings on seed yield of coriander. The maximum seed yield obtained with single cutting (15.44) followed by two cuttings (15.14). The total genotypic mean in relation to treatments (cuttings) was found for Azad Dhaniya-2 (13.34) followed by Azad Dhaniya-1 (11.37). These findings also calculated/ demonstrated by Verma, Duhan, Malik and Yadav et al while worked on coriander.

The analysed data showed the effect of leaf cuttings on test weight that gives the significant

effect on test weight. The maximum test weight was found at single cutting (14.95) followed by two cuttings (14.05). The total genotypic mean in relation to treatments (cuttings) was found for Azad Dhaniya-2 (12.75) followed by Azad Dhaniya-1 (10.50). Such findings also calculated/demonstrated by Maheriya et al., (2015), Singh et al (2017), Nandal et al. (2007), Malik and Tehlan (2013), Kumar S. (2010), Kaur et al (2024) and Datta et al (2008) while worked on coriander.

The calculated data showed that seed yield kg per plot slightly affected by leaf cuttings. The maximum seed yield kg per plot was found at single cutting (1.58) followed by two cuttings (1.49). The total genotypic mean in relation to treatments (cuttings) was found for Azad Dhaniya-2 (followed by Azad Dhaniya-1 (1.03). Such findings also calculated/demonstrated by Maheriya et al. (2015), Singh et al (2017), Nandal et al. (2007), Malik and Tehlan (2013), Kumar S. (2010), Kaur et al (2024), Datta et al (2008) while worked on coriander (Verma & Sen (n.d.)).

The analysed data showed that leaf yield (q/h) slightly affected by leaf cuttings. The maximum leaf yield (q/h) was found at single cutting V_2C0 (4.66) followed by single cuttings V_1C0 (4.65) and three cuttings (4.21). The total genotypic mean in relation to treatments (cuttings) was found for Azad Dhaniya-1 (3.66) followed by Azad Dhaniya-2 (3.62). Such findings also calculated/demonstrated by Kumar, Datta**,** Duhan and Malik while worked on coriander.

In this experiment I saw the effect of leaf cutting on seed yield and other character studied in this experiment like plant height, primary branches/plant, secondary branches/ plant, number of umbels/ plant, seed yield/plant (g), test weight (g), seed yield (kg/h) and leaf yield (q/h). These parameters gradually affected, as number of leaf cuttings increases because 3-4 leaf cutting causes serious problem of scarcity of source (photosynthetic part of plant) that's why low quantity of sink (photosynthetic product) recovered after harvesting of coriander crop and 1-2 cutting promote horizontal growth or branching that is good for yield. The importance of this experiment is that we can take good decision for higher grain yield along with quality and a good side income may be generated by Cilantro (green leaf) harvesting. A significant standard of number of leaf cuttings for good seed yield can be established so farmer can use it in their field make sure their crop production in respect of quantity as well as quality. These findings also revealed by Singh et al, (2021) Kamlesh et al and DK et al.

Table 2. Varieties (V1 & V2) under different conditions (C0–C3)

Plant Height						**No. of primary branches/plant**					
SN	**C0**	**C1**	**C2**	**C3**	**Mean**	**SN**	**C0**	**C1**	**C2**	**C3**	**Mean**
V_1	121.81	120	115	113	117.45	V_1	3.33	4.35	4.21	3.86	3.93
V_2	123.94	121	115	114	118.48	V_2	3.6	6.36	6.14	5.14	5.31
Mean	122.87	120.5	115	113.5	117.96	Mean	3.46	5.35	5.175	4.5	4.62
CD@ 5% V=5.21, C= 6.87, V X C= 0						**CD@ 5%** V=0.761, C= 1.07 and V X C= 0					
Secondary branches/plant						**No. of umbel/plant**					
SN	**C0**	**C1**	**C2**	**C3**	**Mean**	**SN**	**C0**	**C1**	**C2**	**C3**	**Mean**
V_1	7.25	9.15	8.95	7.37	8.18	V_1	13.7	17.95	17.56	16.95	16.54
V_2	7.54	10.75	10.19	8.67	9.28	V_2	13.97	18.95	17.85	15.95	17.58
Mean	7.39	9.95	9.57	8.02	8.73	Mean	13.83	18.45	17.70	16.45	16.61
CD@ 5% V=0, C= 0, V X C= 0						**CD@ 5%** V=0, C= 0, V X C= 0					
Seed Weight (g)						**Test Weight (g)**					
SN	**C0**	**C1**	**C2**	**C3**	**Mean**	**SN**	**C0**	**C1**	**C2**	**C3**	**Mean**
V_1	8.93	13.15	12.54	10.87	11.37	V_1	8.9	12.15	10.65	10.33	10.50
V_2	9.36	15.44	15.14	13.44	13.34	V_2	9.65	14.95	14.05	12.36	12.75
Mean	9.14	14.29	13.84	12.15	12.35	Mean	9.275	13.55	12.35	11.34	11.63
CD@ 5% V=2.15, C= 3.19, V X C= 0						**CD@ 5%** V=1.42, C= 2.01, V X C= 0					
Seed Yield (Kg/Plot)						**Leaf Yield (q/h)**					
SN	**C0**	**C1**	**C2**	**C3**	**Mean**	**SN**	**C0**	**C1**	**C2**	**C3**	**Mean**
V_1	0.83	1.19	1.09	1.04	1.037	V_1	2.63	4.65	3.15	4.21	3.66
V_2	0.89	1.58	1.49	1.29	1.31	V_2	2.78	4.66	3.33	3.73	3.62
Mean	0.86	1.38	1.29	1.16	1.17	Mean	2.705	4.65	3.24	3.97	3.64
CD@ 5% V=0.26, C= 0.36, V X C= 0						**CD@ 5%** V=1.25, C= 0.98, V X C= 0					

4. CONCLUSION

The present investigation indicates the effect of the number of leaf cuttings on studied characters which gave us direction to decide the appropriate number of leaf cuttings for different purposes e.g. Quality of leaves, Grains yield, Lodging resistance, Healthy seeds and other characters characteristics of coriander crop.

In the investigation there are two varieties (Azad Dhaniya-1 and Azad Dhaniya-2) of coriander were took for research work and the performance of these two varieties were different for different characters e.g. For, plant height Azad Dhaniya-2 than Azad Dhaniya-1, No. of Primary Branches/Plant Azad Dhaniya-2 than Azad Dhaniya-1, Secondary Branches/Plant Azad Dhaniya-2 than Azad Dhaniya-1, No. of Umbel/Plant Azad Dhaniya-2 than Azad Dhaniya-1, Seed Weight (g) Azad Dhaniya-2 than Azad Dhaniya-1, Test Weight (g) Azad Dhaniya-2 than Azad Dhaniya-1, Seed Yield (Kg/Plot) Azad Dhaniya-2 than Azad Dhaniya-2 and Leaf Yield (q/h). Number of leaf cutting also affected the expression of character which ultimately affect the quantity and quality of produce. Finally, we can take appropriate number of cutting for good yield of Coriander.

DISCLAIMER (ARTIFICIAL INTELLIGENCE)

Authors hereby declare that NO generative AI technologies such as Large Language Models (ChatGPT, COPILOT, etc) and text-to-image generators have been used during writing or editing of manuscripts.

COMPETING INTERESTS

Authors have declared that they have no known competing financial interests OR non-financial interests OR personal relationships that could have appeared to influence the work reported in this paper.

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