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Quality of coriander (*Coriandrum sativum* L.) genotypes grown under Gangetic Alluvial region of West Bengal

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Abstract

The present study was conducted at Horticultural Research Station, Mandouri, Faculty of Horticulture, Bidhan Chandra Krishi Viswavidyalaya, Nadia, West Bengal during the year 2014-15 and 2015-16 to evaluate twelve genotypes of coriander (*Coriandrum sativum* L.). The results indicated the predominant leaf colour was green (58.33%) followed by dark green (41.66%). All the germplasm showed medium basal lobing and trifoliate. The essential oil yield was low in all variety. Arka Isha yields the highest (0.36%) essential oil. The maximum value of oleoresin content was observed in NRCS A.Cr-1 (12.87%) followed by Suvashini. On the other hand the minimum oleoresin was found with the germplasm Assam collection (3.26). Seed yield/plant in different germplasms ranged from 6.17 g in Pant Haritma to 1.15 g in Manipur collection-2. Yield per plot was found highest in Pant Haritma (445.37 g) followed by NRCS A.Cr-1 (384.33 g). Projected yield per ha is concerned highest yield was obtained in Pant Haritma (22.27 q/ha) whereas Manipur collection-1 recorded the least of (7.75 q/ha). On the basis of good performance with Essential oil and oleoresin content, the genotype Arka Isha and NRCS A.Cr-1 respectively can be considered as the most suitable for quality aspects.

Keywords: Coriander, germplasm, essential oil, oleoresin, yield

Introduction

Coriander (*Coriandrum sativum* L.) belonging to family Umbelliferae/Apiaceae is an important annual spice herb. These oldest spices are originated from Southern Europe and Mediterranean region. India lead in area and production of coriander. It fetched Rs /-272,74 crore by exporting 35,185 tonnes (Spice Board, 2019). The production in India during the year 2013-14 is 496240 t.

The leaves are variously referred to as coriander leaves, cilantro, dhania and Chinese parsley or Mexican parsley. The leaves have a very different taste from the seeds. Extracts of the green herb have also been found to exhibit antibacterial (Kubo *et al.*, 2004) [8] and antioxidant activity. The essential oil from seed content petroselinic acid (68.8%) and linoleic acid (16.6 %) as major constituents and form the main flavouring component (Geed *et al.*, 2014) [4]. The seed contains significant quantities of vitamins (Holland *et al.*, 1991) [6]; minerals and dietary fiber (Ensminger and Ensminger, 1986) [3].

The essential oil has antibacterial, antidiabetic (Mazhar and Mazumder, 2013) [10], chemopreventive (Lakhera *et al.*, 2015) [9], anti-inflammatory (Mohan *et al.*, 2013) [12] and anti-diarrheal (Nithya, 2015) [14]. The seeds form a main component in the preparation of curry powder, bakery product, meat fish, soda, syrups, candy, preserve and liquor (Thamburaj and Singh, 2004) [21] and in preparation of various pickles. It is used as a spice in culinary (Diederichsen, 1996) [2], medicine (Kubo *et al.*, 2004; Delaquis *et al.*, 2002) [8, 1]. Oleoresins are obtained by the solvent extraction ripe fruits coriander. The product has full flavour profile and are widely used in food industries. Highest oil yield and high resistance against stem gall was observed in C-1 cultivar which is the most preferable character as of present situation is concern (Kalra *et al.* 1999) [7]. Qualitative studies in different genotypes available around the country is an important strategy for further improvement of this crop. Keeping this in view, the present study was undertaken to evaluate promising diverse genotypes from across India.

Materials and method

The trial was laid out at Horticultural Research Station, Mandouri, Faculty of Horticulture, Bidhan Chandra Krishi Viswavidyalaya, Nadia, West Bengal during the year 2014-15 and

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2015-16 which is located at 23.5° North latitude, 89° East longitude with an average altitude of 9.75m above mean sea level.

Experimental details

Design of the experiment: Randomized block design (RBD)

Number of treatments: 12

Number of replications: 3

Plot size: 1.8m×1m

Spacing adopted: 25cm×15cm

No. of plants/plot: 48

No. of total plot: 36

Time of planting (2014, 2015): 10th Nov

Table 1: Collection of different genotypes of Coriander

Treatments	Germplasms	Collected from
1.	Arka Isha	IIHR, Bangalore
2.	Manipur collection-1	Imphal, Manipur
3.	Suvashini	Gayespur, West Bengal
4.	West Bengal collection-1	Mohanpur, West Bengal
5.	West Bengal collection-2	Mohanpur, West Bengal
6.	Assam collection	Jorhat, Assam
7.	Five -X	Gayespur, West Bengal
8.	Manipur collection-2	Imphal, Manipur
9.	NRCS A.Cr-1	NRCS, Ajmer
10.	Tripura collection	Tripura
11.	Pant Haritma	GBPUAT, Pantnagar
12.	West Bengal collection-3	Cooch Behar, West Bengal

Harvesting

The crop was harvested when 60 per cent of seeds in main umbels turn yellowish brown in colour. After judging the crop maturity of each plot, plants were harvested by pulling out plants from the soil. The pulled-out plants are tied in small bundles and kept upside down in field so that the seed are less exposed to sun and to get uniform colour in seeds.

Drying and threshing

All harvested plants were kept under sun drying for three days and then in shades for two days. Then, threshing was done by beating lightly with sticks, followed by winnowing and cleaning. For safe storage, again seeds were dried in bright sun light for two days to bring down the excess moisture content. During drying and threshing, proper care was taken to avoid intermixing of seeds.

Projected yield per ha (q)

Total amount of seeds from plot of 1×1.8m² were weighted to obtain the yield per plot. Projected yield per hectare was calculated on the basis of yield per plot and expressed in quintal.

Assay of biochemical constituents

Oleoresin content

Oleoresin content was estimated by Chromatographic column method. For this 10gm of powder sample was taken and placed in chromatographic column (bottom of chromatographic column was plugged with cotton plug). The column was filled with acetone and kept overnight. The slurry was collected on a previously weighted beaker and weigh was recorded. This slurry was the heated over a water bath to 40 °C. Weight was noted at 15minutes interval and heating was

stopped when constant weight was obtained. The oleoresin content was calculated using the formula given below.

$$\text{Oleoresin} = \frac{\text{Weight of oleoresin}}{\text{Weight of sample}} \times 100$$

Where, weight of oleoresin= (weight of beaker+oleoresin)-weight of beaker

Essential oil content

The essential oil of the sample was estimated using Clevenger type apparatus and the percentage of essential oil was calculated using the following formula:

$$\text{Essential oil content (\%)} = \frac{\text{Essential oil extracts (ml)}}{\text{Weight of sample (g)}} \times 100$$

Result and discussion

Several qualitative characters namely, leaf colour, leaf lustre, basal lobing, leaf blade shape, stem colour and seed shape have been recorded in all the 12 coriander germplasm (Table-2). Frequency distribution of these qualitative characters of these germplasms is presented in Table-3

The predominant leaf colour was green (58.33%) followed by dark green (41.66%) whereas all germplasm showed medium basal lobing and trifoliate. In case of stem colour, 41.66% each purple and green with purple streaks are shown in coriander germplasm, however, the rest 16.66% showed green stem colour. 50.00% of the germplasms showed light brown colour of seed and 41.66% showed brown and 8.33% yellowish brown. The pre-dominant seed shape was medium elongated (66.66%) followed by light brown (50.00%) and elongated (8.33%).

The results indicated (Table-4) that the test weight in different germplasms ranged from 9.74 in Pant Haritma to 6.86 in Manipur collection-2. The result was in line with Singh *et al.* (2011) [19]. Seed yield per plant was also influenced significantly. The essential oil yield was low in all variety (Figure-1). Among them Arka Isha yields the highest (0.36%). According to Shankaracharya *et al.* (1972) [18] essential oil content varied from 0.10 to 0.65 per cent. While it ranges from 0.19 to 0.34 per cent according to Prabhu and Balakrishnamurthy (2005) [16]. In case of oleoresin content the maximum value was observed in NRCS A.Cr-1 (12.87 %) followed by Suvashini, Arka Isha. On the other hand, the minimum oleoresin was found with the germplasm Assam collection (3.26 %). Study conducted by Saxena *et al.*, (2015) [17] found the content of oleoresin ranging from 5.39 to 15.53 per cent obtain from non-cryogenically ground seeds. Seed yield/plant in different coriander germplasms ranged from 6.17 g in Pant Haritma to 1.15 g in Manipur collection-2. The results are in line with Phurailatpam *et al* (2016) [15]. Yield per plot was found highest in highest in Pant Haritma (445.37 g) followed by NRCS A.Cr-1 (384.33 g) whereas Manipur collection-1(155.04 g) recorded the least. The result was in agreement with the observations of Moniruzzaman *et al.*, 2013 [13] and Meena *et al.*, 2010 [11]. So far as projected yield per ha is concerned highest yield was obtained in Pant Haritma (22.27 q/ ha) whereas Manipur collection-1 recorded the least of (7.75 q/ ha). Similar results have been obtained by Phurailatpam *et al.* (2016) [15], Singh *et al.* (2012) [20] and Giridhar *et al.* (2014) [5].

Table 2: Qualitative characters recorded in different coriander germplasm

Cultivar	Leaf colour	Leaf luster	Basal leave lobing	Leaf blade shape	Stem colour	Seed colour	Seed shape
Arka Isha	Dark Green	Shiny	Medium	Trifoliolate	Green with purple streaks	Brown	Medium elongated
Manipur collection-1	Green	Shiny	Medium	Trifoliolate	purple	Brown	Elongated
Suvashini	Green	Shiny	Medium	Trifoliolate	purple	Brown	Flattened
West Bengal collection-1	Green	Shiny	Medium	Trifoliolate	green	Light brown	Medium elongated
West Bengal collection-2	Green	Shiny	Medium	Trifoliolate	purple	Light brown	Flattened
Assam collection	Dark Green	Shiny	Medium	Trifoliolate	green	Light brown	Medium elongated
Five X	Dark Green	Shiny	Medium	Trifoliolate	Green with purple streaks	Brown	Flattened
Manipur collection-2	Green	Shiny	Medium	Trifoliolate	Green with purple streaks	Light brown	Medium elongated
NRCSS A. Cr-1	Dark Green	Shiny	Medium	Trifoliolate	purple	Brown	Medium elongated
Tripura collection	Green	Shiny	Medium	Trifoliolate	Green with purple streaks	Yellowish brown	Medium elongated
Pant Haritma	Dark Green	Shiny	Medium	Trifoliolate	purple	Light brown	Medium elongated
West Bengal collection-3	Green	Shiny	medium	Trifoliolate	Green with purple streaks	Light brown	Medium elongated

Table 3: Frequency distribution for different qualitative characters in the coriander germplasm

Characters	Specification	Number of germplasm	% of germplasm
Leaf colour	Dark green	5	41.66
	Green	7	58.33
Basal lobing	Weak	0	0
	Medium	12	100
	Strong	0	0
Leaf blade shape	Simple	0	0
	Trifoliolate	12	100
Stem colour	Green	2	16.66
	Purple	5	41.66
	Green with Purple streaks	5	41.66
Seed colour	Brown	5	41.66
	Yellowish brown	1	8.33
	Light brown	6	50
Seed shape	Elongated	1	8.33
	Medium elongated	8	66.66
	flattened	3	25

Table 4: Performance of coriander genotypes for quality and yield in two years

Genotypes	Test weight			Essential Oil (%)			Oleoresin (%)			Seed yield/plant(g)			Yield/plot(g)			Projected yield/ha(g)		
	1 st year	2 nd year	Pool	1 st year	2 nd year	Pool	1 st year	2 nd year	Pool	1 st year	2 nd year	Pool	1 st year	2 nd year	Pool	1 st year	2 nd year	Pool
Arka Isha	8.20	8.07	8.13	0.36	0.36	0.36	9.09	9.08	9.08	2.44	2.72	2.58	300.75	303.25	302.00	15.04	15.16	15.10
Manipur collection-1	7.32	7.40	7.36	0.26	0.25	0.26	5.20	5.19	5.20	1.21	1.27	1.24	150.70	159.37	155.04	7.54	7.97	7.75
Suvashini	7.72	7.80	7.76	0.28	0.27	0.27	10.69	10.68	10.69	2.66	2.51	2.59	292.44	282.36	287.40	14.62	14.12	14.37
West Bengal collection-1	6.94	6.80	6.87	0.27	0.27	0.27	4.21	4.20	4.20	3.29	3.25	3.27	278.09	266.99	272.54	13.90	13.35	13.63
West Bengal collection-2	7.58	7.70	7.64	0.31	0.30	0.31	6.37	6.39	6.38	5.73	5.76	5.75	336.33	343.16	339.75	16.82	17.16	16.99
Assam collection	7.34	7.41	7.37	0.28	0.27	0.28	3.24	3.27	3.26	1.63	1.87	1.75	172.81	180.14	176.48	8.64	9.01	8.82
Five X	7.14	7.14	7.14	0.29	0.28	0.29	7.42	7.42	7.42	3.78	3.66	3.72	327.08	320.82	323.95	16.35	16.04	16.20
Manipur collection-2	6.82	6.90	6.86	0.25	0.25	0.25	5.80	5.82	5.81	1.12	1.18	1.15	181.13	190.79	185.96	9.06	9.54	9.30
NRCSS A.Cr-1	6.94	7.20	7.07	0.23	0.24	0.24	12.85	12.88	12.87	5.52	5.67	5.60	382.67	386.00	384.33	19.13	19.30	19.22
Tripura collection	7.66	7.78	7.72	0.23	0.25	0.24	6.08	6.10	6.09	3.50	3.38	3.44	218.92	235.26	227.09	10.95	11.76	11.35
Pant Haritma	9.98	9.49	9.74	0.35	0.34	0.35	6.00	6.02	6.01	6.03	6.31	6.17	442.04	448.71	445.37	22.10	22.44	22.27
West Bengal collection-3	9.30	9.41	9.36	0.33	0.32	0.33	6.95	6.98	6.97	2.14	2.18	2.16	295.58	294.87	295.23	14.78	14.74	14.76
SE(m)	0.14	0.11	0.12	0.01	0.01	0.01	0.04	0.03	0.03	0.16	0.14	0.13	3.66	5.42	3.88	0.18	0.27	0.19
CD at 5%	0.42	0.32	0.35	0.03	0.03	0.03	0.11	0.09	0.10	0.48	0.42	0.37	10.73	15.90	11.39	0.54	0.79	0.57

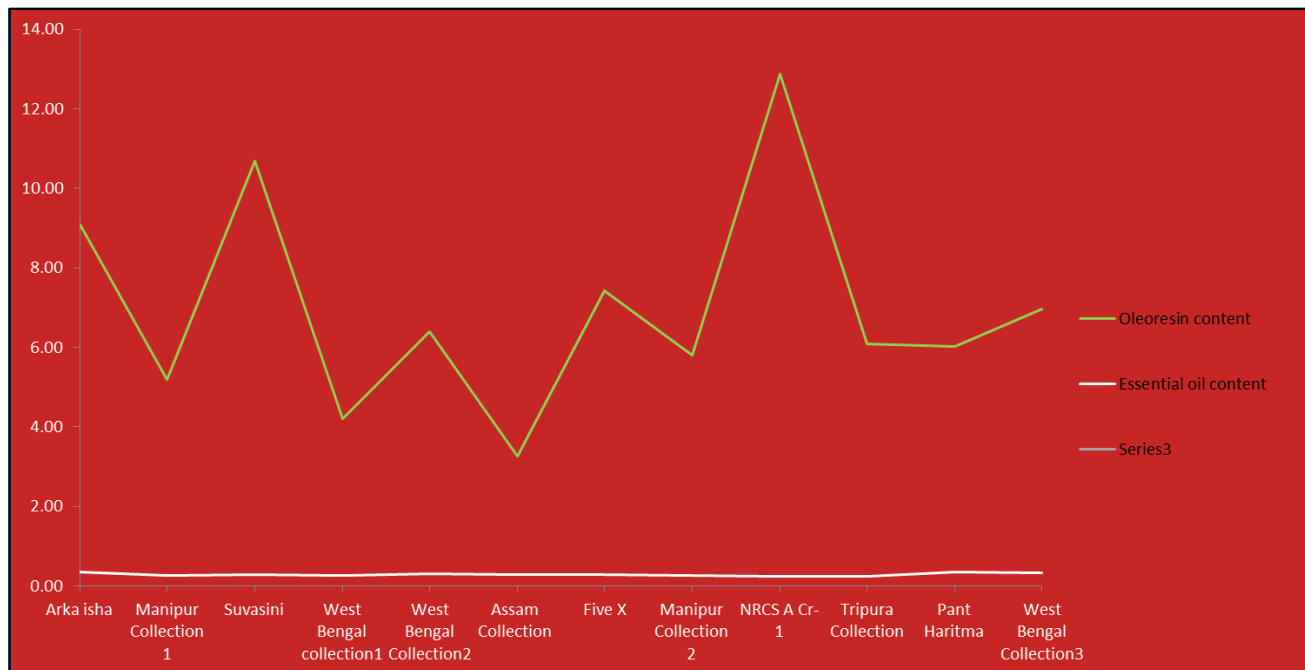


Fig 1: Oleoresin content and essential oil content

References:

- Delaquis PJ, Stanich K, Girard B, Mazza G. Antimicrobial activity of individual and mixed fractions of dill, cilantro, coriander and eucalyptus essential oils. *International Journal of Food Microbiology*. 2002; 74:101-109.
- Diederichsen A. Coriander (*Coriandrum sativum* L). Promoting the conservation and use of underutilized and neglected crops. Institute of Plant Genetics and Crop Plant Research, Gatersleben/ International Plant Genetic Resources Institute, Rome, Italy, 1996, 83-89.
- Ensminger AH, Ensminger MKJ. Food for health: A Nutrition Encyclopedia. Clovis, California: Pegasus Press, USA, 1986.
- Geed SR, Said PP, Pradhan RC, Rai BN. Extraction of essential oil from coriander seed. *International journal of food and nutritional sciences*. 2014; 3(3):7-9.
- Giridhar K, Kumari SS, Rajani A, Sarada C, Naidu N. Identification of potential genotypes of coriander (*Coriandrum sativum* L.) suitable for rainfed vertisols. *Applied Biological Research*. 2014; 16(2):00-00.
- Holland B, Unwin ID, Buss DH. Vegetables, Herbs and Spices. 4th ed. Cambridge, UK, 1991, 163.
- Kalra A, Patra NK, Singh HP, Singh HB, Mengi N, Naqvi AA, Kumar S. Evaluation of coriander (*Coriandrum sativum* L.) collection for essential oil. *Indian Journal of Agricultural Sciences*. 1999; 69(9):657-659.
- Kubo I, Fujita K, Kubo A, Nithei K, Ogura T. Antibacterial activity of coriander volatile compounds against *Salmonella choleraesuis*. *Journal of Agricultural and Food Chemistry*. 2004; 52(1):3329-3332.
- Lakhera A, Ganeshpurkar A, Bansal D, Dubey N. Chemopreventive role of *Coriandrum sativum* against gentamicin-induced renal histopathological damage in rats. *Interdisciplinary toxicology*. 2015; 8(2):99-102.
- Mazhar J, Mazumder A. Evaluation of antidiabetic activity of methanolic leaf extract of *Coriandrum sativum* in alloxan induced diabetic rats. *Research Journal of Pharmaceutical, Biological and Chemical Sciences*. 2013; 4(3):500-507.
- Meena ML, Kumar V, Kumar S, Yadav YC, Kumar A. Genetic variability, heritability, genetic advance, correlation coefficient and path analysis in coriander *Indian Journal of Horticulture*. 2010; 67:242-246.
- Mohan PVN, Suganthi, V, Gowri S. Evaluation of anti-inflammatory activity in ethanolic extract of (*Coriandrum sativum* L). using carrageenan induced paw oedema in albino rats. *Der Pharma Chemica*. 2013; 5(2):139-143.
- Moniruzzaman M, Rahman MM, Hossain MM, Karim AJMS, Khaliq QA. Evaluation of coriander (*Coriandrum sativum* L.) genotypes for seed yield and yield contributing characters. *Bangladesh journal of agricultural research*. 2013; 38(2):189-202.
- Nithya V. Evaluation of antidiarrheal activity on (*Coriandrum sativum* L). in Wistar albino rats. *World Journal of Pharmaceutical Research*. 2015; 4(5):638-643.
- Phurailatpam AK, Geetha KA, Meena RS, Maiti S. Evaluation of coriander (*Coriandrum sativum* L.) cultivars for yield and yield contributing characters in Gujarat *Journal of Spices and Aromatic Crops*. 2016; 25(1):7-12.
- Prabhu T, Balakrishnamurthy G. Evaluation of coriander (*Coriandrum sativum* L.) accessions under irrigated conditions for growth, yield and quality. *Proc. Nat. Sem. Emerging Trends in Production, Quality, Processing and Export of Spices*, 28-29 March, Coimbatore, 2005, 13.
- Saxena SN, Sharma YK, Rathore SS, Singh KK, Barnwal P, Rohit S *et al*. Effect of cryogenic grinding on volatile oil, oleoresin content and anti-oxidant properties of coriander (*Coriandrum sativum* L.) genotypes. *Journal of Food Science and Technology*. 2015; 52(1):568-573.
- Shankaracharya NB, Anandaraman S, Natarajan CP. Chemical composition of coriander varieties and changes on roasting. *Proceedings First National Symposium. Plantation Crops*, 1972, 184-189.
- Singh SK, Singh SJ, Singh D, Tripathi SM. Association analysis in elite germplasm lines in coriander (*Coriandrum sativum* L.). *Annals of Horticulture*. 2011; 4(2):187-192.

20. Singh SK, Kakani RK, Meena RS, Pancholy A, Pathak R, Raturi A. Studies on genetic divergence among Indian varieties of spice herb, *Coriandrum sativum*, 2012
21. Thamburaj, Singh N. Vegetables and tuber crops and spice, Published by Directorate of information and publication of Agriculture (ICAR), New Delhi, 2004, 372-73.