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Ajmer Coriander 2: A High Yielding Coriander Variety

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Abstract

Spices have played a pivotal role in human history, not only as culinary ingredients but also for their medicinal, economic, and cultural importance. Coriander is grown both for seed spices purpose in the rabi season and leafy vegetable purpose as an herb all year round. The average productivity of coriander seeds in India is 1330 kg ha⁻¹ (2017-18) as against genetic potential of 1600-2000 kg ha⁻¹. So there is a need of high-yielding coriander variety with disease resistance. A new coriander variety ACr-2 was developed and released in 2019 for all coriander growing areas of India (Rajasthan, Haryana, Bihar Uttar Pradesh, Gujarat, Uttarakhand and Chhattisgarh). Adoption of new coriander variety ACr-2 by the coriander growers will increase their farm productivity and income, thus improving their livelihood besides better sustenance of the spice industry in the country.

Keywords: Coriander, herb, genetic potential, growing region and livelihood.

Introduction

Spices have been known for ages as an effective therapeutic food. The power of spices to impart biological activity is slowly emerging as an area of interest for human health (Rathore *et al.*, 2013). The seed spices constitute an important group of agricultural commodities and play a significant role in our national economy. Coriander (*Coriandrum sativum* L.) is one of the important seed spices among many others grown in India. It is also commonly grown in Pakistan, Bangladesh, Russia, Central Europe, Morocco, and China (Saxena and Agarwal, 2019). It is an annual herb in the family *Apiaceae* also known as Chinese parsley or, particularly in the America, cilantro (Maroufi *et al.*, 2010). Coriander is native to southern Europe and North Africa to south-western Asia. The primary chemical constituents found in coriander essential oil are linalool (60-70%) and hydrocarbons (approximately 20%), including α -pinene, dipentane, p-cymene and α -terpinene (Rathore *et al.*, 2015). It is an important spice crop having a prime position in flavouring food (Kassahun,

2020) and the crop grown in throughout the sub-continent either for green leaf purpose or for seeds and has prime position in flavouring foods. In India it is grown in an area of 710613 ha with a production of 973973 metric tons (Anon., 2024) and it is mainly grown in Rajasthan, Gujarat, Andhra Pradesh, Uttar Pradesh, Madhya Pradesh, Himachal Pradesh. Coriander is an important spice crop having a prime position in flavouring food and the herb has a pleasant aroma. The commonest use of coriander seed is in curry powders, where it is the bulkiest constituent, often rough ground to give a crunchy texture. The main processed product of coriander is ground powder (Saxena *et al.*, 2015). The whole plant has a pleasant aroma. Coriander seed oil is an aromatic stimulant, a carminative (remedial in flatulence), an appetizer and a digestant stimulating the stomach and intestines. It is generally beneficial to the nervous system (Saxena and Agarwal, 2019). The plant height ranges between 50 to 100cm tall. The leaves are variable in shape, broadly lobed at the base of the plant, and slender and feathery higher on the flowering stems. The flowers are borne in small umbels, white or very pale pink, asymmetrical. Inflorescence is a compound umbel comprises 5 smaller umbels. Fruit is globular, 3 to 4 mm diameter and the seeds have delicate fragrance and pale white to light brown in colour.

A new coriander variety Ajmer Coriander-2 (ACr-2) was developed from ICAR-National Research Centre on Seed Spices (ICAR-NRCSS), Ajmer and released in 2019 for all coriander growing states of India viz., Rajasthan, Haryana, Bihar Uttar Pradesh, Gujarat, Chhattisgarh and Uttarakhand. Adoption of new coriander variety ACr-2 by the coriander growers will increase their farm productivity and income, thus improving their livelihood besides better sustenance of spice industry in the country.

Materials and Methods

Pedigree: This variety (population) has been developed from the germplasm which was collected in the region of Himachal Pradesh (IC-572847). The present variety was developed by recurrent selection method and tested under AICRPs by code ACr-2, COR 44, COR 57 and COR 82.

Selection procedure: The selected superior high yielding plants are evaluated under replicated trail for

the seed yield and yield attributing traits, stem gall resistance and for percentage essential oil content for the three year at ICAR-NRCSS, Ajmer (26°27'0"N and 74°38'0"E AT 460 m mean sea level altitude) by adopting recommended package of practices from 2013-2016.

Results and discussion

Varietal description

Plant: Plants are medium, 90-110 cm in height with semi erect branching pattern.

Seeds: The seeds are bold and oval in shape, brown in colour.

Maturity: The variety grouped under medium maturity group, matures in 120-130 days.

Reaction to biotic and abiotic stresses: It is field resistant to Stem gall disease (*Protomyces macrosporus*) in hot spot area (Kota & Dholi Centers). The variety had reported at results with other varieties against aphid's infestation.

Quality attributes: Seeds possess good aroma with essential oil (EO) 0.54%.

Other attributes: This variety is suitable for loamy and clay loam soils having good drainage facility. Dry cool and frost free environment particularly in January is most suitable for exploitation of full genetic potential.

Yield performance in multi-location AICRP trials

Variety was evaluated for three years at 12 locations (2012-15) across all the AICRP on Coriander centers of the country, however, variety performed well across locations of the country. The results are described in table 1 and table 1a. In replicated trials at different locations over the country, variety gave an average seed yield of 1292.92 kg ha⁻¹. The seed yield was higher than 1.94% over the national check Hisar Anand and 6.72% higher than state check RCr-728. Further, the ancillary traits (Table 2) were also recorded in comparison with the national and local check. The variety ACr-2 has recorded 10.85 and 11.94 primary and secondary branches per plant compared to Hisar Anand (6.24 and 11.51) RCr-728 (6.14 and 11.74). The yield attributing traits viz., number of umbel plant⁻¹ (32.50), number of umbellate umbel⁻¹ (5.90), number of seed umbel⁻¹ (40.85) and test weight (9.70 gm) were also higher compared to the check varieties across the locations (Table 2).

Stem gall disease resistance

Among the fungal diseases, the stem gall disease caused by *Protomyces macrosporus* Unger is the most destructive disease. It is the most common, widespread, and damaging disease affecting almost every cultivar irrespective of geographical and ecological differences (Khare *et al.*, 2017). The most serious losses occur during flowering and fruit formation, and on the severe incidence of stem gall, no fruits are produced. A minimum temperature range of 13–15°C and a maximum of 25–30°C along with 45–75% RH are the most conducive for disease development. The two-year trial was conducted on screening of coriander entries against stem gall disease of coriander under natural condition at three different locations viz., Dr. RP Central Agricultural University, Dholi (27°40'55.092"S; 152°54'27.144"E), ICAR-NRCSS, Ajmer (48°25'56.892"N; 10°24'48.636"E) and SKNAU, Jobner (26°58'26.76"N; 75°23'10.32"E). The variety ACr-2 found resistant at both the locations while the check variety Rajendra Swati was found susceptible (Table. 3)

Essential oil

The essential oils (EO) and extracts of aromatic plants and spices have been used in food preservation, pharmaceuticals, alternative medicine and natural therapies. The EO contents in different species are varied inherently, influenced greatly by culture conditions and environment, as well as by crop and

post-crop processing. The results from a two-year trial conducted on essential oil content (%) in seeds of the proposed variety tested during Rabi 2012-13 to 2014-15 at Jobner Centre. The essential oil found 0.54 % in ACr-2 which was 28.57% higher than HisarAn and 54.29% higher than RCr-728 (Table 4).

Agronomic management

The optimum seed yield can be obtained by adopting standard agronomical practices viz., Sowing of seeds during 2 & 3rd week of October with a seed rate of 10-12 kg ha⁻¹ at a distance of 30 cm between the lines.

Irrigation: 5-6 irrigations are sufficient depending on soil type and climatic conditions in conventional method and when irrigation is given by drip method water should be given at 0.8 IW/CPE ratio.

Spacing: 30 x 10 cm. Fertilizer & manures: Apply 5-10 t ha⁻¹ FYM, 60 kg N, 30 kg P₂O₅ and 20 kg K₂O ha⁻¹.

Conclusion

The ACr-2 has performed better compare to rest of the genotypes during primary evaluation trials carried at ICAR-NRC on Seed Spices, Ajmer. In multi-location testing, it gave 1292.92 kg ha⁻¹ average seed yield, which is 1.94% and 6.72 higher than as compare to national check HisarAn and RCr-728 respectively in 25 trials conducted different locations across the country via AICRPs.

Conflicts of Interest : The authors declare no conflicts of interest.

Table 1. Summary of performance of coriander variety ACr-2 in Station and coordinated trials at different locations across the State for Seed yield (kg ha⁻¹)

Particulars	Proposed entry (ACr-2)	National check Hisar Anand	Local check RCr-728
Years of testing	2012-13 to 2014-15	2012-13 to 2014-15	2012-13 to 2014-15
Total yield over the locations/years	32323.1	31708.68	30287.72
No of locations / years	25	25	25
Mean	1292.92	1268.34	1211.50
% increase over national check Hisar Anand		1.94	
% increase over state check Rcr-728		6.72	

Table 1a. Seed yield (kg ha⁻¹) of coriander varieties in Station and coordinated trials at different locations across the country (2012-15)

Year	Location	ACr-2 (COR-44)	Hisar Anand (National Check)	RCr-728 (State Check)
2012-13	NRCSS, Ajmer	1589	1433	1057
2014-15		1955.56	1364.58	1217.36
2012-13	Hisar	1384	1761.7	1560.1
2013-14		1391.8	1852.7	1734.6
2014-15		1451.4	1043.21	753.09
2012-13	Jabalpur	1785	2818	2447
2012-13	Dholi	861.11	522.22	416.67
2013-14		766.7	405.6	461.1
2012-13	Jagudan	1081	1206	832
2013-14		1069	1102	806
2014-15		1349	1827	1123
2012-13	Kumarganj	1475	1298	1214
2013-14		1124	711	1124
2014-15		1318	1162	1079
2012-13	Navsari	641.98	837.53	746.67
2013-14		614.20	888.89	780.86
2014-15		709.88	1043.21	735.09
2012-13	Pantnagar	1967.59	1550.93	2175.93
2013-14		2893.5	2083.3	2569.5
2012-13	Kota	1111.11	1145.83	680.56
2014-15		1215	1181	885
2013-14	Jobner	1622.7	1305.6	1143.5
2014-15		2315.74	2085.19	2760.65
2014-15	Raigarh	265.63	388.19	448.96
2014-15	TNAU	365.2		398.53
	Total	32323.1	31708.68	30287.72
	Average	1292.92	1268.34	1211.50
% increase over Hisar Anand (National Check)			1.94	
% increase over RCr-728 (State Check)				6.72

Table 2. Ancillary traits recorded for the proposed variety ACr-2 tested at different locations of the country in CVT during 2012 to 2015.

Character	ACr-2	Hisar Anand	RCr-728
Plant Height (cm)	89.36	89.47	90.77
Primary Branches	10.85	6.24	6.14
Secondary Branches	11.94	11.51	11.74
Days to maturity	125	130	135
No. of Umbel/plant	32.50	32.50	28.37
No. of Umbellate/umbel	5.90	5.94	5.82
No. of Seed/umbel	40.85	39.38	42.11
Test weight (g)	9.70	13.06	8.42

Table 3. Reaction of coriander entries against stem gall disease for the year

Sl. No.	Coriander Entries	Contributing center	2015-2016		2016-2017	
			Disease Score	Disease reaction	Disease Score	Disease reaction
1.	RD-377	Dholi (Dr.RPCAU)	2	MR	2	MR
2.	RD-417	Dholi (Dr.RPCAU)	4	S	4	S
3.	RD-154	Dholi (Dr.RPCAU)	4	S	2	MR
4.	RD-416	Dholi (Dr.RPCAU)	4	S	4	S
5.	RD-365	Dholi (Dr.RPCAU)	4	S	4	S
6.	RD-385	Dholi (Dr.RPCAU)	2	MR	2	MR
7.	RD-393	Dholi (Dr.RPCAU)	1	R	2	MR
8.	ACr-2	Ajmer (NRCSS)	1	R	1	R
9.	ACr-1	Ajmer (NRCSS)	1	R	1	R
10.	RCr-446	Jobner (SKNAU)	4	S	4	S
11.	RCr-41	Jobner (SKNAU)	4	S	4	S
12.	RCr-475	Jobner (SKNAU)	2	MR	2	MR
13.	RCr-480	Jobner (SKNAU)	1	R	2	MR
14.	RCr-436	Jobner (SKNAU)	1	R	1	R
15.	RCr-20	Jobner (SKNAU)	4	S	4	S
16.	RCr-728	Jobner (SKNAU)	4	S	2	MR
17.	RCr-435	Jobner (SKNAU)	1	R	1	R
18.	RCr-684	Jobner (SKNAU)	4	S	4	S
19.	Rajendra Swati (Sus. check)	Dholi (Dr.RPCAU)	4	S	4	S

Table 4. Essential oil content (%) in the seed of the proposed variety tested at Jobner centre (Rabi 2012-13 and 2014-15)

S. No.	Name of entries	Essential oil	% higher than Anand	Hisar	% higher than RCr -728
1	ACr -2	0.54	28.57		54.29
2	Hisar Anand	0.42			
3	RCr -728	0.35			

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