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Short communication

Comparative superiority of coriander variety NRCSS ACr-1 for yield and stem gall disease tolerance

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ABSTRACT

Coriander (*Coriandrum sativum* L.), owing to several functional properties, is valued profusely in food and medicinal industry. Stem gall disease, caused by *Protomyces macrospores* fungus has become a widespread disease of the coriander and causing heavy damage to the crop in the production areas due to monoculture of old varieties. A new variety NRCSS ACr-1 has been developed when evaluated under multi-location trials under the hotspot areas compared to different check varieties. It produced on an average 1168.8 kg/ha seed yield, which had 0.49% essential oil and 8.68% total oil. It showed higher yield even under hot spot situations with no major yield reduction.

Key words: *Coriandrum sativum* L., stem gall disease, yield.

Coriander (*C. sativum* L., family Apiaceae) is an annual seed spice, grown mostly for the seeds (botanically fruits) and green herbs. Coriander is grown for seed spices purpose in *rabi* season and leafy vegetable purpose in summer and rainy season in Rajasthan, Madhya Pradesh, Uttar Pradesh, Gujarat, Andhra Pradesh and few other states. The average productivity of coriander seeds in India is 837 kg/ha and 797 kg/ha in Rajasthan (2014-15) as against genetic potential of 1600-2000 kg/ha. The productivity of coriander in affected areas has gone down to 325-400 kg/ha and one of the major reasons identified is increasing incidence of stem gall in coriander (DASD, 2). Monoculture of coriander and that too with susceptible varieties like RCr-435, CS-6 and other local cultivars have increased the severity. Stem gall disease, caused by *Protomyces macrospores* fungus has become a widespread disease of the coriander and is causing considerable damage to the yield and quality of the crop. The fungus has been reported to survive in soil or in seed and losses varied from 10.4 to 57.4%, which may further increase in severe conditions. In case of severe incidence, no fruit is produced (AICRPS, 1; Lakra, 5; Malhotra, 6, 7; Lal *et al.*, 4).

Therefore, the performance of a new variety NRCSS ACr-1 resistant to stem gall disease was undertaken. The variety NRCSS ACr-1 (Sel ACr-01-256) was developed at ICAR-NRCSS, Ajmer through selection from an accession EC 467683 based on breeding methodology of mass selection with progeny testing and reported resistance to stem gall and fusarium wilt. It was notified in January 2016 by the State Varietal Release Committees of Rajasthan. Other important quality characters as analyzed were 8.68% total oil content, 0.497% essential oil with 77.755% linalool content.

Performance of NRCSS ACr-1 in multi-location and station trials was assessed from 2010-11 to 2012-13 over years and locations at Ajmer, Jobner and Kota areas (Table 1). It was found that ACr-1 consistently performed better and yielded average production of 1168.8 kg/ha seeds and was 3.13% less than check RCr 435 but was 21.01% higher than local check under normal conditions. But in stem gall

Table 1. Seed yield (kg/ha) of coriander varieties at different locations.

Year	Location	ACr-1 (COR-35)	RCr-435 (State check)	Local check
2010-11	NRCSS, Ajmer	1284.00	1070.00	992.00
2012-13		1189.00	930.00	477.00
2009-10	SKNCOA, Jobner	1149.07	1496.76	1064.35
2010-11		937.5	1562.50	1300.93
2011-12		1278.24	1492.13	999.07
2010-11	ARS, Kota	1181.00	694.00	-
	Total	7018.81	7245.39	4833.35
	Av.	1169.8	1207.57	966.67
% increase over RCr-435			-3.13	
% increase over local check				21.01

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Table 2. Summary on performance of coriander varieties in station and co-ordinated trials for seed yield (kg/ha) and stem gall reaction (2009-10 to 2012-13).

Particulars	Proposed entry (NRCSS ACr-1)	State check (RCr-435)	Local check (CS 6)
No. of locations/year	6	6	5
Mean yield (kg/ha) under healthy conditions	1169.8	1207.57	966.67
% increase over national check	-3.13	-	-
% increase over local check	21.01	-	-
*Reaction to stem gall disease (%) in sick plots at Anta, Baran	0.2	42	78
Mean yield kg/ha from sick fields	1198	632	345
% increase of yield over state check	89.55	-	-
% increase of yield over local check	247%	-	-
Leaf yield in shade net during summer (kg/ ha)	660.23	-	573.36
Total oil content (%)	8.68	-	-
Essential oil content (%)	0.497	0.4	0.3
Linalool (%)	77.755	-	-

*0-4 scale was used and disease % was calculated as per AICRPS (2004): Stem gall (Coriander) 0 = Healthy; 1 = Galls on stem alone; 2 = Galls on stem and leaf; 3 = Galls on inflorescence; 4 = Galls on stem, leaf and inflorescence

Table 3. Performance of coriander variety ACr-1 during the year 2013-14 and 2014-15 at Anta, Baran district.

Treatment	Plant height (cm)	No. of branches	Root		No. of umbellets per umbel	No. of seeds per umbel	1000-seed wt. (g)	Yield (kg ha^{-1})
			No.	Length (cm)				
ACr- 1	123.14	39.39	18.27	18.40	7.1	59.33	11.32	1198
RCr-436	55.37	29.78	10.43	11.01	7.0	43.02	15.26	632*
CS- 6	51.36	24.01	8.59	10.99	7.0	42.19	15.38	345*

*The yield of coriander variety RCr-436 and CS-6 was low only due to the severe incidence of stem gall.

affected hot spot areas in Anta (Baran district), the disease percentage recorded was 0.2% for ACr-1, 42% for RCr 435 and 78% for local check with yield performance of 1198, 632 and 345 kg/ha, respectively and ACr-1 exhibited higher yield of 89.55% than state check and 247% than local check, which was the most susceptible but popular variety (CS 6) used as local check for this disease (Table 2). Though ACr-1 showed 3.13% low yield that state check under normal conditions but it yielded 89.55% high seed than state check under disease affected soil conditions. Similar results were earlier noted by Mqalhotra *et al.* (7) and Meena *et al*. (8).

Demonstrations in large area of 14 ha with 17 farmers were conducted in the identified hot spot areas in Bagli, Chatrapura, Udpuria and Bhawargarh villages of Anta, Baran district of Rajasthan. The average yield performance per hectare recorded was 1,198 kg from ACr-1, 632 kg from RCr 435 and 345 kg from local check (CS 6) (Table 3). The yield performance of RCr 435 and CS-6 was low because high incidence of stem gall was observed in this variety (Lal *et al*., 4). Hence, NRCSS ACr-1 can be grown in Rajasthan and other coriander growing states.

REFERENCES

1. AICRPS. 2004. Proceedings of the XVII workshop of AICRP Spices, 3-5, February, 2004, IISR Calicut, pp 62.

2. Annual Report. 2007. *NRCSS Annual Report*, 2006-07, pp. 15.

3. DASD. 2016. Spices statistics at a glance 2016. Directorate of Arecanut and Spices Development, Calicut, Kerala, India, 156 p.

4. Lal. G., Singh, B., Khan, M.A., Singh, D.K., Gupta, I.N. and Cheriyan, H. 2015. Coriander variety ACr-1 safe against stem gall and natural

hazards: a success story. *Indian J. Arecanut, Spices Med. Plants*, **17**: 24-27.

5. Lakra, B.S. 2000. Management of stem gall of coriander (*Coriandrum sativum*) incited by *Protomyces macrosporus. Indian J. Agri. Sci.* **70**: 338-40.

6. Malhotra, S.K. 2003. Plant genetic resources of seed spices in India. *Seed Spices Newslett*. **3**: 1-4.

7. Malhotra, S.K., Vashishtha, B.B. and Apparao, V.V. 2006. Influence of nitrogen, *Azospirillum* sp. and farmyard manure on growth, yield and incidence of stem gall disease in coriander (*Coriandrum sativum* L.). *J. Spices Arom. Crops*, **15**: 115-17.

8. Meena, S.S., Sen, N.L. and Malhotra, S.K. 2006. Influence of sowing date, nitrogen and plant growth regulators on growth and yield of coriander (*Coriandrum sativum* L.). *J. Spices Arom. Crops*, **15**: 88-92.

9. Singh, D.K., Kakani, R.K., Khan, M.A., Aswal, S. and Solanki, R.K. 2016. Expansion of coriander variety ACr-1 in Haroti region of Rajasthan. *Int. J. Seed Spices*, **6**: 86-89.

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