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On-farm assessment of fennel varieties in Rajasthan

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Abstract

Fennel varieties *viz*., RF-205, RF-125, RF-145, RF-178 and NRCSS-AF1 with the recommended package of practices were evaluated in 120 farmers' field from eight adopted villages of Pali district of Rajasthan. The results of the study indicated that under diversified agro-climatic conditions, three varieties of fennel *viz*., NRCSS-AF1, RF-205 and RF-125 were promising over local check with higher B : C ratio of 2.21, 2.02 and 1.63, respectively.

Keywords: fennel, front line demonstration, technological innovation

India is the largest producer of fennel which is cultivated in 0.79 lakh ha with a production of 0.74 lakh tonnes (2009–10). The fennel seeds were exported to the tune of 6800 tonnes valued worth Rs. 5,872.60 lakhs during the year 2009–10 (Anonymous 2010). The main markets for fennel are Japan, USA, U.K., Canada, Singapore, Saudi Arabia and U.A.E. In India, its production is concentrated mainly in the state of Rajasthan, Gujarat, Madhya Pradesh, Maharashtra, Haryana, Punjab, and Uttar Pradesh. Fennel is one of the most important *rabi* seed spices crop in the Rajasthan state. It occupies about 7690 ha area accounting for 6570 tonnes production in the state, which is 4.87% and 8.88% of total seed spices area and production in the country, respectively. Rajasthan and Gujarat contribute more than 80% of the total seed spices production in the country. But the average productivity of fennel crop (1235 kg ha^{-1}) in the state is very low as compared to other parts of the country. The reasons for low productivity may be the traditional methods of cultivation followed by the farmers. In the present study, improved varieties were tested on-farm and reported.

The study was conducted during the year 2009–10. A total of 120 farmers were selected from eight adopted villages *viz*., Bittura Kallan, Dayalpura, Sodawas, Hemawas, Chandawal, Hingola, Sonaimanji and Bhagwanpura of Pali district of Rajasthan to test five high yielding fennel varieties *viz*., RF-205, RF-125, RF-145, RF-178 and NRCSS-AF1, with the recommended package of practices. Sowing was done in October–November, while harvesting was in the month of March. Fertilizer schedule was N: 90, P_2O_5:40, K_2O:0 kg ha^{-1} for all the varieties except for RF-RF-178. Need based plant protection chemicals were used to control the insect-pests. Locally cultivated variety namely *Deshi Sonf* as practiced by the non-adopted farmers with their own management system was taken as the local check. In the present

study, the data were collected through personal interviews, group discussion and empirical observations with the help of semi-structured interview schedule and field records of FLD plots and local practices. To estimate the technology gap, extension gap and technology index, the following formula were used (Samui *et al.* 2000; Sagar & Chandra 2004).

Technology gap= Potential Yield—Demonstration yield

Extension gap= Demonstration yield—Farmers yield

Technology index= [(Potential yield—Demonstration yield) / Potential yield] × 100

The potential and field performance of the newly released fennel varieties along with the local check were evaluated and data are presented in Table 1. The percentage increase in the seed yield over the farmers practice was 60.90, 33.98, 41.75, 28.15 and 47.09 for RF-205, RF-125, RF-145, RF-178 and NRCSS-AF1, respectively.

The technology gap ranged from 4.70 q ha^{-1} for RF-205 to 7.10 q ha^{-1} for RF-125, which corroborates with the gap in demonstrated yield over potential yield. The technology gap observed may be attributed to variation in soil fertility, weather conditions and implementation of management practices. Though the technology index among the varieties did not vary widely, assessment of location specificity of varieties appeared to be necessary to achieve the expected yields from different fennel varieties. The lowest yield was recorded in the demonstration plot for the variety RF-178, a technology gap of 6.90 q ha^{-1}. RF-205 and NRCSS-AF1 showed lower technology gap of 4.70 q ha^{-1} and 4.85 q ha^{-1}, respectively.

Comparatively higher extension gap (7.60 q ha^{-1}) was recorded for variety NRCSS-AF1, followed by RF-205 (6.20 q ha^{-1}) and RF-145 (4.30 q ha^{-1}). This indicated that there is need to educate the farmers and help them for optimizing the seed yield by adopting improved practices. More use of newly released high yielding varieties by the farmers will subsequently change existing trend of extension gap. The technology index showed the feasibility of the evolved technology at the farmer's field. The technology index of variety NRCSS-AF1 (21.32%) was closely followed by RF-205 (22.17%). The higher technology index of variety RF-178 (34.33%), RF-125 (33.97%) and RF-145 (29.81%) indicated existence of a considerable gap between the technology performance at Research Station and the farmers' field.

The technology index of three fennel varieties NRCSS-AF1, RF-205 and RF-125 indicated that these varieties are performing well in the arid conditions and will help to increase the productivity of fennel through the adoption of improved practices. It is also supported with performance of the varieties, NRCSS-AF1 and RF-178 in terms of economic returns than the other varieties, except local check (Table 2). The findings are in line with the earlier studies of Meena & Singh (2011).

The comparative benefit cost analysis presented in Table 2, indicated that the highest net return was obtained from the energized NRCSS-AF1 variety Rs. 30,700 ha^{-1} followed by RF-205 (Rs. 27,480 ha^{-1}), RF-125 (Rs. 26,787 ha^{-1}),

Table 1. Productivity of fennel variety, yield gap and technology

Variety	No. FLDs	Area (ha)	Potential yield (q ha^{-1})	FLD yield (q ha^{-1})	Local check yield (q ha^{-1})	Increase %	Techno-logy gap (q ha^{-1})	Exten-sion gap (q ha^{-1})	Technology index
RF-205	20	10.5	21.20	16.50	10.30	60.19	4.70	6.20	22.17
RF-125	15	8.5	20.90	13.80	10.30	33.98	7.10	3.50	33.97
RF-145	10	6.8	20.80	14.60	10.30	41.75	6.20	4.30	29.81
RF-178	10	5.5	20.10	13.20	10.30	28.15	6.90	2.90	34.33
NRCSS-AF1	10	5.5	22.75	17.90	10.30	47.09	4.85	7.60	21.32

Table 2. Economics of cultivation of fennel

Sl. No.	Variety	Yield q ha^{-1}	Cost of cultivation (Rs. ha^{-1})	Gross return (Rs. ha^{-1})	Net return (Rs. ha^{-1})	B:C ratio	Yield over FP* (q ha^{-1})	Additional return over FP (Rs. ha^{-1})
1	RF-205	16.50	13600	41080	27480	2.02	6.02	16000
2	RF-125	13.80	16458	43245	26787	1.63	3.39	14579
3	RF-145	14.60	18987	40900	21913	1.15	4.18	16890
4	RF-178	13.20	17700	39700	22000	1.24	2.81	17120
5	NRCSS-AF1	17.90	13900	44600	30700	2.21	4.71	18000
	Average	15.20	16129	41905	25776	1.60	4.22	16518
6	Local check		14110	19500	5390	0.38	-	-

*FP=Farmers Practice

RF-178 (Rs. 22,000 ha^{-1}), RF-145 (Rs. 21,913 ha^{-1}) and Local Soanf (Rs. 5,390 ha^{-1}). The average cost of cultivation per hectare was Rs. 16,129, giving a net return of Rs. 25,776 ha^{-1} at a price range from Rs. 5,500 to Rs. 6,000 q^{-1}. In terms of benefit-cost ratio, the variety NRCSS-AF1 ranked first (2.21) followed by RF-205 (2.02), RF-125 (1.63), RF-178 (1.24), RF-145 (1.15), and lowest value for local check (0.38).

Variety-wise comparison of additional yield gain showed that the demonstrated improved varieties gave more yield under FLDs that ranged from 2.82 t ha^{-1} from the variety FR-178 to 6.02 t ha^{-1} from the variety RF-205 over farmers' practice. Besides, the additional economic return ranged from Rs. 14,589 ha^{-1} from the variety RF-125 to Rs. 18,000 ha^{-1} from the variety NRCSS-AF1. It can be concluded that NRCSS-AF1 with lesser cost of cultivation, higher return over local check and higher B:C ratio in the best suited variety.

Under diversified agro-climatic conditions, three varieties of fennel *viz*., NRCSS-AF1, RF-205 and RF-125 have given encouraging results over local check and have potential to perform well with timely management practices in arid condition of Rajasthan.

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