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Impact of technology transfer for fennel primary processing on income and employment opportunities for tribal women in district Sirohi (Rajasthan)

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Abstract

Krishi Vigyan Kendra organized a set of need based skill oriented training programmes for selected 500 tribal women (fennel producers) in small groups (25-30 trainees) during last four years (2008 to 2012) with an aim to develop their skills regarding harvesting of umbel at post-mature stage, grading of produce (A, B, C & D grades), drying of fennel in modified shade house made up of local indigenous material, threshing on RCC floor or polyether sheet and packaging in polythene lined bags and marketing of the final produce. The skill oriented trainings had a positive impact on tribal women and about half of the total area (50%) has been transformed in primary processing. By primary processing of fennel, additional employment of about one lakh man days have been generated in district Sirohi. By this intervention, additional monetary returns of around Rs. 29.0 crores have been generated in the district. In the district, trained tribal women are getting Rs. 200-250 day⁻¹ for harvesting and primary processing of fennel, whereas other unskilled women are getting only Rs. 100-150 day⁻¹. This intervention has not only improved the living standards of the rural and tribal households but also increased the socio-economic status by providing self employment opportunities and livelihood security.

Keywords: economy, livelihood, primary processing, self-employment, tribal

Introduction

A paradigm shift has been observed in cropping pattern by including spice crop i.e. fennel by the farmers of Sirohi district giving better economic returns to the rural and tribal families. Fennel is a biennial herb and a very useful spice crop of India. It is mainly grown in the *rabi* season but in some parts of south west

Rajasthan like Sirohi it is grown in *kharif* season by transplanting. The total area under fennel cultivation in Rajasthan is 7500 ha, out of which maximum area is in Sirohi district i.e. 4528 ha (Database 2009). The total fennel production in Rajasthan was 6249 t, out of which 4349 t was from Sirohi with average productivity of 22 q ha⁻¹. Due to lack of

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knowledge about primary processing (time of harvesting, grading, drying and packing, etc.) the fennel growers fetch very low market prices, because they have been selling lower quality produce without primary processing. The Krishi Vigyan Kendra, Sirohi, Rajasthan has developed a complete package on primary processing and organized different types of skill oriented training programmes for selected 500 tribal women. In this paper, the impact of such training has been assessed and presented.

Materials and methods

The present study was conducted during 2011–12 in Krishi Vigyan Kendra, which adopted five fennel producing villages (Kacholi, Phoola bai ka khera, Nagpura, Sanwara and Panchdeval) to know the impact of fennel primary processing training on socio-economic development of tribal women. The tribal farm women were divided in two categories on the basis of fennel production and processing i.e. fennel production without primary processing or partial processing (untrained group) and fennel production with primary processing (trained group). The respondent sample was collected as 50 farm women (25 from each group) from each village and total 250 women (125 trained + 125 untrained) were selected giving equal allocation using purposive sampling technique with the hope of representing the whole area (Cochran & Cox 1950).

A well designed questionnaire was developed and pre-tested. Primary data was collected with the help of a questionnaire. Two hundred and fifty farm women respondents of the selected five villages were interviewed in the year 2011–12. For supporting the results of primary data (progressive farmers labour record), the secondary information was collected from published and unpublished sources. After collection of data, a tally sheet was prepared which facilitated the enumeration of answer of each question. By using descriptive statistics the data were analyzed by calculating simple percentages. To estimate the technology gap, extension gap and the technology index the following formulae were used (Samui *et al.* 2000).

Technology gap = Potential market rate of fennel - Primary processed fennel market rate

Extension gap = Primary processed fennel market rate - Untrained farmers produce market rate

Technology index = [(Potential market rate of fennel) – (Primary processed fennel market rate)/(Potential market rate of fennel)] × 100

Results and discussion

Adoption of primary processing by tribal women

Large number of rural tribal women are involved in primary processing and allied activities of fennel (Table 1). According to the field survey data collected, the tribal women perform numerous labour related jobs such as timely harvesting of fennel umbels (93%), construction of umbel drying structure (76%), collection and transportation of umbel from field to drying structure (91%), grading of umbels before drying (95%), arrangement of umbel in drying structure (64%), collection of umbel after drying for threshing (96%), threshing of umbels (85%), removal of debris from fennel seeds (98%), winnowing of fennel seeds (95%), cleaning of seeds (100%), grading of fennel seed based on quality (92%) and packing of final produce (73%). Farouque & Anwar (1998) reported that correlation analysis among female education and knowledge of homestead farming, hobby, extension contact and attitude towards technology has significant relationship with their selected self employment activities. Similar results were observed by Bhardwaj *et al.* (2010), Bhardwaj (2011) and Nandal & Ojha (2012) who reported that the primary processing of the fennel is mostly done by the tribal women.

Role analysis of tribal women in district economy

Primary processing played very important role in improving quality of the produce for fetching good market price. The primary processing activities undertaken by tribal women include harvesting the umbel at post mature stage; removal of all under sized, infested, discoloured, light weight seeds, inert

Table 1. Contribution of tribal farm women in primary processing of fennel

Various primary processing activities	Involvement (%)	
	Male	Female
Timely harvesting of fennel umbels	7	93
Construction of drying structure for umbel	24	76
Collection and transportation of umbel from field to drying structure	9	91
Grading of umbels before drying	5	95
Arrangement of umbel in drying structure	36	64
Collection of umbel after drying for threshing	4	96
Threshing of umbels	15	85
Removal of debris from fennel seeds	2	98
Winnowing of seeds	5	95
Cleaning of seeds	0	100
Grading of seeds	8	92
Packing of seeds	27	73
Total share in primary processing	11.84	88.16

material and other debris from final produce. During first stage, grading- selection of good quality umbel for drying was done. In the second stage, all infested, under sized, discoloured umbel were removed. In the third, stage removal of all type of inert material and under size seeds was done using different sized sieves. In the fourth stage removal of plant partials of uniform weight, undersized seeds and any other inert material was done using locally made thresher cum grader machine and final product was packed in gunny bags with polyethylene lining. By the above mentioned processing, the fennel produce was divided into three categories *viz.*, A (59%-65%), B (19%-25%), C (13%-19%) as per standard quality parameters. Graded product fetched higher (101%) market price than the ungraded ones and farmers earned additional income (Rs. 1.23 lakh ha⁻¹) from processed fennel as compared to non-primary processed fennel. More than 50% (2354 ha) fennel growers adopted the primary processing activities and total additional income by virtue of primary processing in district Sirohi was Rs. 29.0 crores per annum. Hence, role of tribal women in

primary processing is 88.16%, and they contributed more than Rs. 26.0 crores per annum through primary processing of fennel (Table 2). Similar results were also observed by Sagar & Chandra (2004), Ahmad *et al.* (2007), Jamali (2009), Bhardwaj (2011) and Nandal & Ojha (2012).

Technology gap, extension gap and technology index

From the study, technology gap of Rs. 85,800 ha⁻¹, extension gap of Rs. 1,01,200 ha⁻¹ and technology index of 22.94 were observed (Table 3), which emphasized the need to educate the farmers through various means like trainings, demonstrations and exposure visits for adopting primary processing technologies. More and more farmers adopting the primary processing technology will subsequently change this alarming extension gap. Similar results were observed by Bhardwaj *et al.* (2010), Bhardwaj (2011) and Nandal & Ojha (2012) who reported that the training of farm women for adoption of primary processing and value addition of farm produce at farmers level increased market rate of produce and minimized technology gap and extension gap.

Table 2. Contribution of tribal farm women in economy of district Sirohi through primary processing of fennel

Sl. No.	Grade	Rate (Rs kg ⁻¹)	Produce (%)	Earning (Lakh ha ⁻¹)
1	A	130-170	59-65	2.04
	B	115-135	19-25	0.60
	C	55-75	13-19	0.22
		<i>Total</i>		2.88
2	Graded	131.0	22	2.88
3	Ungraded	65.0	22	1.65
Difference in income due to secondary agriculture ha ⁻¹				1.23
Total area under adoption of primary processing (ha)				2354
Total additional income due to primary processing in district Sirohi(1.23 × 2354 ha = Rs. 2895/-)				2900.0
Present role of tribal women in primary processing (%)				88.16
Economic empowerment of tribal women through primary processing of the fennel in district Sirohi				2600.0

Table 3. Technology gap, extension gap and technology index for fennel processing

Technology gap (Rs. ha ⁻¹) = 170–131= 39 × 2200 kg (Yield ha ⁻¹) = 85,800	0.86
Extension gap (Rs. ha ⁻¹) = 131–85 = 46 × 2200 kg (Yield ha ⁻¹) = 101,200	1.01
Technology index = (170–131)/170 × 100 = 22.94	22.94

Effect on socio-economic profile of adopters and non adopters

The results in Table 4 depicted that the primary processing adopters earned 108.33% more than non adopters. By adopting primary processing, employment generation increased upto 42 man days ha⁻¹, which means an increase of about one lakh man days in 2354 ha area of the district. Socio-economic status of farm tribal women was directly affected by primary processing of the fennel. Primary processing adopting tribal women made pucca houses (35%), purchased radio, TV, CD player, bed, storage bin etc. (42%), maintained bank account with more than Rs. 10,000 balance (42%), gave good education to children (23%), purchased improved agricultural implements (36%), had active participation and interaction with extension workers (72%), had personal transportation facilities (53%), maintained telephone or mobile facilities (47%), greater adoption of new

technology (35%), better understanding of urban society (17%), awareness about health and hygiene (20%), participation in social works (29%), change in behavior and thought (22%). Women participation in decision making was also increased by adoption of primary processing (32%) as compared to 13% in non-primary processing adopters. Sanyang *et al.* (2009), Bhardwaj *et al.* (2010), Bhardwaj (2011) and Nandal & Ojha (2012) also reported that the agro product processing by women groups played a significant role in the socio-economic development of the country as provider of food, foreign exchange, employment and income.

The fennel growers need skill oriented off and on campus trainings and field demonstrations related to production and primary processing (harvesting, grading, drying, threshing, packing and storage) alongwith supply of farm inputs which increases the production

Table 4. Socio-economic profile of adopters and non adopters of primary processing

Essential components	Respondents (n=250)	
	Non adopters of primary processing (Untrained group)	Adopters of primary processing (Trained group)
Average annual income (Rs.)	132000	275000
Employment generation (mandays ha ⁻¹)	228	270
Construction of pucca house (%)	15	35
Utility facilities (Radio, TV, CD player, bed, storage bin etc. (%))	17	42
Bank account with more than Rs. 10000 balance (%)	15	42
Children education in good school (%)	11	23
Improved agricultural implements (%)	17	36
Interaction with extension workers for different field problems (%)	42	72
Personal transportation facilities (cycle, motorcycle, car) (%)	18	53
Adoption of new technology (%)	15	35
Understanding about urban society (%)	10	17
Awareness about health and hygiene (%)	19	20
Participation in social works (%)	19	29
Change in behaviour and thought (%)	11	22
Telephone and Mobile facilities (%)	33	47
Women participation in decision making (%)	13	32

manifold. Primary processing of fennel also contributed immensely to socio-economic development of the tribal women. Therefore, more emphasis should be given to these areas while planning the need based skill oriented training programmes on primary processing of fennel at field level. Short training course (one day off campus) should be organized at farmers field and long training course (three and seven days) should be organized at progressive farmers field or research centres in presence of field experts. A need based set of training programmes with full involvement of producers, progressive farmers, extension workers, scientists, processors, exporters and marketers will give more fruitful results than other training programmes. Overall, it can be concluded that skilled tribal women involved in primary processing are key to improving the socio-economic status of a community.

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