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Association between the Selected Independent Variables and the Knowledge Level of Farmers about Recommended Production Technology of Fennel

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A B S T R A C T

Seed spices occupy prominent place in the total basket of spices of the country and play a significant role in our national economy. The group of spices account for about 37 per cent and 18 per cent of the total area and production of spices in the country, respectively. Fennel (*Foeniculum vulgare*) commonly known as *'Saunf'* is an important and highly valued spice grown in India. This crop is widely grown throughout the temperate and subtropical region of the world for its aromatic fruits used in various food preparations such as soups, meat dishes, sauces, pastries, confectionaries, pickles, liquors etc. The fennel seeds are aromatic, stimulants and carminative. Rajasthan is the third largest producer of spices in the country and accounts for 12.48 % of the total production of major spices. The major fennel producing districts of Rajasthan are Nagaur, Sirohi, Jalore, Dausa, Tonk, Sawai Madhopur and contribute above 90 per cent of area and production of fennel crop. Fennel is an important commercial cash crop of arid and semi arid region. There is a wide scope to improve and increase the fennel production and productivity by enhancing the knowledge and adoption of fennel production technology. The present study was conducted in eight villages (four villages from Mertacity tehsil and four villages from Degana tehsil) in Nagaur district of Rajasthan. A sample of 120 fennel growers was selected from these selected villages by using simple random sampling with proportion sample method. The results indicated that the age, education and annual income were found to be positive and significantly associated with the knowledge level of farmers about fennel production technology. While, the variables like, caste, size of land holding, family type and family size were found to be non-significantly associated with the knowledge level of farmers about fennel production technology.

Introduction

India is known the world over as 'The Home of Spices', thus Spices and condiments need no introduction. The climate of the country is ideal for the growth of almost all spices. Spices are an important group of agricultural goods, which are virtually indispensable in the culinary art.

They also play a significant role in our national economy and also in the economies of several spice producing, exporting and importing countries. India accounts for about 45% of the global spice exports. In India, from the point of view of both domestic consumption and export, spices are important commercial crops.

Seed spices occupy prominent place in the total basket of spices of the country and play a significant role in our national economy. The group of spices accounts for about 37 per cent and 18 per cent of the total area and production of spices in the country, respectively. Seed spices are mainly cultivated in the states of Rajasthan, Gujarat, Andhra Pradesh, and Madhya Pradesh. Among these fennel, coriander, cumin, fenugreek, and Ajwain are cultivated on sizeable acreage as compared to other spices. It is the world's largest producer, consumer and exporter of seed spices which are being cultivated widely in the country over different agro climatic zones. Seed spices are not only for home consumption but also for improving economic status of the farmers. In India fennel is cultivated over an area of 1,00,000 ha with the production of 1,43,000 MT and productivity of 1,430 kg/ha (Anonymous. 2010-11).

Fennel (*Foeniculum vulgare*) commonly known as 'Saunf' is an important dominant and highly valued spice grown in India. This crop is widely grown throughout the temperate and subtropical region of the world for its aromatic fruits used in various food preparations such as soups, meat dishes, sauces, pastries, confectionaries, pickles and liquors etc. The fennel seeds are aromatic, stimulants and carminative.

Fennel oil is used as a flavoring agent in various culinary preparation, confectionary cordials and liquors. The percentage volatile oil in seed varies from 1.5 to 3.5 per cent. It contains 14-22 per cent protein with 12 to 18.5 per cent fat. It is used as a gripe water given to colicky infants. It is used to relieve bronchial spasms because of its antispasmodic properties. It targets the smooth muscles of the respiratory system, stomach muscles and intestines. Herbalists have used it for centuries to induce milk production in nursing mothers. Rajasthan is the third largest producer of spices in the country and accounts for 12.48 of the total production of major spices. The state produces about 6,96,700 tones of seed spices from an area of 9,01,628 ha with productivity 4,832 kg/ha.

The major fennel producing districts of Rajasthan are Nagaur, Sirohi, Jalore, Dausa, Tonk, Sawai Madhopur and occupy above 90 per cent of area and production of fennel crop. The average area, production and productivity of last five years are 13,404 ha, 11,085 tones, 827 kg/ha respectively (Anonymous. 2010-11). So there are possibilities to increase its production by 40 to 50 per cent by adoption of improved technologies.

Fennel is an important commercial cash crop of arid and semi arid region. The production of spices is largely in the hands of small and marginal farmers and the level of productivity of most of the spices in India is below the level as prevailing in other countries. The lower productivity is attributed to lack of knowledge of high yielding varieties, ravages due to pest and diseases, inadequate post-harvest technology and poor processing and storage facilities. Keeping this fact in view the present study entitled "The knowledge and Adoption of Recommended Production Technology of Fennel Cultivation by the Farmers in Nagaur District of Rajasthan" was undertaken.

Materials and Methods

The present investigation was conducted in purposively selected Nagaur district of Rajasthan state highest area and great potential of increasing production and productivity. The researches himself is resident of the area and acquainted with the farmers and their local dialect which facilitated easy rapport building and authentic data collection from the farmers.

The selected consist of twelve tehsils, Out of which two tehsils namely Mertacity and Degana with maximum area under fennel crop production were selected for the study purpose. Separate lists of gram panchayats of the selected tehsils were prepared with the help of concerned 'patwaries' of the Mertacity and Degana tehsils. Mertacity and Degana tehsils comprise of 42 and 34 gram panchayats respectively. Out of which two gram panchayats (Dava and Jaroda kala) from Mertacity tehsil and two gram panchayats (Sanjoo and Chonsli) from Degana tehsil were selected on proportionate random basis.

Initially, a complete list of all the major fennel growing villages of the selected tehsils was prepared in consultation with the personnel of revenue department and Agriculture department of the concerned area. From the list so prepared, 4 villages from each Tehsil were identified on the random basis under fennel crop. Thus, in all eight villages were selected for the present investigation.

A comprehensive list of all fennel growers was prepared separately for all selected villages of identified tehsils. In preparing the list, the help of revenue personnel and agricultural supervisor of the concerned area was taken for authenticity and counter check of information. Then after the farmers were categorized in to three categories i.e. large, small and marginal farmers.

Following the procedure laid down above a sample of total 15 respondents i.e. 5 in each category from every selected village was drawn randomly. Thus the study sample for the present investigation was comprised 120 respondents. (i.e. 60 from each Tehsil). Keeping in mind the objectives of study, the interview schedule was developed for the collection of data from the selected respondents.

Association between selected personal variables of the respondents with their level of knowledge of recommended fennel production technology

This section of the chapter deals with the association between the level of knowledge and selected personal variables *viz.*, age, education, annual income, caste, size of land holding, family type and family size of fennel growers. To find out the association between these personal characteristics and the level of knowledge, chi-square test was applied. The results have been presented in subsequent tables.

Association between age of the respondents and level of knowledge

Hypothesis

NH_{11}	:	There is no association between age of respondents and knowledge of fennel production technology.
RH_{11}	:	There is an association between age of respondents and knowledge of fennel production technology.

An observation of data in table 1 shows that out of total 19 respondents in age group less than 35 years, 8 (42.11%), 8 (42.11%) and 3 (15.789%) were having low, medium and high level of knowledge of improved fennel cultivation technology respectively. In the age group of 35 to 53 years, 25 (59.52%), 10(23.81%) `and 7 (16.67%) farmers had low, medium and high level of knowledge respectively. While, in the age group of above 53 years, 7(11.86%), 22 (37.29%) and 30 (50.85%) respondents possessed low, medium and high level of knowledge of improved practices of fennel cultivation, respectively.

The data in table 1 further indicate that the calculated chi-square value (29.782) was higher than tabulated value therefore, the null

hypothesis (NH_{11}) was rejected. This reveals that there existed an association between age of respondents and knowledge of fennel production technology.

The present finding is in conforming to that of Kumar *et al.*, (2013) who revealed that antecedent variables like knowledge and age, education level, and size of land holding were found to be positively and significantly associated with the knowledge level of farmers about coriander production technology.

Association between education and level of knowledge of recommended fennel production technology

Hypothesis

NH_{12}	:	There is no association between education of respondents and knowledge of fennel production technology.
RH_{12}	:	There is an association between education of respondents and knowledge of fennel production technology.

The results in table 2 indicate that out of total 19 fennel growers in illiterate group, 5 (26.32%), 4 (21.00%) and 10 (52.63%) possessed low, medium and high level of knowledge of improved practices of fennel cultivation respectively. In the group of up to primary level, 12 (35.29%), 14 (41.18%), and 8 (23.53%) respondents had low, medium and high level of knowledge respectively. In the group of primary level to middle level of education, 11 (61.11%), 2 (11.00%) and 5 (27.78%) respondents reported in low, medium and high level of knowledge respectively. While, in the group of above middle level of education, 12 (24.49%), 20 (40.82%) and 17 (34.69%) respondents were observed in low, medium and high level of knowledge about improved fennel cultivation technology.

Further the data in table 2 indicate that the calculated chi-square value (13.910) was higher than tabulated value therefore, the null hypothesis (NH_{12}) was rejected. This reveals that there existed an association between education of respondents and knowledge of fennel production technology.

The present finding is in conformity with that of Kumar *et al.*, (2013) who revealed that antecedent variables like knowledge and age, education level, and size of land holding were found to be positively and significantly associated with the knowledge level of farmers about coriander production technology.

Association between annual income of respondents and level of knowledge of recommended fennel production technology

Hypothesis		
NH_{13}	:	There is no association between annual income of respondents and knowledge of fennel production technology.
RH_{13}	:	There is an association between annual income of respondents and knowledge of fennel production technology.

The data accorded in table 3 show that 36 (57.14%), 23 (36.51%) and 4 (6.35%) less than 90,000 income farmers had low, medium and high level of knowledge about fennel production technology respectively. Whereas, 90,000 to 1,75,000annual income farmers who possessed low, medium and high level of adoption were 2 (14.29%),7 (50.00%) and 5 (35.71%) respectively. In the income category of more than 1,75,000, 2 (4.65%), 10 (23.26%) and 31 (72.09%) farmers were

observed in the low, medium and high knowledge category, respectively.

Further the data in table 3 indicate that the calculated chi-square value (58.683) was higher than tabulated value, therefore, the null hypothesis (NH_{13}) was rejected. This reveals that there existed an association between annual income of respondents and knowledge of fennel production technology.

The present finding is in conformity with that of Kumar *et al.,* (2013) who revealed that antecedent variables like knowledge and age, education level, and size of land holding were found to be positively and significantly associated with the knowledge level of farmers about coriander production technology.

Association between caste of respondents and level of adoption of recommended fennel production technology

Hypothesis

NH_{14}	:	There is no association between caste of respondents and knowledge of fennel production technology.
RH_{14}	:	There is an association between caste of respondents and knowledge of fennel production technology.

The data in table 4 indicate that out of total 29 fennel growers in scheduled caste 11 (37.93%), 10 (34.48%) and 8 (27.59%) possessed low, medium and high level of knowledge respectively about improved practices of fennel production. In the group of OBC12 (26.67%), 15 (33.33%) and 18 (40.00%) respondents had low, medium and high level of knowledge about fennel production technology. Whereas, in the group of general 17 (36.96%), 15 (32.61%) and 14 (30.43%) respondents had low, medium and high level of knowledge about fennel production technology.

It could be further observed from table 4 that calculated chi-square value (1.987) was less than tabulated value. Therefore, the null hypothesis (NH_{14}) was accepted. This reveals that there is no association between caste of respondents and knowledge of fennel production technology. It could be inferred that caste did not play a significant role in knowledge level of fennel production technology among the farmers of the study area. The present finding is in conformity with that of Kumar *et al.,* (2013) revealed that farmer's knowledge and caste, family size, and family type were found to be non – significantly associated with regard to recommended coriander production technology. The findings of this study could be supported by the findings of Chodhary (1999), Meena (2001), Jaitawat and Sharma (2008), Jangid (2001) Mahendra singh (2012) and Surendra kumar (2013).

Association between size of land holding of respondents and level of knowledge of recommended fennel production technology

Hypothesis

NH_{15}	:	There is no association between size of land holding of respondents and knowledge of fennel production technology.
RH_{15}	:	There is an association between size of land holding of respondents and knowledge of fennel production technology.

The data accorded in table 5 show that 9 (22.50%) 10 (25.00%) and 21 (52.50%) marginal farmers had low, medium and high level of knowledge about fennel production technology respectively. Whereas, small farmers who possessed low, medium and high

level of knowledge were 8(20.00%), 12 (30.00%) and 20 (50.00%) respectively. In the category of large farmers, 5 (12.50%), 17 (42.50%) and 18 (45.00%) farmers were observed in the low, medium and high knowledge category, respectively. The data further show that calculated chi-square value (3.419) was less than tabulated value. Thus, the null hypothesis (NH_{15}) was accepted and research hypothesis was rejected. This non-significant value shows that there is no association between size of land holding and knowledge of fennel production technology. Hence, it is concluded that land holding did not play a significant role in knowledge of fennel production technology in the study area.

The present finding is in conformity with that of Kumar *et al.*, (2013) revealed that farmer's knowledge and caste, family size, and family type were found to be non – significantly associated with regard to recommended coriander production technology.

Association between family type of respondents and level of knowledge of recommended fennel production technology

Hypothesis

NH_{16}	:	There is no association between family type of respondents and knowledge of fennel production technology.
RH_{16}	:	There is an association between family type of respondents and knowledge of fennel production technology.

The data in table 6 indicate that out of total 67 fennel growers in single family composition 18 (26.87%), 22 (32.84%) and 27 (40.298%) possessed low, medium and high level of knowledge respectively about improved practices of fennel production. In the group of joint family composition 22 (41.51%), 18 (33.96%) and 13 (24.53%) respondents had low, medium and high level of knowledge about fennel production technology.

It could be further observed from table 6 that calculated chi-square value (4.123) was less than tabulated value. Therefore, the null hypothesis (NH_{16}) was accepted. This reveals that there is no association between family type of respondents and knowledge of fennel production technology. It could be inferred that family type did not play a significant role in knowledge level of fennel production technology among the farmers of the study area.

The present finding is in conformity with that of Kumar *et al.*, (2013) revealed that farmer's knowledge, caste, family size and family type were found to be non – significantly associated with regard to recommended coriander production technology.

Association between family size of respondents and level of knowledge of recommended fennel production technology

Hypothesis

NH_{17}	:	There is no association between family size of respondents and knowledge of fennel production technology.
RH_{17}	:	There is an association between family size of respondents and knowledge of fennel production technology.

Table.1 Association between age of respondents and level of knowledge of recommended fennel production technology

n = 120

Age category	Level of knowledge			R-Total	X^2 value
	Low	Medium	High		
<35 years (young)	8 (42.11)[1] (20.00)[2]	8 (42.11)[1] (20.00)[2]	3 (15.789)[1] (7.50)[2]	19 (100)[1] (15.83)[2]	29.782*
35-53 years (adult)	25 (59.52)[1] (62.50)[2]	10(23.81)[1] (25.00)[2]	7 (16.67)[1] (17.50)[2]	42 (100)[1] (35.00)[2]	
>53 years (old)	7 (11.86)[1] (17.50)[2]	22(37.29)[1] (55.00)[2]	30 (50.85)[1] (75.00)[2]	59 (100)[1] (49.17)[2]	
C-TOTAL	40 (33.33)[1] (100)[2]	40(33.33)[1] (100)[2]	40 (33.33)[1] (100)[2]	120 (100)	

*Significant at 1 per cent level of significance R = Row

1 = Percentage of row C = Column

2 = Percentage of column

Table.2 Association between education of respondents and level of knowledge of recommended fennel production technology

n=120

Education level	Level of knowledge			R-Total	X^2 value
	Low	Medium	High		
Ill	5 (26.32) (12.50)	4 (21.00) (10.00)	10 (52.63) (25.00)	19 (100) (15.83)	13.910**
<5	12(35.29) (30.00)	14(41.18) (35.00)	8 (23.53) (20.00)	34 (100) (28.33)	
Middle	11(61.11) (27.50)	2 (11.00) (5.00)	5 (27.78) (12.50)	18 (100) (15.00)	
>middle	12(24.49) (30.00)	20(40.82) (50.00)	17 (34.69) (42.50)	49 (100) (40.83)	
C-Total	40(33.33) (100)	40(33.33) (100)	40 (33.33) (100)	120 (100)	

**Significant at 5 per cent level of significance R = Row

1 = Percentage of row C = Column

2 = Percentage of column

Table.3 Association between annual income of respondents and level of knowledge of recommended fennel production technology

n=120

Annual income group	Level of knowledge			R-Total	X^2 value
	Low	Medium	High		
<90000	36 (57.14) (90.00)	23 (36.51) (57.50)	4 (6.35) (10.00)	63 (100) (52.50)	58.683*
90000-175000	2 (14.29) (5.00)	7 (50.00) (17.50)	5 (35.71) (12.50)	14 (100) (11.67)	
> 1.75 lakh	2 (4.65) (5.00)	10 (23.26) (25.00)	31(72.09) (77.50)	43 (100) (35.83)	
C-total	40 (33.33) (100)	40 (33.33) (100)	40(33.33) (100)	120 (100)	

*Significant at 1 per cent level of significance R= Row
1 = Percentage of row C = Column
2 = Percentage of column

Table.4 Association between caste of respondents and level of knowledge of recommended fennel production technology

n=120

Caste	Level of knowledge			R-Total	X^2 value
	Low	Medium	High		
Sc	11 (37.93)[1] (27.50)[2]	10(34.48) (25.00)	8 (27.59)[1] (20.00)[2]	29 (100)[1] (24.17)[2]	1.987^{NS}
OBC	12 (26.67)[1] (30.00)[2]	15(33.33)[1] (37.50)[2]	18 (40.00)[1] (45.00)[2]	45 (100)[1] (37.50)[2]	
Gen	17 (36.96)[1] (42.50)[2]	15(32.61)[1] (37.50)[2]	14 (30.43)[1] 35.00)[2]	46 (100)[1] (38.33)[2]	
C-Total	40 (33.33)[1] (100)[2]	40(33.33)[1] (100)[2]	40 (33.33)[1] (100)[2]	120 (100)	

NS = Non-significant R= Row
1 = Percentage of row C = Column
2 = Percentage of column

Table.5 Association between size of land holding of respondents and level of knowledge of recommended fennel production technology

n=120

Size of Land holding	Level of knowledge			R-Total	X^2 value
	Low	Medium	High		
Marginal farmers	9 (22.50)[1] (40.91)[2]	10(25.00)[1] (25.64)[2]	21(52.50)[1] (35.59)[2]	40 (100)[1] (33.33)[2]	3.419[NS]
Small farmers	8 (20.00)[1] (36.36)[2]	12(30.00)[1] (30.77)[2]	20(50.00)[1] (33.89)[2]	40 (100)[1] (33.33)[2]	
Large farmers	5 (12.50)[1] (22.72)[2]	17(42.50)[1] (43.59)[2]	18(45.00)[1] (30.51)[2]	40 (100)[1] (33.33)[2]	
C-Total	22 (18.33)[1] (100)[2]	39(32.50)[1] (100)[2]	59(49.17)[1] (100)[2]	120 (100)	

NS = Non-significant ; R= Row; C = Colum

1 = Percentage of row; 2 = Percentage of column

Table.6 Association between family type of respondents and level of knowledge of recommended fennel production technology

n=120

Family type	Level of knowledge			R-Total	X^2 value
	Low	Medium	High		
Single	18 (26.87)[1] (45.00)[2]	22(32.84)[1] (55.00)[2]	27(40.298)[1] (67.50)[2]	67 (100)[1] (55.83)[2]	4.123[NS]
Joint	22 (41.51)[1] (55.00)[2]	18(33.96)[1] (45.00)[2]	13 (24.53)[1] (32.50)[2]	53 (100)[1] (44.17)[2]	
C-Total	40 (33.33)[1] (100)[2]	40(33.33)[1] (100)[2]	40 (33.33)[1] (100)[2]	120 (100)	

NS = Non-significant ; R= Row; C = Colum

1 = Percentage of row; 2 = Percentage of column

Table.7 Association between family size of respondents and level of knowledge of recommended fennel production technology

n=120

Family size	Level of knowledge			R-Total	X^2 value
	Low	Medium	High		
Small	12 (27.27)[1] (30.00)[2]	15(34.00)[1] (37.50)[2]	17 (38.64)[1] (42.50)[2]	44 (100)[1] (36.67)[2]	1.364[NS]
Large	28 (36.84)[1] (70.00)[2]	25(32.89)[1] (62.50)[2]	23 (30.26)[1] (57.50)[2]	76 (100)[1] (63.33)[2]	
C-Total	40 (33.33)[1] (100)[2]	40(33.33)[1] (100)[2]	40 (33.33)[1] (100)[2]	120 (100)	

NS = Non-significant ; R= Row; C = Colum

1 = Percentage of row; 2 = Percentage of column

The data in table 7 indicate that out of total 44 fennel growers in small family composition 12 (27.27%), 15 (34.00%) and 17 (38.64%) possessed low, medium and high level of knowledge respectively about improved practices of fennel production. In the group of large family composition 28 (36.84), 25 (32.89%) and 23 (30.26%) respondents had low, medium and high level of knowledge about fennel production technology. It could be further observed from table 7 that calculated chi-square value (1.364) was less than tabulated value. Therefore, the null hypothesis (NH_{17}) was accepted. This reveals that there is no association between family size of respondents and knowledge of fennel production technology. It could be inferred that family size did not play a significant role in knowledge level of fennel production technology among the farmers of the study area.

The present finding is in conformity with that of Kumar *et al.,* (2013) revealed that farmer's knowledge and caste family size and family type were found to be non – significantly associated with regard to recommended coriander production technology.

In conclusion, the age, education and annual income were found to be positive and significantly associated with the knowledge level of farmers about fennel production technology. While, the variables like, caste, size of land holding, family type and family size were found to be non-significantly associated with the knowledge level of farmers about fennel production technology.

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