Original Research Article

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

Abstract:

Present study tries to identify the socio-economic factors and association between farmer's attributes and adoption level of recommended cultivation practices of fennel. The present study was formulated during the year 2014 with 120 respondents from selected eight villages of Nagaur district. The data of personnel attributes, i.e., age, education, annual income, caste, size of land holding, family type and size of family of the respondentswere collected through personal interview. The age and annual income were found to be positive and significantly associated with the adoption level. The old age group was possessed high level of adoption (82.76%) as compare to other age group. Further, annual income had maximum level of adoption with high annual income group (75.00 %) compared to other annual income groups. Other variables like, education, caste, size of land holding, family type and family size were found to be non-significantly associated with the adoption level.

Key words: Association, Fennel, Independent Variables, Level of Adoption, Nagaur District

Introduction:

India is known the world over as 'The Home of Spices', thus Spices and condiments need no introduction. India has also an old history of cultivation of spices and takes benefit of being a largest producer, exporter and consumer in the world. India produces about 8.61million tons of spices from an area of 4.03 million ha [10]. There are total 63 spices which are grown in India and out of which 20 are being classified as seed spices. The major seed spices grown in India are Cumin, Fenugreek, Coriander and Fennel because they are being cultivated in considerable area. Celery, Nigella, Ajwain, Caraway etc. are the minor seed spices grown in India. Seed spices are mainly cultivated in the states of Rajasthan, Gujarat, Andhra Pradesh, and Madhya Pradesh. Seed spices are not only for home consumption but also for improving economic status of the farmers.

Fennel is an important commercial cash crop of arid and semi-arid region. Its aromatic seeds used in various food preparations such as soups, meat dishes, sauce, 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. The production of fennel in India is cultivated over an area of 89,540 ha with the production of 1.49 million tons [10].

Rajasthan is the third largest producer of spices in the country. The state produces about 1.39 million tons of seed spices from an area of 1.00million ha.Out of these area and production, Rajasthan produces 56,240 tons of fennel from an area of 45,200 ha [4]. 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 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 and adoption of high yielding varieties, ravages due to pest and diseases, inadequate post-harvest technology and poor processing and storage facilities. Keeping this objective in view the present study was undertaken on association between independent variables and their adoption level by the farmers in Nagaur district of Rajasthan.

Research Methodology:

The present investigation was conducted in purposely selected Nagaur district of Rajasthan. Fennel crop is prominently grown in viz. Nagaur, Jayal, Mertacity, Degana, Kheenvsar, Didwana. Out of these, Mertacity and Degana tehsils were selected randomly on the basis of fennel area.From Mertacity Tehsiltwo Gram Panchayats viz., Dava and Jaroda kala and from Degana tehsil two gram panchayats viz. Sanjoo and Chonsli were selected on proportionate random basis. With the help of prepared list of fennel growing villages, the four villages were identified from each Tehsil on the random basis (Two villages from each gram Panchayat).

Thereafter, 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 samples for the present investigation were comprised of 120 respondents i.e. 60 from each Tehsil. The details about the number of villages and respondents of each category from identified villages are presented in Figure 1. Keeping in view the specific objective of study, the interview schedule was developed for collection of data from the selected respondents. Schedule consisted of general information of personnel attributes of respondents i.e. age, education, annual income, caste, size of land holding, family type and size of family of the respondents.

Statistical analysis:

The selected variables were analyzed on the basis of mean. For the analysis of association between selected personal attributes with extent of adoption of fennel production technology, Chi-square test was applied. The calculated Chi-square value was compared with tabulated value of Chi-square at 1 per cent level of significance to draw the inference. For the purpose of this study, null hypothesis (NH) and alternate hypothesis (RH) were given below.

NH : There is no association between age, education, annual income, caste, size of land holding, family type, size of family of respondents and adoption of fennel production technology.

RH : There is an association between age, education, annual income, caste, size of land holding, family type, size of family of respondents and adoption of fennel production technology.

Result and Discussion:

Distribution of the fennel growers according to their selected personal variables

Age, education, annual income, caste, size of land holding, family type and size of family were the important personal characteristics of the respondents included in the study. The details of these attributes with their respective measures are given in table 1

On the basis of their age, the respondents were classified into three categories i.e. young, adult and old. The data presented in table 1 depict that out of total 120 respondents, 40.83 per cent belonged to the age group of up to 35 years in age, while 36.67 per cent respondents belonged to 36 to 53 years in age and remaining were come under old in age. A close observation of data in table 1 indicates that 47.50 per cent marginal, 32.50 per cent small and 42.50 per cent large farmers belonged to young in age. Whereas, 32.50 per cent marginal, 42.50 per cent small and 35.00 per cent large farmers were observed from adult age

group. The representation of old age group respondents from marginal, small and large farmers' categories were found to be 20.00, 25.00 and 22.50 per cent, respectively. To develop an understanding about the level of education of selected respondents, they were classified into four categories i.e. illiterate, up to primary level, middle, above middle level of education. The frequencies of the respondents were counted and converted into percentage for all the categories of respondents. The data recorded in table 1 show that 36.67 per cent respondents were illiterate in the study sample, 28.33 per cent respondents educated up to primary level, 14.17 per cent respondents educated up to middle level, whereas 20.83 per cent educated above middle level. Further analysis of the data in table 1 indicated that 40.00 per cent marginal, 40.00 per cent small and 30.00 per cent large farmers were illiterate in the study sample. At primary level, the respondents were classified into marginal (30.00%), small (35.00 %) and large (20.00 %). The middle level farmers were classified into marginal (10.00%), small (7.50 %) and large (25.00 %). Whereas, the marginal, small and large farmers who possessed education above middle level were observed to be 20.00, 17.50 and 25.00 per cent, respectively. The majority of the respondents belonged to medium annual income, 11.57 per cent of the total sample and 36.36 per cent respondents belonged to high annual income and remaining belonged to low annual income. The marginal, small and large farmers on the basis of annual income were grouped into low, medium and high (Table 1). On the basis of caste, majority of fennel growers belonged to 20.00 % in Scheduled caste (SC), 63.33 % in Other Backward Caste (OBC) and 16.67 % in General Caste (GEN).These categories were further divided into three groups i.e. marginal, small and large. The data pertaining in table 1 show that the majority of fennel growers belonged to three categories on the basis of land holding i.e. Marginal (< 1 ha), small (1-2 ha) and large (>2 ha)and each category had equal number of farmers.

Out of 120 respondents, 69 fennel growers belonged to nuclear family and remaining belonged to joint family. On the basis of number of members in the family, the respondents were grouped into two categories i.e., small (up to 5 members) and big family (above 5 members).The data in table 1 indicated that out of total 120 respondents, 40.00 per cent respondents were from small family composition (up to 5 members), while 60.00 per cent respondents belonged to big family size (above 5 members). Further, the data indicated that 40.00 per cent marginal, 42.50 per cent small and 37.50 per cent large farmers had small size family composition, while the respondents belonging to big family size from marginal, small and large farmers were observed to be 60.00 per cent, 57.50 per cent and 62.50 per cent, respectively.

Association between age of respondents and level of adoption

Out of total 47 respondents in young age group, 24, 19 and 4 were having low, medium and high level of adoption, respectively. The adoption level in adult age group had 31.82, 40.91 and 27.27%in low, medium and high level of adoption, respectively. While, in old age group, the adoption level recorded 6.90, 10.34 and 82.76 % respondents in low, medium and high, respectively (Table 2). The high adoption was recorded higher in old age group compared to others, because they had more experience of fennel cultivation. This revealed that there existed positive and significant association between age of respondents and adoption of fennel production technology. The present finding is in conformity with that of Singh and Chauhan who found that age had negative and significant correlation with adoption of mung bean production technology [9].

Association between education and level of adoption

The association between education level and adoption was non-significant. 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 adoption, respectively (Table 3). In the group of up to middle level

of education, 4 (23.53%), 3 (17.65%) and 10 (58.82%) respondents reported in low, medium and high level of adoption respectively. So that, the null hypothesis was accepted. The highest level of adoption was recorded by the illiterate fennel growers (44 respondents) as compare to other levels of education. It could be inferred that education did not play a significant role in adoption level of fennel production technology among the farmers. This confirms that schooling education has nothing to do with the adoption of agricultural innovations. Chandra stated that the non-significant association between education and level of adoption about improved isabgol cultivation practices [2]. Whereas, Bairolia found that the education was positively and significantly related with knowledge level of farmers about various agricultural technology [1].

Association between annual income of respondents and level of adoption

Out of 59 fennel growers low income group, 54.24%, 37.29% and 17.24% farmers had low, medium and high level of adoption, respectively. In the group of medium annual income, 23.81%, 52.38% and 23.81% respondents were observed in low, medium and high level of adoption, respectively. The respondents in high annual income were observed low (7.50%), medium (17.50%) and high (75.00%) adoption level (Table 4). The high annual income group had high level of adoption as compare to other groups of annual income. This reveals that there existed an association between annual income of respondents and adoption of fennel production technology. It could be inferred that the annual income played a significant role in adoption level of fennel production technology. The high cost of the cultivation was major restrictions to adopt the new technology by low income based respondent. Khan and Chouhan concluded that income of farmers was positively and significantly correlated with the adoption behaviour of farmers' about new farm technology of gram, groundnut and mustard [5].

Association between caste of respondents and level of adoption

In SC, The adoption level possessed low (45.83%), medium (41.67%) and high (12.50%) level of adoption about improved practices of fennel production. The lowest number of respondents belonged to General caste *i.e.* 20 followed by SC and OBC. Maximum level of adoption was observed in OBC *i.e.* 42.11 per cent in all levels of adoption (Table 5). This revealed that the association between caste and level of adoption was found negative and non-significant. Kumar et al. revealed that caste of respondents were found to be non–significantly associated with regard to recommended coriander production technology [6].

Association between size of land holding of respondents and level of adoption

The total adoption was found low in large land holding farmers *i.e.* 34 followed by the marginal and small. Whereas, small farmers who possessed low, medium and high level of adoption were 21 (42.00%), 15 (30.00%) and 14 (28.00%), respectively (Table 6). The association between adoption level and land holding was found negative and non-significant. Hence, it is concluded that land holding did not play a significant role in adoption of fennel production technology in the study area. The present findings is in conformity with that of Chandra who observed a non-significant association between land holding and level of adoption about improved isabgol cultivation practices [2].

Association between family type of respondents and level of adoption

The medium level of adoption obtained maximum in nuclear family (36.22%), followed by high and low level of adoption. The joint family type possessed 39.22, 29.41 and 31.37% low medium and high level of adoption, respectively (Table 7). So that, the family type was non-significantly associated with level of adoption. It could be inferred that family type did not play a significant role in adoption level of fennel production technology among the farmers of the study area. The present finding is in conformity with that of Choudhary

who found that the family type was non-significantly related with adoption level of farmers [3].

Association between family size of respondents and level of adoption

The family size was non-significantly associated with the level of adoption. The total level of adoption was recorded superior under big family size rather than small family size. The high level of adoption was obtained 26.92 and 38.24% with small and big family size, respectively (Table 8).This reveals that there is no association between family size of respondents and adoption of fennel production technology. Naruka found that the family size was non-significantly related with the adoption level of improved technologies by farmers [7]. Naruka and Singh also found that size of family was found to be non-significantly association with knowledge level of soybean production technology [8].

Conclusion:

It could be inferred from the above study that, age and annual income played a significant role that might be due to the experience in fennel growing and availability of money to spend in adoption of the technologies. While, the education, caste, size of land holding, family type and family size did not play a positive role in adoption level of fennel production technology among the farmers of the Nagaur district of Rajasthan.

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Table 1: Distribution of respondents according to their selected personal variable

Sl. No	Personnel attributes	Marginal farmers *F	Marginal farmers %	Small farmers F	Small farmers %	Large farmers F	Large farmers %	Total F	Total %
(A)	**Age group**								
1	Young (up to 35 years)	19	47.50	13	32.50	17	42.50	49	40.83
2	Adult (36-53 years)	13	32.50	17	42.50	14	35.00	44	36.67
3	Old (Above 53 years)	8	20.00	10	25.00	9	22.50	27	22.50
Overall		40	100.00	40	100.00	40	100.00	120	100.00
(B)	**Education**								
1	Ill	16	40.00	16	40.00	12	30.00	44	36.67
2	Upto primary	12	30.00	14	35.00	8	20.00	34	28.33
3	Middle	4	10.00	3	7.50	10	25.00	17	14.17
4	Above middle	8	20.00	7	17.50	10	25.00	25	20.83
Overall		40	100	40	100	40	100	120	100.00
(C)	**Annual income**								
1	Low (<90,000)	35	87.80	23	57.50	4	10.00	62	52.07
2	Medium (90,000 to 1,75,000)	2	4.88	7	17.50	5	12.50	14	11.57
3	High (>1,75,000)	3	7.32	10	25.00	31	77.50	44	36.36
Overall		40	100.00	40	100.00	40	100.00	120	100.00
(D)	**Caste**								
1	S.C.	11	27.50	10	25.00	3	7.50	24	20.00
2	OBC	21	52.50	23	57.50	32	80.00	76	63.33
3	Gen.	8	20.00	7	17.50	5	12.50	20	16.67
Overall		40	100	40	100	40	100	120	100
(E)	**Size of land holding**	40	33.33	40	33.33	40	33.33	120	100.00
(F)	**Family type**								
1	Nuclear	20	50.00	25	62.50	24	60.00	69	57.50
2	Joint	20	50.00	15	37.50	16	40.00	51	42.50
Overall		40	100	40	100	40	100	120	100
(G)	**Family size of respondents**								
1	Small (Up to 5 member)	16	40.00	17	42.50	15	37.50	48	40.00
2	Big (> 5 member)	24	60.00	23	57.50	25	62.50	72	60.00
Overall		40	100.00	40	100.00	40	100.00	120	100.00

*F = frequency

Table 2: Association between age of respondents and level of adoption

Age category	Level of adoption			R-Total	X² value
	Low	Medium	High		
Young (<35 years)	24(51.06)[1] (60.00)[2]	19(40.42)[1] (47.50)[2]	4(8.51)[1] (10.00)[2]	47(100)[1] (39.16)[2]	
Adult (36-53 years)	14(31.82)[1] (35.00)[2]	18(40.91)[1] (45.00)[2]	12(27.27)[1] (30.00)[2]	44(100)[1] (36.17)[2]	47.034**
Old (>53 years)	2(6.90)[1] (5.00)[2]	3(10.34)[1] (7.50)[2]	24(82.76)[1] (60.00)[2]	29(100)[1] (24.17)[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; C = Column; 1 = Percentage of row; 2 = Percentage of column

Table 3: Association between education of respondents and level of adoption

Education level	Level of adoption			R-Total	X² value
	Low	Medium	High		
Illiterate	16(36.36)[1] (40.00)[2]	16(36.36)[1] (40.00)[2]	12(27.27)[1] (30.00)[2]	44(100)[1] (36.67)[2]	
Upto primary	12(35.29)[1] (30.00)[2]	14(41.18)[1] (35.00)[2]	8(23.53)[1] (20.00)[2]	34(100)[1] (28.33)[2]	7.993^NS
Middle	4(23.53)[1] (10.00)[2]	3(17.65)[1] (7.50)[2]	10(58.82)[1] (25.00)[2]	17(100)[1] (14.17)[2]	
Above middle	8 (32.00)[1] (20.00)[2]	7 (28.00)[1] (17.50)[2]	10(40.00)[1] (25.00)[2]	25(100)[1] (20.83)[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 4: Association between annual income of respondents and level of adoption

Annual income	Level of adoption			R-Total	X^2 value
	Low	**Medium**	**High**		
Low (upto Rs. 90000)	32 (54.24)[1] (80.00)[2]	22(37.29)[1] (55.00)[2]	5 (17.24)[1] (12.50)[2]	59 (100)[1] (49.17)[2]	
Medium (Rs. 90000-175000)	5(23.81)[1] (12.50)[2]	11(52.38)[1] (27.50)[2]	5 (23.81)[1] (12.50)[2]	21 (100)[1] (17.50)[2]	54.228[**]
High (> Rs. 1.75 lakh)	3 (7.50)[1] (7.50)[2]	7 (17.50)[1] (17.50)[2]	30(75.00)[1] (75.00)[2]	40 (100)[1] (33.33)[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; C = Column; 1 = Percentage of row; 2 = Percentage of column

Table 5: Association between caste of respondents and level of adoption

Caste	Level of adoption			R-Total	X^2 value
	Low	**Medium**	**High**		
SC	11 (45.83)[1] (27.50)[2]	10(41.67)[1] (25.00)[2]	3 (12.50)[1] (7.50)[2]	24 (100)[1] (20.00)[2]	
OBC	21 (27.63)[1] (52.50)[2]	23(30.26)[1] (57.50)[2]	32 (42.11)[1] (80.00)[2]	76 (100)[1] (63.33)[2]	8.161[NS]
Gen	8 (40.00)[1] (20.00)[2]	7 (35.00)[1] (17.50)[2]	5 (25.00)[1] (12.50)[2]	20 (100)[1] (16.67)[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 = Column; 1 = Percentage of row; 2 = Percentage of column

Table 6: Association between size of land holding of respondents and level of adoption

Size of Land holding	Level of adoption			R-Total	X^2 value
	Low	Medium	High		
Marginal farmers	10 (27.78)[1] (25.00)[2]	12(33.33)[1] (30.00)[2]	14(38.89)[1] (35.00)[2]	36 (100)[1] (30.00)[2]	
Small farmers	21 (42.00)[1] (52.50)[2]	15(30.00)[1] (37.50)[2]	14(28.00)[1] (35.00)[2]	50 (100)[1] (41.67)[2]	3.151[NS]
Large farmers	9 (26.47)[1] (22.50)[2]	13(38.24)[1] (32.50)[2]	12(35.29)[1] (30.00)[2]	34 (100)[1] (28.33)[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 = Column; 1 = Percentage of row; 2 = Percentage of column

Table 7: Association between family type of respondents and level of adoption

Family type	Level of adoption			R-Total	X^2 value
	Low	Medium	High		
Nuclear	20(28.99)[1] (50.00)[2]	25(36.22)[1] (62.50)[2]	24(34.79)[1] (60.00)[2]	69 (100)[1] (57.50)[2]	
Joint	20(39.22)[1] (50.00)[2]	15(29.41)[1] (37.50)[2]	16(31.37)[1] (40.00)[2]	51 (100)[1] (42.50)[2]	1.432[NS]
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; C = Column; R = Row; 1 = Percentage of row; 2 = Percentage of column

Table 8: Association between family size of respondents and level of adoption

Family size	Level of adoption			R-Total	X^2 value
	Low	Medium	High		
Small (upto 5 members)	16 (30.77)[1] (40.00)[2]	22(42.30)[1] (55.00)[2]	14 (26.92)[1] (35.00)[2]	52 (100)[1] (45.83)[2]	
Big (above 5 members)	24 (35.29)[1] (60.00)[2]	18(26.47)[1] (45.00)[2]	26 (38.24)[1] (65.00)[2]	68 (100)[1] (56.67)[2]	3.529[NS]
C-Total	40(33.33)[1] (100)[2]	40(33.33)[1] (100)[2]	40(33.33)[1] (100)[2]	120 (100)	

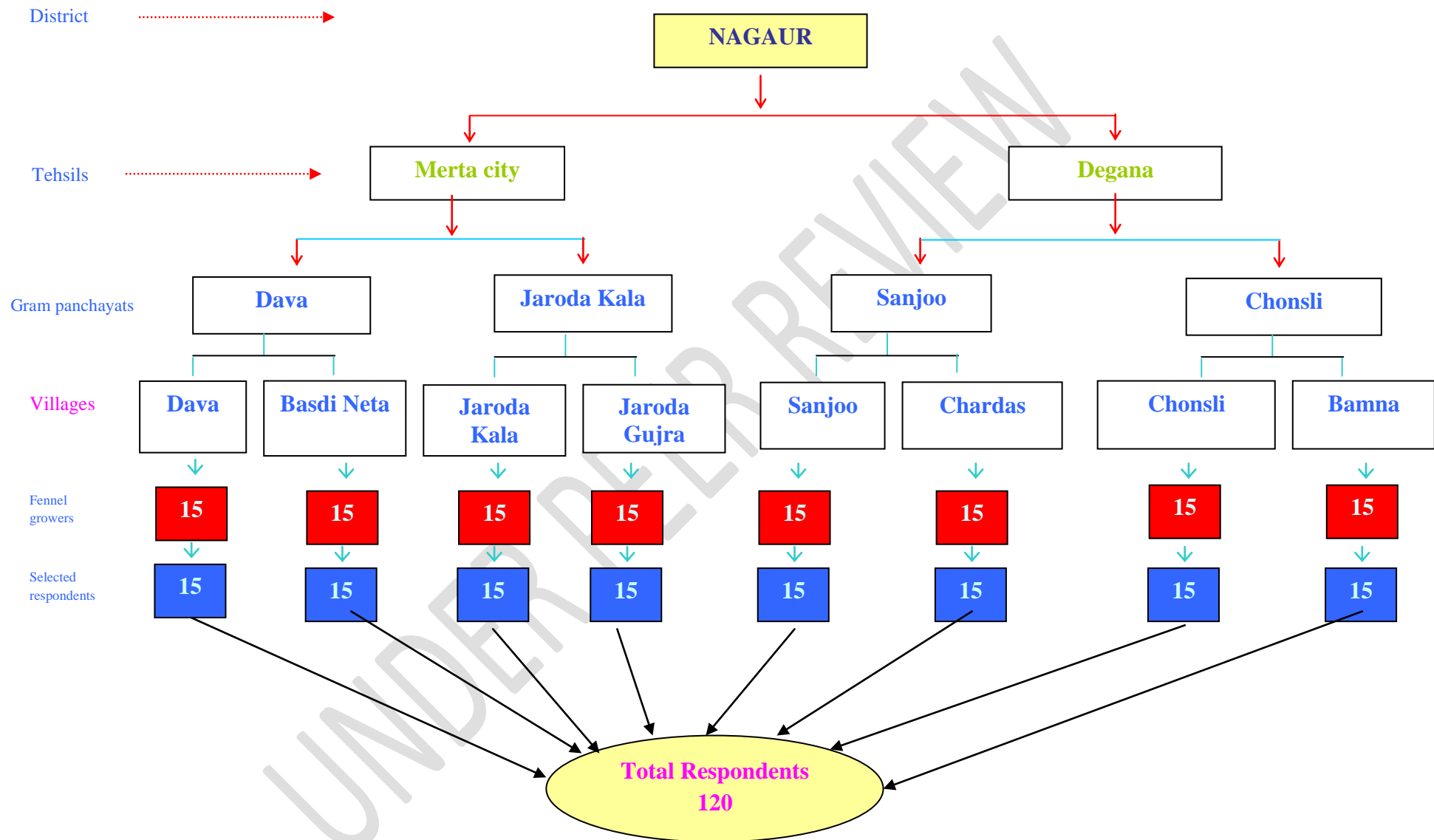NS = Non-significant; R = Row; C = Column; 1 = Percentage of row; 2 = Percentage of column

Fig 1: Flow chart of selected study area.