Identifying profitable Technologies for Adoption of Recommended Package of Practices by Cabbage Growers in Western Himalayas of Jammu and Kashmir, India

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ABSTRACT

A research entitled "A Study onAdoption of Recommended Package of Practices by Cabbage growers in Budgam district of J&K". was conducted for the study purpose. Ex- post- facto research design was adopted for the study. The study was carried out in purposively selected Zone Chadoora of district Budgam of Jammu and Kashmir State, as having maximum area under cabbage crop. A sample of 120 cabbage growers was selected by proportionate allocation method from randomly selected six villages. The data were collected with the help of a well-structured questionnaire and interview schedule. Data derived from the interviewees of the sampled farmers was analysed by employing suitable statistical methods. The findings of the study revealed that Majority (57.50%) of the respondents had medium level of adoption whereas, 27.50 per cent and 15.00 per cent of the respondents had low and high level of adoption respectively. Correlation analysis revealed that age had a negative and significant correlation with the adoption of recommended crop production technology. Education, occupation, operational land holding, area under cabbage cultivation, net income from cabbage crop, experience in cabbage cultivation, mass media exposure and scientific orientation had a positive and significant correlation with the adoption of recommended package of practices. Family size, innovation proneness and extension contact had no significant correlation with the adoption of recommended package of practices.

Key words: Adoption, Sample, Cabbage growers, Data, package of practices, variable.

Introduction

Vegetables are considered essential for well-balanced diets since they supply vitamins, minerals, dietary fiber, and phytochemicals. Considering food and nutritional security vegetables play an important role in Indian agriculture. They are commonly called "protected food" because of their protective effects against degenerative diseases. Vegetables are considered as nutraceutical food of the century (Rahal *et al.,* 2014). Almost every vegetable is a source of specific bioactive compounds like vitamins, anthocynins, flavanoids, carotenoids and polyphenols. All these compounds have ability in disease prevention and reduction because of their antioxidant property. According to the latest reports, vegetables are grown over the world on an area of 9.5 million hectares with the production of 168.30 million tonnes (Anonymous, 2016).

The cult of veganism is increasing in the health

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conscious world and the nutritional security of under developed and developing countries depend heavily on vegetables. India being predominantly a country of vegetarians, it becomes imperative to attach more significance for the production of vegetable crops. With the introduction of liberal trade policies, prospects for export of fruits and vegetables have improved. These have a vital role to play on the food front as they reduce the demand of cereals (Choudhary, 2006).

Cabbage is grown over the world with the production of 71803269 tons and China is the leading producer of cabbage having a production of 33881515 tons. India ranks 2nd in the production of cabbage with an area of 403 million hectare and production of 8755000 tons (Anonymous, 2019a). In India, West Bengal ranks 1st having an area of 79.13 million ha and production of 2288000 tons of Cabbage. Jammu and Kashmir ranks 17th having an area of 2000.49 ha and production of 114000.70 tons of cabbage (Anonymous, 2019b). District Budgam produces the maximum portion of cabbage among all the districts of Kashmir valley having an area of 406 hectare under cabbage and production of 99700 Q (Anonymous, 2019c).

Materials and Methods

The present study was carried out purposely in district budgam on the basis of maximum area and production under cabbage cultivation. One agriculture sub-division Chooda was selected purposively out of four sub-divisions in district budgam. Agri-
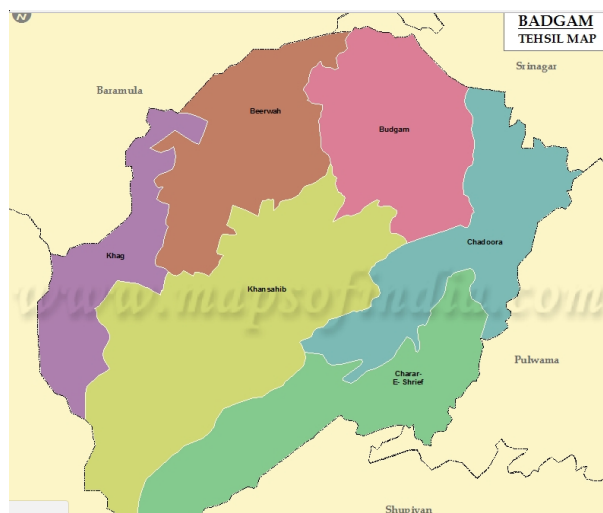

Fig. 1. Sampling plan of the study area

cultural sub division Chadoora consists of 7 Agricultural zones only one Agricultural zone Chadoora having maximum area and production under Cabbage cultivation was selected purposively. 6 villages were selected randomly namely. Bugam, Wathoorabatpora. Dawlatpora, Nowbugh, Gowherpora, and Porwara with having maximum number of cabbage growers for the present study. A sample of 120 cabbage growers was selected by proportionate allocation method from randomly selected six villages

Design of interview schedule

The device used for data collection was well structured interview schedule. The schedule was developed for gathering information of independent variable, dependent variable, marketing and constraints faced by the Cabbage growers. The interview schedule was strictly formulated in accordance with the set objectives and in consultation with experts from the division of Vegetable science, Agriculture economics, KVK's and Agriculture extension functionaries of the Agriculture Department. The Part-A of the interview schedule consisted of socio-personal characteristics of the respondents. Part-B included questions related to the recommended package of practices by Cabbage growers. Part-C consisted of open ended constraints faced by Cabbage growers. Part-D consisted of marketing system of Cabbage growers.

Pretesting of interview schedule

The interview schedule was pretested before finalizing over some 10 respondents not included in the sample. The necessary modifications were made in light of offered suggestions to make the interview schedule more appropriate, effective and useful.

Data collection

The researcher personally collected the data by interviewing the respondents through the well-structured interview schedule. The data was collected at the leisure time of the respondents. Each respondent was met personally so that investigator can get firsthand information. The response of each respondent was recorded in the interview schedule separately. The respondents were at ease and expressed their opinion freely, fairly and frankly as friendly atmosphere was maintained during the interview. Every effort was kept to check and cross check the data collected from all the sampled respondents.

Compilation and working of data

After collection of data from the growers, scores were given to responses collected from them and then accordingly tabulated, classified and quantified. Suitable statistical tools were used for the analysis of data and findings emerged out of the data were interpreted based on the objectives and accordingly discussed and necessary inferences, conclusions were drawn.

Statistical procedures

The following statistical tests and measures were used for the analysis of the data.

Arithmetic Mean

This was used to compare the respondents in respect of their dependent variables. The arithmetic mean is the sum of scores divided by the number of respondents.

$$\bar{x} = \frac{\Sigma x}{n}$$

Where,

$\bar{x}$ = Mean
Sx = sum of scores
n = Number of respondents

Standard Deviation

Standard deviation is the square root of the mean of the sum of squares of the deviation taken from the mean of the distribution.

$$\sigma = \sqrt{\frac{1}{n}\left(\Sigma x^2 - \frac{(\Sigma x)^2}{n}\right)}$$

Where,

σ = Standard deviation
x^2 = Sum of squared deviations from the mean
n = Number of items

Frequencies (f) and Percentages (%)

Some of the data were also subjected to and interpreted in terms of their frequencies and percentages. Wherever necessary to know the distribution pattern of respondents according to variables and for standard deviation by calculating the number of individuals that would be in given category if the number of cases were 100.

Correlation co-efficient (r)

This tool was used to find out the significant relationship, if any between scores of the independent variables and the scores of the dependent variable of the sample respondents. By using the following formula:

$$r = \frac{\Sigma xy - \frac{(\Sigma x)(\Sigma y)}{n}}{\sqrt{\Sigma x^2 - \frac{(\Sigma x)^2}{n}}\sqrt{\Sigma y^2 - \frac{(\Sigma y)^2}{n}}}$$

Where,

r = Co-efficient of correlation between x and y
Σx= Sum of independent variable x
Σy = Sum of dependent variable y
Σx^2 = Sum of squares of x variable
Σy^2 = Sum of squares of y variable
n = Size of the sample

Table 1. Selection of the Respondents in District Budgam

District	Sub-Division Agriculture office	Zonal Agriculture office	Area under cabbage crop	No. of cabbage growing villages in chadoora zone	No.of villages selected by random sampling method	No. of cabbage growers from selected villages	No. of cabbage growers selected by proportionate allocation method
Budgam	Chadoora	Chadoora	274 ha	31	Bugam	120	42
					Wathoora-Batpora	86	30
					Dowlatpora	40	14
					Nowbugh	30	10
					Gowherpora	30	10
					Porwara	40	14
Total				31	06	346	120

Source: Chief Agriculture office Budgam 2017

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The significance of the correlation co-efficient was tested by using the following formula:

$$t = \frac{|r| \sqrt{n-2}}{\sqrt{1-r^2}}$$

The computed 'r' values were then compared with the table values and coefficient of correlation at 1 and 5 per cent level of significance was tested.

Results and Discussion

From the Table- 4, it is clear that cent per cent of the cabbage growers were cultivating recommended variety of cabbage (Golden Acre) whereas, only 19.17 per cent of the growers adopted non-recommended variety (T-621). The table in data also reveals that all (100%) of the growers had followed 50-75 per cent less than the recommended spacing for sowing of seeds in their nursery.

A perusal of data presented in Table-5 reveals that majority (75.83%) of the growers had used 35-45 per cent more than recommended seed rate whereas, 17.50 per cent of the growers had used recommended seed rate (25-40 g/kanal) and only 6.67 per cent of the growers had used 25-35 per cent less than recommended seed rate.

The data given in Table 6 reveals that majority (46.67%) of the growers had transplanted seedlings as per the recommendation (35 days old), 40.83 per cent of the growers had transplanted 40 days old seedlings whereas 12.50 per cent of the growers had transplanted 45 days old seedlings. The reason might be the unavailability of labor at time of transplanting.

From Table 7, it is clear that the majority (65.83%) of the growers had adopted 20-30 per cent less than

Table 2. Variables and their empirical measurement

S. No.	Variables	Empirical Measurement
A).	**Dependent variables**	
1.	Knowledge	Nineteen questions regarding cabbage cultivation were framed for measuring the knowledge.
2.	Level of adoption	Level of adoption has been measured by framing questions based on package of practices regarding cabbage cultivation given by SKUAST-K.
B).	**Independent variables**	
1.	Age	Chronological age of the respondent
2.	Education	Number of years of formal schooling
3.	Family size	Number of members in family
4.	Occupation	Measured with involvement of respondents in various occupations.
5.	Operational Land holding	Total land possessed by the grower in kanals
6.	Area under cabbage crop	Land possessed by the farmer under cabbage cultivation in kanals
7.	Experience in cabbage cultivation	No. of years completed by the respondent in cultivating cabbage at the time of interview.
8.	Innovation proneness	Measured with scale developed by Feaster (1968) and Bhanu (2006) with suitable modifications
9.	Net Income	Gross income from cabbage crop- cost of cultivation
10.	Extension contact	It has been measured by the frequency of contact of farmers with various extension personals
11.	Mass media exposure	It has been measured with the use of various information sources by the respondents
12.	Scientific orientation	Measured with scale developed by Raja (1998) with suitable modifications

Table 3. Adoption categories

Category	Criterion
Low adoption	Below mean – S.D. (23.8-4.49) =below 19.31
Medium adoption	Between mean ± S.D. (23.8± 4.49) = between 19.31- 28.29
High adoption	Above mean + S.D. (23.8+4.49) =Above 28.29 [Grab your reader's attention with a great quote from the document or use this space to emphasize a key point. To place this text box anywhere on the page, just drag it.]

Table 4. Distribution of respondents on the basis of adoption of different varieties and spacing followed for sowing of seeds in nursery by cabbage growers   N =120

S. No.	Varieties adopted	Respondents	
		Frequency	Price Percentage
A)	Recommended		
1)	Golden Acre	120	100.00
2)	Pusa Drumhead	0	0.00
B)	Non recommended		
1)	*T-621	23	19.17

S.No.	Spacing adopted	Respondents	
		Frequency	Percentage
1	Recommended (5-10 cm)	0	0.00
2	50-70% less than recommended	120	100.00

* Multiple response

Table 5. Distribution of respondents on the basis of seed rate used for raising nursery   N=120

S. No.	Level of adoption	Respondents	
		Frequency	Percentage
1.	Recommended seed rate(25-40 g/ kanal)	21	17.50
2.	25-35 per cent less than recommended seed rate	08	6.67
3.	35-45 per cent more than recommended seed rate	91	75.83

Table 6. Distribution of respondents on the basis of age of seedlings used for transplanting   N=120

S. No.	Age of seeding	Respondents	
		Frequency	Percentage
1.	Recommended (35 days old seedlings)	56	46.67
2.	5 days more than recommended	49	40.83
3.	10 days more than recommended	15	12.50

Table 7. Distribution of respondents on the basis of spacing adopted for transplanting of seedlings   N=120

S. No.	Spacing followed	Respondents	
		Frequency	Percentage
1.	Recommended 45x45 cm	34	28.33
2.	20-30 per cent less than recommended	79	65.84
3.	10-20 per cent more than recommended	07	5.83

Table 8. Distribution of respondents on the basis of method and time of irrigation schedule of cabbage crop   N=120

S. No.	Irrigation schedule	Respondents	
		Frequency	Percentage
A)	No. of irrigation		
1.	As per recommendations (6-8)	72	60.00
2.	Not as per recommendations (3-5)	48	40.00
B)	Time of irrigation		
1.	As per recommendation (at 10-15 days interval)	72	60.00
2.	Not as per recommendation (25-30 days interval)	48	40.00
C)	Method of irrigation		
1.	Furrow method	120	100.00

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recommended spacing while transplanting the seedlings, 28.33 per cent of the growers had adopted 45x45cm recommended spacing, only 5.83 per cent of the growers had adopted 10-20 per cent more than the recommended spacing.

From Table 8, majority (60%) of the growers had given recommended no. of irrigations to the cabbage crop and 40 per cent of the growers had given less than recommended no. of irrigations (3-5) to the cabbage crop. The data in Table 4.13 furthers showed that majority 60per cent of the growers had irrigated the crop at recommended time and 40 per cent of the growers had not irrigated the crop at the recommended time. In case of method of irrigation adopted by the cabbage growers, cent per cent of the growers had followed the furrow method of irrigation to the cabbage crop.

From Table 9, majority (47.50%) of the growers had done less than recommended hoeing (once) , 30.83 per cent of growers had done hoeing as per the recommendations (2-3 times) whereas 21.67 per cent of growers had done hoeing more than recommended (4-5 times). The data in Table 4.14 further revealed that the majority (57.50%) of the growers had done hoeing at less than recommended time (40-45 days after transplantation) followed by 24.17 per cent of the growers had done hoeing as per recommended time and only 18.33 per cent of growers had done hoeing at more than the recommended time (5-8 days interval).

Overall adoption level of respondents

From Table 10, it is evident that, majority 57.50 per cent of the growerswere having medium level of
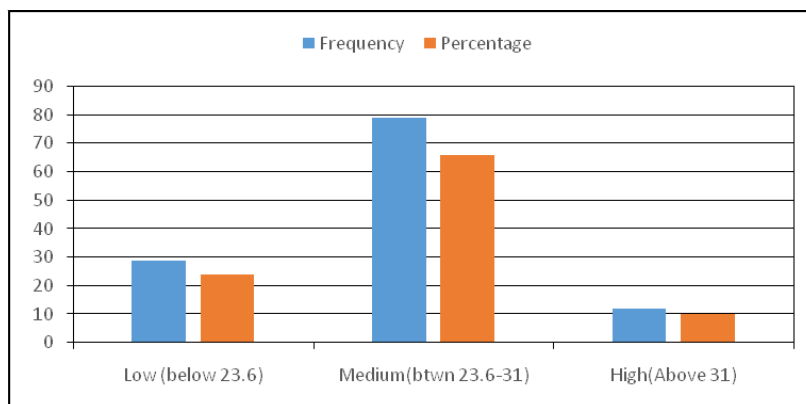

Table 9. Distribution of respondents on the basis of adoption of hoeing practices by Cabbage growers   N=120

S. No.	Intercultural practices	Respondents	
		Frequency	Percentage
A)	Hoeing		
	1) As per Recommendation (2-3 times)	37	30.83
	2) Less than recommended (only once)	57	47.50
	3) More than recommended (4-5 times)	26	21.67
B)	Time of hoeing		
	1) Recommended (At interval of 10-15 days)	29	24.17
	2) Less than recommended (40-45 days after transplantation)	69	57.50
	3) More than recommended (5-8 days interval)	22	18.33

Table 10. Overall adoption level of growers   N=120

S. No.	Variable	Categories	Respondents	
			Frequency	Percentage
1.	Adoption	Low (below 19.31)	33	27.50
		Medium (between 19.31-28.29)	69	57.50
		High (Above 28.29)	18	15.00
		Mean: 23.8, S.D: 4.49		

Table 4.18. Relationship of Independent variables of respondents with the Adoption level of the cabbage growers N=120

S.No.	Variable	Correlation coefficients ('r' Value)	'p' Value
1.	Age	-0.284*	0.018
2.	Education	0.172*	0.035
3.	Family size	0.209NS	0.118
4.	Occupation	0.348**	0.000
5.	Operational Land holding	0.288**	0.001
6.	Area under cabbage	0.201*	0.017
7.	Experience in vegetable cultivation	0.167*	0.016
8.	Net income	0.137*	0.021
9.	Mass Media Exposure	0.181*	0.045
10.	Innovation proneness	0.151NS	0.083
11.	Extension contacts	0.169NS	0.087
12.	Scientific Orientation	0.127*	0.003

* Significant at the 0.05 level
** Significant at the 0.01 level

adoption, whereas 27.50 per cent and 15.00 per cent of the growerswere having low and high level of adoption respectively.

This might be because that majority of the growers were middle aged with medium farming experience, scientific orientation and knowledge about the recommended package of practice and were educated up to middle level having medium scientific orientation. The findings are in line with the results of Soni *et al.* (2015).

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