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Knowledge Level of Vegetable Growing Farmers in Hills of Uttarakhand: A Comparative Study

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Abstract

The study was conducted in Uttarakhand state in India where vegetables are identified as the most remunerative crops for replacing the existing subsistence farming system. Total 40 items that reflect various aspects of vegetable cultivation practices were collected for construction of the test. Finally, 16 knowledge items were included in knowledge test using objective criteria of Difficulty Index, Discrimination Index and Point bi-serial correlation. Standardized test was administered to the selected farmers. Results revealed that 34 per cent adopted farmers and 2.7 per cent non-adopted farmers possess high level of knowledge regarding vegetable cultivation with significant difference at 1 per cent level.

Key words: *Knowledge level, vegetable cultivation, hill agriculture, Uttarakhand, Knowledge test*

Introduction

The changing climatic conditions pose new challenges and threats to hill agriculture. This situation can be overcome by diversifying the agricultural pattern to create alternative income and better living standards. The alternative areas of diversification are vegetable and horticulture crops, spices and condiments, tea plantations, and herbal and medicinal plants. The climatic condition of hilly areas can be used for growing off-season vegetable through protected cultivation coupled with micro-irrigation. Vegetable production is labour-intensive and undertaken largely by small farmers in Uttarakhand. Vegetable farming is attracting farmers in hills as it is highly remunerative and provides a regular source of income and employment. In order to increase the productivity of vegetable crops, farmers have to adopt the scientific practices of vegetable cultivation. Various efforts are being done by research institutes, SAUs and horticulture departments to raise the production of seasonal and off-seasonal vegetable in hill region of Uttarakhand. Therefore, it is desirable to find out the existing status of knowledge possessed by the vegetable growers and factors that influence it.

Methodology

In order to develop a test for assessing the knowledge level of farmers in vegetable cultivation practices, the following steps were following[4].

Development of a test for measuring the knowledge level of farmers in vegetable cultivation

- **Collection of Items**

Initially 40 knowledge items (statements) reflecting various aspects of vegetable cultivation practices were collected for the construction of the knowledge test. These items were collected from package of practices developed by ICAR-VPKAS, other relevant literature and in consultation with related scientists.

•Preliminary Selection of Items

List of 40 knowledge items was given to concerned scientist of the institute, other ICAR institutes and private seed companies to check the suitability of each knowledge item for its inclusion in the preliminary test. Finally, keeping in view the opinion of these experts, 28 items were retained for item analysis.

•Item Analysis

The preliminary test containing 28 knowledge items was administered to 28 farmers of different villages of Almora district. For this purpose, the score of one was assigned to correct response and zero to each incorrect response. Thus, the range of obtainable score was 0-28.

•Final Selection of Items

Three objective criteria namely difficulty index, discrimination index and point bi-serial correlation were considered for final selection of items in knowledge test.

•Difficulty index

The difficulty index indicates the extent to which an item is difficult. In knowledge test, an item should not be so easy that all persons can pass it, nor should be so difficult that none can pass it.

The item difficulty index was worked out in this study as P; that is the percentage of respondents answering an item correctly. The difficulty index was calculated by the following formula.

$$P = \frac{NC}{N} \times 100$$

Where, P = Difficulty index, NC = Number of respondents who answered correctly and N is the total number of respondents. The items with P values ranging from 30 to 80 were considered for selection in the final knowledge test.

- **Discrimination Index (DI):**

The function of item discrimination index is to find out whether an item really discriminates a well informed respondent from poorly informed respondents. The scores obtained were arranged in descending order of total scores and the respondents were divided into four equal groups- G1, G2, G3 and G4 with 7 respondents in each groups. The middle two groups namely G2 and G3 were eliminated. Two groups G1 (high score) and G4 (Low score) were retained for further analysis.

$$D = \frac{(S1) - (S4)}{N(14)}$$

S1 and S4 are the frequencies for correct answers in the group G1 and G4. Items with D value more than 0.20 was considered for final selection for inclusion in the knowledge test.

- **Point-biserial Correlation (r_{pbi})**

For establishing internal consistency of each item, point biserial correlation coefficient (r_{pbi}) was estimated.

The items with r_{pbi} value equal to or more than 0.238 was considered for the selection in the final knowledge test. Finally, 16 items were selected in the knowledge test by considering the objective criteria.

- **Split-half Method**

The final knowledge test was administered to a new sample of 44 farmers. Thereafter, the test was divided into two equal halves. The reliability of the test was calculated by the Spearmen-Brown formula**.** The reliability coefficient of the test was found to be 0.88, which was found to be highly significant.

$$r_u = \frac{2r_{hh}}{1+ r_{hh}}$$

Where, $\mathbf{r_u}$ = reliability coefficient of the test and $\mathbf{r_{hh}}$ = the correlation between two halves of the test.

- **Content Validity**

The knowledge items in the test were representing entire universe of the relevant behavioral aspects of the farmers with respect to knowledge about vegetable farming. The care was taken to include the items that cover major practice of vegetable farming and same was validated by the concerned scientists. The items in the final knowledge test were also covering the major practice of vegetable farming. Therefore, it was assumed that the scores obtained by administering this test measured the knowledge of the farmers as intended.

The standardized knowledge test was administered to the selected 74 farmers from non-adopted villages and 51 farmers from adopted villages of Almora district of Uttarakhand. The results were interpreted by assigning '1'score for the correct response and '0'for incorrect response. The maximum obtainable score of a respondent was '16'. The mean and standard deviation of all the respondent's knowledge scores were compounded for classifying the knowledge in different categories. Based on the mean knowledge score and standard deviation, the farmers were categorized under three knowledge level categories namely low, medium and high. Collected data using knowledge test and questionnaire was analysed with the help of statistical technique viz, percentage, arithmetic mean, standard deviation and independent

sample 't' test. Coefficient of correlation was computed by Karl Pearson's formula to determine the nature of relationship between independent variables and knowledge score.

Results and Discussion

Out of shortlisted 28 knowledge items, 16 knowledge items having difficulty index 30-80, discrimination index above 0.20 and point biserial correlation value equal to or more than 0.238 was selected as shown in the table 1.

Table 1 Item analysis of statements selected for testing knowledge about vegetable cultivation practices

S. No.	Statements	Difficulty Index	Discrimination Index	Point-biserial Correlation (r_{pbi})
1	In nursery, seed bed should be _____ cm raised.	42.8	0.29	0.4
2	After how many weeks tomato seedlings from nursery can be planted in field?	42.8	0.43	0.52
3	In nursery line spacing should be _____ centimeter.	46.4	0.29	0.37
4	In cabbage _____ week old seedlings are transplanted to the field/poly house.	50	0.29	0.35
5	Which one is the improved variety of tomato crop suitable for hills?	28.6	0.29	0.46
6	What should be the seed rate per nali required for raising nursery of cauliflower?	50	0.50	0.65
7	What should be the seed rate per nali required for raising nursery of tomato?	35.7	0.43	0.55
8	How many days before sowing, FYM should be applied in nursery.	67.8	0.43	0.37
9	In tomato crop _____ kg NPK per nali should be applied?	32.1	0.21	0.36
10	Which one is disease of tomato that affects its yield drastically?	53.6	0.29	0.31
11	Which one is recommended chemical used for control of damping-off in tomato?	35.7	0.29	0.47
12	Before planting seedlings should be kept in a solution of Bevistein _____ gm per liter of water?	50	0.29	0.36
13	Which chemical should be sprayed for controlling fruit rot in capsicum?	35.7	0.36	0.29
14	_____ is the most serious disease during plants are in nursery?	32.1	0.29	0.25
15	What is the effect of sowing same crops in poly-house again and again?	50	0.36	0.46
16	For the best production, prune tomato plant to stem by removing lateral stems.	32.1	0.36	0.42

Knowledge level of farmers regarding vegetable cultivation

The standardized knowledge test was administered to the selected 74 respondents from non adopted village and 51 respondents from adopted village. The total score of each respondent was calculated and based on the mean and standard deviation; the respondents were grouped in three categories as low, medium and high knowledge categories. It was found that 31.4 % respondents from adopted villages had high level of knowledge whereas only 2.7 per cent of respondents from non-adopted village had high level of knowledge (Fig 1).

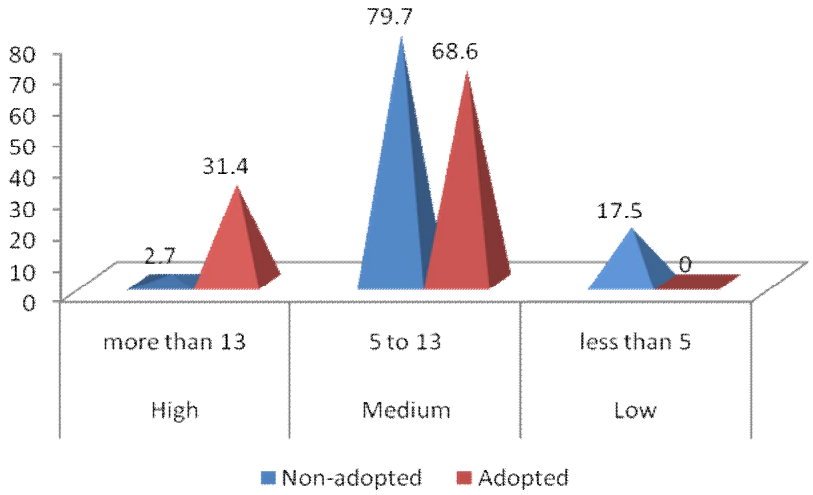

Fig 1: Knowledge level of farmers regarding vegetable cultivation

The data presented in table 2 indicated that majority of the adopted farmers possessed medium level of knowledge (68.6%) followed by high level of knowledge (31.4%).

It was also found that majority of the non-adopted farmers possess medium level of knowledge (79.7 %). Only 2.7 per cent non-adopted farmers possessed high level of knowledge. Comparative data pertaining to these three category clearly showed upward movement in knowledge level of farmers as a result of adoption, trainings and demonstration.

Table 2 Distribution of farmers according to their level of knowledge

Level of knowledge	Adopted farmers (N1=51)		Non-adopted farmers (N2=74)		Pooled (N=125)	
	f	*%*	*F*	*%*	*f*	*%*
Low (<6)	0	0	13	17.5	13	10.4
Medium (6-13)	35	68.6	59	79.7	94	75.2
High (> 13)	16	31.4	2	2.7	18	14.4

Knowledge level of farmers regarding different vegetable cultivation practices

The knowledge level of adopted and non-adopted farmers with regards to scientific practices of vegetable cultivation was measured in terms of Mean Percent Score (MPS). A perusal of table 3 clearly elucidates that adopted farmers possessed highest knowledge on improved varieties (94.1) and was ranked first followed by seed rate (86.2) and agronomic practices (82.3), which were ranked second and

third, respectively. In case of nursery raising and disease management, the mean percent score was observed 72.5 and 69.4, securing fourth and fifth rank, respectively. However, the mean percent score with respect to application of manure and fertilizer was found 59.8 and accorded last rank. Therefore, it can be concluded that vegetable growers possessed maximum knowledge about nursery raising, whereas minimum knowledge on application of manure and fertilizer[1].

Data of table 3 also indicate that the non-adopted farmers possessed highest knowledge on improved varieties (64.7) and was ranked first followed by agronomic practices (52.0) and seed rate (44.6) which secured second and third rank. In case of disease management and nursery raising, the mean percent score was observed 42.9 and 42.5 securing fourth and fifth rank, respectively. However the mean percent score with respect to application of manures and fertilizer was found 31.1 and accorded last rank. It can be concluded that non-adopted farmers have relatively less knowledge of vegetable cultivation as they possessed Mean Percent Score of less than 65 for all the scientific practices of vegetable cultivation.

If we look at the table 2, irrespective of beneficiary and non-beneficiary farmers, data show that farmers had good knowledge (above 65 MSP) in practices like; improved varieties, agronomic practices and seed rate with first, second and third rank, respectively. They possessed least knowledge regarding application of manures and fertilizer.

Table 3 Farmers knowledge on vegetable cultivation practices

S. No.	Scientific practices	Adopted farmers *(N1=51)*		Non-Adopted Farmers *(N2=74)*		t-test for Equality of mean	
		MPS	Rank	MPS	Rank	t	sig
1	Nursery Raising	72.5	IV	42.5	V	-5.964	.000**
2	Improved Varieties	94.1	I	64.7	I	-4.498	.000**
3	Application of manures and fertilizer	59.8	VI	31.1	VI	-1.873	$.064^{NS}$
4	Seed Rate	86.2	II	44.6	III	-6.720	.000**
5	Agronomic practices	82.3	III	52.0	II	-1.819	$.072^{NS}$
6	Disease Management	69.4	V	42.9	IV	-7.439	.000**

*Note: ** significant at 1 per cent level*

Table 3 also reveals that knowledge level of adopted farmers was found to be significantly higher in comparison to non-adopted farmers at 1 per cent level, which may be due to the fact that adopted farmers had better opportunities for training, extension orientation and interventions by research institute (ICAR-VPKAS).

Relationship between the independent variables and knowledge level of vegetable growing farmers

Correlation analysis is presented in table 4 which shows the relationship between the independent variables and knowledge level of vegetable growing farmers. Results revealed that age, education, family size, farm size, area under vegetables and training attended by farmers had a significant and positive relationship with knowledge level at 1 percent level.

Many researchers also found positive and significant relationship between educational level of farmers and

their level of knowledge[3]. This reveals that educated farmers know more about scientific vegetable cultivation than less educated/illiterates as they collect information from various sources.

Farm size and area under vegetable cultivation was observed to be positively and significantly correlated with the knowledge of the respondents about practices of vegetable cultivation. This positive relationship might be due to the fact that vegetable growers who had large farm size had more urge to update their knowledge on scientific practices of vegetable farming. It also supports the assumption that increase in size of any enterprise and increase in knowledge level go together.

Extension contacts of vegetable growing farmers and their level of knowledge showed positive and significant correlation which indicates higher extension contacts of farmers with scientists/extension personnels results in higher level of knowledge. Vegetable growing farmers who had frequent discussion and contacts with scientist/extension functionaries about vegetable farming are likely to have more knowledge about the subject.

Socio-economic status of the vegetable growing farmers was found to be significantly and positively correlated with the knowledge level of farmers about scientific vegetable cultivation practices. It means higher the socio-economic status of the vegetable growers, higher the level of knowledge level. Similar results were also revealed in various research findings[2].

Table 4 Relationship between the independent variables and knowledge level of vegetable growing farmers (N=125)

S.No.	Characteristics	r-values
1.	Age	0.37**
2.	Education	0.27**
3.	Family Size	0.39**
4.	Farm Size	0.28**
5.	Area under vegetable	0.66**
6.	Extension Contacts	-0.13NS
7.	Trainings attended	0.77**

*** significant at 1 per cent level*

Conclusion

It can be concluded from the above findings that majority of the adopted farmers (68.6%) and non-adopted farmers (79.7%) possessed medium level of knowledge regarding vegetable cultivation. Farmers had good knowledge for vegetable production (MSP>65) about improved varieties, agronomic practices and seed rate. They had less knowledge regarding application of manure and fertilizers. Moreover, significant difference was found with regard to knowledge about improved practices and overall knowledge level of adopted and non-adopted farmers. The characteristics like age, education, family size, farm size, area under vegetable and training attended were significantly and positively correlated with the knowledge level of farmers about scientific vegetable cultivation practices.

The researchers and development agencies for planning similar developmental programs may take into account these results which show the response of farmers and association of various socio-personal factors in adoption of scientific practices of vegetable cultivation

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