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Short communication

Knowledge level assessment and influencing factors of vegetable growers in western Uttar Pradesh

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ABSTRACT

The study was conducted in the Ghaziabad and Hapur districts of Uttar Pradesh to ascertain the level of knowledge possessed by vegetable growers through knowledge test and to determine the factors influencing it. A preliminary test of knowledge items was initially administered to 42 vegetable farmers for item analysis. The final items were included in the knowledge test based on the difficulty index (30 to 80), discrimination index (> 0.20) and point-biserial correlation coefficient (> 0.236). The reliability of the knowledge test was measured with the help of split-half method and reliability co-efficient was found to be 0.82, which indicates that this knowledge test is quite reliable. The test was further administered to 200 respondents and it was found that majority of the respondents (70.00%) had moderate level of knowledge, whereas 20.50 and 9.50% of farmers had low and high level of knowledge about vegetable farming. Furthermore, step-wise regression analysis showed that five independent variables, *viz.* education (X2), farm size (X3), extension contact (X6), extension participation (X7) and mass media exposure (X8) could explain 93.96% of the variation.

Key words: Knowledge level, scientific vegetable cultivation, knowledge index.

India enjoys a large diversity of vegetable crops, which occupy a significant place in human diet and provide vitamins and minerals, essential for human health and growth. Vegetable production is labour-intensive and undertaken largely by the small farmers. India is the second largest producer of vegetables in the world (ranks next to China) and accounts for about 15 percent of the world's production of vegetables. The current production level is over 162.19 MT and the total area under vegetable cultivation is around 9609 million hectares, which is about 3 percent of the total area under cultivation in the country. Though the vegetable requirement is 300 g/day/person as recommended by USDA, we are able to meet about 1/9th of that requirement only. Therefore, a planned development in the field of vegetable production will not only improve the nutritional requirement for masses but can also meet the challenge of adequate food supply to the growing population in India. The limited cultivable area can be best utilized for growing vegetables which are known to give higher yields per unit area. Vegetable growing being labour intensive can substantially increase employment avenues too. To fulfill the increasing demands of vegetables of the country, there is a need to boost the production of vegetables by increasing the productivity as well as area under vegetable cultivation. IARI being a premium institute of agriculture in India releases almost 86 vegetable varieties for increasing availability of vegetables in India. Further, only good variety is not enough for increasing its productivity unless we focus on scientific method of cultivation. Hence, scientific cultivation of vegetables will not only improve its productivity but can also meet the challenges of adequate food supply to the growing population in India. Kumar *et al*. (5) had established that knowledge of farmers is one of the most important factor that influences the adoption of scientific practices of vegetable cultivation positively. Therefore knowledge assessment of farmers is very important to bridge the knowledge gap between cultivators and researchers. This will also explore the areas of training need and formulate strategies to mitigate it. Keeping this in mind, the study was conducted to develop a valid and reliable tool for assessing the knowledge level of vegetable growers in farming and to determine the factors behind it.

Three objective criteria, namely difficulty index, discrimination index and point biserial correlation were considered for the final selection of items in the knowledge test. The difficulty index indicates the extent to which an item is difficult. An item should not be so easy that all persons can pass it, nor should be so difficult that none can pass it. The second criterion applied for item selection was the discrimination index. The function of item discrimination index is to find out whether an item really discriminates a well informed respondent from a poorly informed respondent. In order to work out the discrimination index among the respondents for each question, the G6 with 7 respondents in each group. The middle two groups

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namely G3 and G4 were eliminated and the four terminal groups; that is, high score groups (G1 and G2) and low score groups (G5 & G6) were retained for further analysis. The following formula was used to calculate the discrimination index of each item.

$$DI = \frac{(S1 + S2) - (S5 + S6)}{N/3}$$

Where, DI = Discrimination index, S1, S2, S5, and S6 are the frequencies for correct answers in the group G1, G2, G5, and G6, respectively. N is total number of respondents in the sample selected for item analysis. In the present study, the item with DI value more than 0.20 was considered for final selection for inclusion in the knowledge test. For establishing the internal consistency of each item, point biserial correlation coefficient (r_{pbi}) was estimated. It was worked out by using formula (Guilford and Fruchter, 3). The item with r_{pbi} value equal to or more than 0.236 was considered for the selection in the final knowledge test. Split-half method was used to determine the reliability of the knowledge test. The final knowledge test was administered to a new sample of 50 vegetable farmers of 'Sudna' village of the Hapur district of Uttar Pradesh. Thereafter, the test was divided into two equal halves. The reliability of the test was calculated by split-half method (Ray and Mandal, 7). The reliability coefficient of the test was found to be 0.82, which was found to be highly significant.

Where, r_{tt} = reliability coefficient of the test and r_{hh} = the correlation between two halves of the test.

The standardized knowledge test was administered and based upon obtained scores the respondents were grouped into the following three categories of level of knowledge: Poor (0-41.99), Moderate (42-63.99) and Adequate (64-100). The preliminary test containing 11 knowledge items (Table 1) was administered to 42 vegetable farmers of different development blocks of Hapur district (UP). For this purpose, the score of one was assigned to the correct response and zero to each incorrect response. Thus, the range of obtainable score was 0-11.

From 17 knowledge items, 11 items having difficulty index ranging from 30 to 80, discrimination index above 0.20 and significant bi-serial correlation were selected as shown in the Table 1. These knowledge items can be used as a reliable tool for knowledge testing of farmers. It is clear from Table 2 that 9.5% vegetable growers possessed high level of knowledge about scientific practices of vegetable cultivation, followed by 70% average and 20.5% low level of knowledge. In other words, more than two third of vegetable cultivars possessed poor-to-moderate level of knowledge about scientific vegetable cultivation and about one-third had high knowledge level. Lal (6) pointed out that the majority of the vegetable growers (60.83%) possessed poor-to-moderate level of knowledge about vegetable

Table 1. Item analysis of statements selected for testing knowledge about vegetable farming practices (n = 42).

Sl. No.	Knowledge item	Difficulty index	Discrimination index	Point biserial correlation co-efficient
1	Sowing method	52.381	0.50	0.520
2	Plant-plant distance	47.620	0.21	0.475
3	Sowing time	45.239	0.14	0.447
4	Seed rate	54.762	0.14	0.546
5	Seed treatment	50.794	0.93	0.501
6	Fertilizer dose	52.976	0.36	0.523
7	Irrigation	49.206	0.86	0.490
8	Intercultural operation	52.381	0.64	0.519
9	Plant protection	53.175	0.43	0.430
10	Harvesting	53.571	0.36	0.528
11	Storage	53.175	0.79	0.431

Table 2. Distribution of vegetable growers as per their level of knowledge about scientific vegetable cultivation (n = 200).

Level of knowledge	Knowledge index	Frequency (No.)	Percentage	Mean	SD
Low	0-41.99	41	20.5	51.10	9.32
Medium	42-61.99	140	70.0		
High	62-100	19	9.5		

farming Furthermore the overall mean knowledge index (MKI) about scientific vegetable cultivation was observed to be 51.10%, which is quite low. Yadav *et al*. (11), Divakar *et al.* (1) and Yadav *et al*. (10) also made similar observations using standardized knowledge test in their respective studies.

Pearson's coefficient of correlation was worked out to determine the strength and direction of relationship between the knowledge level and selected socio-personal attributes of the vegetable growers. The results obtained are presented in Table 3 and reveal that education, extension contact, extension participation and total family income showed a positive and significant correlation with the knowledge level of the respondents about the scientific practices of vegetable cultivation. Kumar *et al.* (5) and Shakya *et al.* (8) also found positive and significant relationship between education level and level of knowledge. The probable reason is that educated farmers used to gather information from various sources in order to increase their knowledge level. Likewise, family education status also leads to a gain in the knowledge of the respondents. Farm size was observed to be positively and significantly correlated with the knowledge of the respondents about practices of vegetable cultivation. It supports the assumption that an increase in size of the enterprise and increase in knowledge level go together. George *et al.* (2) also concluded similar observation in their research. Total annual family income and level of knowledge of the respondents about vegetable cultivation exhibited positive and significant correlation. Farmers with high income might have accessibility to various information sources about vegetable cultivation helps them to enhance their knowledge about improved techniques of vegetable farming. Singh *et al.* (9) also found a positive and significant correlation between total family income and the level of knowledge of the farmers. Farmers who get higher income from farming motivated to enhance their knowledge to further maximize their profit by applying scientific practices of farming. Age of the farmers was observed to be non-significantly correlated with scientific knowledge level of respondents. It reveals that age is not a very important factor in gaining knowledge about olericulture.

Table 3. Correlation between selected attributes of vegetable growers and their level of knowledge (n = 200).

Sl. No.	Characteristic	r value
1	Age	0.019
2	Education	0.343**
3	Farm size	0.250**
4	Family type	0.044
5	Family size	0.109
6	Extension contact	0.259**
7	Mass media exposure	0.044
8	Extension participation	0.218**
9	Total family income	0.309**

*, **Significant at 5 and 1% levels

To determine the factors influencing the level of knowledge of farmers about scientific vegetable cultivation, multiple regression analysis technique (full as well as stepwise model) was employed. In this study, the effects of the eight independent variables- age, education status, farm size, family type, family size, extension contact, mass media exposure and extension participation- were predicted towards the level of knowledge. The findings of multiple regression analysis pertaining to overall level of knowledge about scientific vegetable cultivation are presented in Table 4. The positive and significant value of X_2, X_3, X_6 and X_8 indicated that a unit increase in each of them resulted in an increase of 0.789, 0.899, 1.100 and 1.397 units of knowledge gain about scientific vegetable cultivation respectively. The contribution

Table 4. Regression analysis for the level of knowledge about scientific cultivation of vegetables (n = 200).

Factor	Characteristics	R^2	Regression coefficient	Std. error	t-value
X_1	Age	0.005	0.058	0.059	0.987
X_2	Education	0.020	0.789**	0.389	2.029
X_3	Farm size	0.012	0.899**	0.259	2.549
X_4	Family type	0.002	1.118	1.820	0.614
X_5	Family size	0.050	1.135	1.608	0.706
X_6	Extension contact	0.170	1.100**	0.267	4.121
X_7	Mass media exposure	0.007	0.278	0.763	0.364
X_8	Extension participation	0.241	1.397**	0.290	4.809

*, **Significant at 5 and 1% levels

Table 5. Stepwise multiple regression analysis for level of knowledge about scientific cultivation of vegetables.

Factor	Independent variable	R^2	Regression coefficient	SE	*t*-value
X_2	Education	0.892	0.635*	0.057	11.22
X_3	Farm size	0.041	7.160*	1.802	3.97
X_6	Extension participation	0.003	4.673*	0.453	10.32
X_7	Extension contact	0.002	5.997*	2.156	2.78
X_8	Mass media exposure	0.001	4.399*	2.024	2.17

*Significant at 5% level

of other variables towards level of knowledge about scientific vegetable cultivation could not be explained with full validity in regression analysis as they were statistically found non-significant.

In order to find the most important variables affecting the overall level of knowledge about scientific vegetable cultivation, stepwise regression analysis was also done and the results are presented in Table 5. The results indicated that five independent variables, *viz*., education status (X_3), farm size (X_9), extension participation (X_{10}), extension contact (X_{14}) and mass media exposure (X_8) could explain 93.96% of the variation, which is almost equal to that of multiple regression equation (full model). Furthermore, the contribution of individual variable to the total R^2 showed that the most important contributor was education (89.22%) followed by farm size (4.13%). The least contributors were extension participation (0.31%), extension contact (0.20%) and mass media exposure (0.10%). The final regression equation is as follows $y = 0.635X_2 + 7.160 X_3 + 4.673 X_6 + 5.997X_7 + 4.399 X_8$ ($R^2 = 0.9595$*)

It is concluded from above findings that the developed knowledge test was found to be valid and a reliable tool which was used for assessing the knowledge level of cultivators about scientific practices of vegetable farming and found that majority of respondents possessed moderate level of knowledge about vegetable cultivation. Furthermore education, farm size, mass media exposure, extension contact and extension participation were found to be the most influential factors contributing significantly.

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