Original Research Article

Construction of Knowledge Test to Measure the Knowledge Level of the Millet Farmers of Bundelkhand region, Uttar Pradesh

ABSTRACT

Knowledge is the key to development and growth. It creates foundation for speedy adoption of agricultural innovations among the farmers. Millet being the most relevant crops of recent times, attracted farmers back to its cultivation. Extension systems initiated various programmes focusing on the increase in millet production and quality. Prior to this it is imperative to assess the knowledge level of the farmers about millet cultivation practices. With this background, the study was conducted to construct the knowledge test to determine the knowledge level of the Millet farmers in Bundelkhand region of Uttar Pradesh. The steps viz. selection of items, item analysis and pre testing, calculation of difficulty index, discrimination index and point bi-serial correlation, final selection of the items and also testing its reliability and validity were followed to develop a standardized knowledge test. The final knowledge test retained 32 items out 50 raw items. The test was found to be significantly reliable and valid which was indicated by high significant value of reliability coefficient and content validity.

Keywords: Knowledge test, adaptation, millets, web based system

Introduction

Millets are a diverse group of cereals, including pearl millet, proso millet, foxtail millet, barnyard millet, kodo millet, finger millet, and sorghum. These ancient crops have been cultivated for thousands of years. For instance, finger millet was domesticated about 5,000 years ago in Africa (Chamoli*et al*., 2018), pearl millet around 4,000 years ago (Taylor, 2018), and foxtail millet about 8,000 years ago (Lu, 2002). Typically, millets are grown as rain-fed crops with minimal or no fertilizer input (Devkota*et al*., 2016). They also do not require pesticides, as they are less susceptible to insect attacks compared to other major cereals (Gupta *et al*., 2017; Saxena*et al*., 2018). The growing consumer demand for millets, driven by an increase in lifestyle-related diseases, suggests a need for increased millet production in the coming years (Kane-Potaka*et al*., 2021). Millet-based foods are now frequently recommended

for promoting a healthy diet and addressing various health concerns (Anitha*et al*., 2022; Anitha, Botha*et al*., 2021; Anitha, Kane-Potaka, *et al*., 2021).

Despite the above facts, the importance of millet crops has been significantly reduced over the past five decades giving way to other commercial crops, pulses and oilseeds due to their relatively lower remuneration. For increasing the millet production and bringing it back to the major cultivation, the knowledge and information about improved millet production technology, method and practices need to be imparted at the right time at the farmers' door step. Insufficient information may leave farmers exposed to inappropriate practices leading low quality production and low yield (Tripp and Pal, 2000).Various mass media, such as radio, television, print, internet, etc. have been playing significant roles in creating awareness among consumers and farming community. Studies suggested that the millet farmers seek information related to improved varieties, insect-pest and disease management, and nutrient management in the millet crops (Malik and Rathi, 2019). In developing countries, the low "extension worker - farmer" ratio is resulting in less direct contacts between the 'change agents' and farmers. Deficient information has always impeded growth and development in the farming sector; and hence, mass media may have to discharge the duty of technology - transfer more intensively (Moyo and Salawu, 2018).

Bloom *et al*. (1956) defined knowledge as those behavior and test situation, which emphasized the remembering, by either recognition or recall, of ideas, materials and phenomenon. Knowledge is an important trait in individuals for which it is acquired from formal education and informal sources through self-learning, personal experience, discussion as well as from social media etc. Rogers (2009) in his Innovation decision process concept stated knowledge as first step for adoption of anyinnovation. Knowledge helps in boosting the performance of the farmers through speeding up the rate of adoption of improved farm practices. As knowledge test has not been developed in the past with respect the knowledge of the millet farmers. With this background, a present study was conducted with the objective to construct the knowledge test so that we could determine the knowledge level of the Millet farmers in Jhansi and Chitrakoot district of Uttar Pradesh. A knowledge test is a set of questions, each of which has a correct answer, to which people respond (Ray and Mondal, 2014).

METHODOLOGY

A systematic approach to knowledge test construction includes generating pilot test items, conducting expert reviews, and calculating the properties of the pilot items. Test development is a highly complex process involving the collection and selection of items based on expert evaluation, item analysis (such as difficulty and discrimination analysis), and assessing both the reliability and validity of the test before its final administration (Sullivan and Dunton, 2004).For the development of knowledge test 30 non sample millet farmers of Banda district of Uttar Pradesh were taken. 30 another non-sample respondents were selected for reliability check of the instrument.

The Knowledge test was developed as per the process elucidated by Lindquist (1951). The procedure followed for constructing the knowledge test is described below:

- **Selection of Items:**The most important element of a knowledge test is the set of statements or questions is called items. The content of knowledge test is composed of questions called items (Chatterjee*et. al*., 2020). The suitable items were collected and compiled after referring different available literature like books, magazines, IIMR website, and further, the items were critically reviewed and validated by the subject expert of the BUAT, Banda. A set of fifty raw items were selected covering most of the areas related tomillet cultivation, which constitute the initial test battery to carry out 'item analysis'. The items of the test were converted into genuine dichotomous objective type questions to facilitate facile scoring of the analyses.
- **Pre- testing and item analysis:** item analysis of a test usually yields two kinds of information (Guilford 1954 andVerma*et al*).The preliminary knowledge test battery was to administered to the respondents of the non sampling area i.e., Banda in the case. The score were assigned to 1 and 0 for the correct and incorrect answers, respectively; and then the total score for each of the respondent was calculated by summing up his/her scores for all the items. Later on, the "Difficulty Index" and "Discrimination Index" for each of the items were calculated, separately. Point bi-serial correlation was calculated for item analysis, as there were genuine dichotomous items in the knowledge test battery (Ray and Mondal, 2014).

RESULTS AND DISCUSSION

Item Difficulty Index: Difficulty of an item refers to the relative aggravation or ado faced by the respondents to answer the items or question correctly. Garret (1966) described several

ways to determine the difficulty of an item (i) by the judgments of the competent people who rank the items in order of difficulty, (ii) speed with which the items can be correctly solved and (iii) by the number of examinees in the group who can solve the items correctly. In the present study method of calculating the difficulty index of the items was used to determine the difficulty level of all the items in the test battery. Difficulty index can be defined as the proportion of the respondents giving correct answer to the particular item (Ray and Mondal, 2014). The difficulty index was calculated by using the following formula:

$$\text{Item Difficulty Index (DI)} = nc/N$$

Where,

DI=Items Difficulty Index,

nc=Number of the respondents who answered the question correctly

N=Total number of the respondents

Discrimination Index: Discrimination index is calculated to express the extent to which a particular items discriminates the respondents who sharply has more knowledge about the topic with those who lacks the same. The statement or items which is either answered correctly by everyone or none in the sample, is supposed to have no power of discrimination. In order to compute discrimination indices for all the items, the total scores of all the respondents were arranged in the descending order. Out of this, the top 27 percent and the bottom 27 percent of the respondents were treated as high and low group, which was further, used to calculate the discrimination index. Discrimination index was calculated using the formula :

$$\text{Discrimination Index} = (n1H - n2L)/n$$

Where,

n1H=Number of non –sample respondents in 27 percent high group who answered correctly

n2L=Number of non –sample respondents in 27 percent low group who answered correctly; and

n=(n1H+n2L)=Total number of non –sample respondents in the 27 percent high group and 27 percent low group.

Point–biserial Correlation Coefficient: Point-bi serial correlation coefficient is the statistics used to work out the internal consistency of the items of dichotomous or binary nature, which

signifies the relationship of the total score to a dichotomized answer of any given item. The point bi-serial correlation for each of the items of the initial knowledge test was calculated by using the formula given by Garret (1966):

$$\text{Point bi-serial correlation} = r_{pbi} + \frac{Mp - MQ}{MQ} \times \sqrt{pq}$$

Where,

r_{pbi}=point bi-serial correlation coefficient

MP=mean of the total scores of the respondents who answered the items correctly.

MQ=mean of the total scores of the respondents who answered the items incorrectly.

SD=Standard deviation of the entire sample

P =Proportion of the respondents giving correct answer to the item

Q = Proportion of the respondents giving incorrect answer to the item (or) q=1-p.

Final selection of the items : Those items, which met all the following conditions, were finally selected for the knowledge test:Difficulty index (DI) between 0.30 and 0.80 Discrimination index value between 0.30 and 0.80 and Point bi-serial correlation coefficient at five to one percent level of significance.

Thus, a total of 32 items from a total of 50 items were retained finally, for the knowledge test.

Table 1: Item Difficulty, Item Discrimination Index and Point bi-serial Correlation Values for Statements of Knowledge Test

	Items	Difficulty Index	Discrimination Index	Point bi-serial correlation	S/R
General millets					
1.	The group of coarse grains or millets is also known as- Shree anna (1) Shree anaj (0)	0.63	0.75	0.643	S
2.	Which of the following is the main dry land crop in India? Millets crop(1) Wheat crop (0)	0.66	0.44	0.597	S
3.	Can millets be grown with less water? Yes (1) No (0)	0.46	0.5	0.3197	S
4.	How much fertilizers is required to grow Millets? Low quantity (1) High quantity (0)	0.36	0.71	0.382	S
5.	Which one of these are called climate-friendly crops?	0.43	0.33	0.22	S

	Millets crops (1) Wheat crop (0)				
6.	Is crop rotation necessary for pearl millets crop? Yes (1) No (0)	0.31	0.33	0.241	S
7.	Which of the following millets crop is a good source of iron andzinc? Pearl millet (1) Sorghum millet (0)	0.43	0.57	0.577	S
8.	How much calcium is found in 100 gram of sorghummillet? 25 mg (1) 38 mg (0)	0.40	0.42	0.431	S
9.	How much energy is found in 100 gram of barnyardmillet? 307kcl (1) 415kcl (0)	0.30	0.16	-0.313	R
10.	How much fiber is found in 100 gram of foxtail millet? 8 gm (1) 12 gm (0)	0.43	-0.11	0.626	R
11.	Which one of the following millet grains contain highest amountof iron? Pearl millet (1) Sorghum millet (0)	0.50	0.5	0.215	S
12.	Which of the following coarse grains can cure cancer? Pearl millet (1) Barnyard millet (0)	0.23	0	0.959	R
Variety selection					
13.	Which of the following is a hybrid variety of Pearl millet KBH-4 (1) JMV-4 (0)	0.33	0.66	0.499	S
14.	Which of the following is a native variety of Sorghum millet CSV-17 (1) CSV -23 (0)	0.40	0.55	0.508	S
Agronomic management					
15.	What type of weather is required for Millet cultivation? Hot and dry both season (1) Cold season (0)	0.40	0.33	0.773	S
16.	In which season should deepploughing be done to prepare a goodseed bed in millets ? In summer season (1) In rainy season (0)	0.33	0.66	0.372	S
17.	How many times should the field for Sorghum millet be ploughed and levelled? 3 to 4 and 1 (1) Three and one (0)	0.46	0.2	0.313	R
18.	How deep should millet seeds be sown? 3-4 cm (1) 7-8 cm (0)	0.36	0.5	0.156	S
19.	What kind of soil is required for barnyard millet cultivation? Well drained clay soil (1)	0.26	1	0.26	R

	Moisture free (0)				
20.	The seed rate for sowing in foxtail millet by broadcasting method should be kept at- 12-15 kg per hectare (1) 6-8 kg per hectare (0)	0.50	0.33	0.275	S
21.	How much nursery area is required to prepare one hectare of millet seedlings? 500 sq. m (1) 800 sq. m (0)	0.46	0.25	0.3197	R
22.	Which of the following is the ideal cropping system in the barnyard millet? Barnyard millet + green gram (1) Barnyard millet + red gram (0)	0.33	0.42	0.221	S
23.	Which one of the following chemicals is used for seed treatment in pearl millet and sorghum millet? Atrazine (1) Metaphos (0)	0.46	0.55	0.156	S
24.	Which of the following chemicals is used for seed treatment in PearlMillet ? Imidacloprid 70% W.S. with 2 gmCarbendazim (1) Agrobacterium radiobacter (0)	0.43	0.33	0.247	S
25.	Which substance is mixed with chemicals in seed treatment? Jaggery (1) Salt (0)	0.26	1	0.313	R
26.	What should be the distance between rows and plants in Barnyard millet? Row to row = 25 cm xplant to plant = 10 cm (1) Row to row = 30 cmx plant to plant = 12 cm (0)	0.33	1	0.254	R
27.	Is good drainage essential for millet production? Yes (1) No (0)	0.36	0	0.471	R
Nutrient management					
28.	How many kg of chemical fertilizer is required per hectare in the native variety of Sorghum millet? 50 kg N and 30 kg P and 25 kg K (1) 60 kg N and 40 kg P and 30 kg K (0)	0.43	0.33	0.252	S
29.	How should chemical fertilizers be given to the millet crop? Full doses of Phosphorous and Potash and half doses of Nitrogen at the time of land preparation and the remaining quantity of Nitrogen after 30 days of sowing (1) Full doses of Nitrogen, Phosphorous and Potash after 30 days of sowing (0)	0.33	0.71	0.156	S
Weed management					
30.	At what interval weeding should be done in Sorghum millet? Third, fifth and seventh week after sowing (1) First, second and third week after sowing (0)	0.23	0.5	-0.94	R
31.	Can weedicides be used to control weeds in Barnyard millet? No (1)	0.43	0	0.626	R

	Yes (0)				
32.	Which of the following problems can be addressed by adjusting the sowing time in millet? Diseases (1) Water requirement (0)	0.40	0.66	0.207	S
Irrigation					
33.	Which one of the following is the critical stage of irrigation in Pearl millet crop? Flowering and pod development (1) Buds emergence (0)	0.40	0.33	0.265	S
Insect management					
34.	Which of the following is the major insect that harms the pearl millet crop? White grub (1) Grass hopper (0)	0.43	0.42	0.167	S
35.	Which part of sorghum millet is damaged by shoot fly? Eats growing heads (1) Eats growing flowers (0)	0.36	0.33	0.313	S
36.	How to prevent shoot fly in pearl millet and sorghum millet? By spraying carbofuron 3G (1) By spraying furadon 3G (0)	0.36	0.5	0.251	S
Disease management					
37.	Which of the following is the major disease of pearl millet crop? Downy mildew (1) Powdery mildew (0)	0.30	-0.2	NC	R
38.	Which of the following are the major symptoms of downy mildew in pearl millet crop? The ears of the infected plant partially or completely transform into small, curled, green leaf-like structures (1) The ears of the infected plant partially or completely transform into big, curled, black leaf-like structures (0)	0.40	0.6	0.1598	S
39.	How to prevent downy mildew disease in pearl millet ? By spraying Ridomil M Z 72 W P (1) By using Furadan 4G (0)	0.33	0	NC	R
40.	What are the major symptoms of sorghum grain mold disease? The color of the grain becomes pale and when the infection increases, the weight and size of the grain decreases. (1) The color of the leaves fades and when the infection increases, the leaves dry up. (0)	0.30	-0.2	NC	R
41.	What are the major symptoms of smut in barnyard millet crops? It forms inflorescence sori which turn from light green to brownish black later (1) The color of the leaves changes from light green to brownish black (0)	0.40	0	NC	R
42.	How does downy mildew affect foxtail millet crop? Due to excessive shoots, the plants become diseased and remain unsown (1)	0.40	0.14	NC	R

	Ears turn into smooth leaf-like structures, Panicles long as normal (0)				
Harvesting management					
43.	What is the right time to harvest pearl millet crop? When black spots start appearing on the lower surface of the seed (1) When green spots start appearing on the lower surface of the seed (0)	0.36	-0.5	NC	R
44.	After harvesting, how many days should pearl millet be dried in the sun? 10-20 days (1) 20-30 days (0)	0.43	0.33	0.436	S
45.	After harvesting, how many days should the sorghum millet be dried under the sunlight ? One week (1) Two week (0)	0.43	0.42	0.327	S
46.	How much yield is obtained from hybrid variety of pearl millet? 25-35 quintal/ha (1) 20-25 quintal/ha (0)	0.40	0.6	0.234	S
47.	How much yield is obtained from hybrid variety of sorghum millet ? 35-40 quintal/ha (1) 15-20 quintal/ha (0)	0.36	0.33	0.313	S
48.	How much yield is obtained from barnyard millet crop? 12-15 quintal/ha (1) 25-30 quintal/ha (0)	0.50	-0.33	NC	R
49.	How much dry fodder is obtained per hectare in foxtail millet crop ? 20-25 quintal/ha (1) 12-15 quintal/ha (0)	0.46	0.66	0.3197	S
50.	What should be the required moisture content in millets at the time of storage? Less than 14 percent (1) Greater than 14 percent (0)	0.53	0.40	0.4796	S

NC= Rphis is not calculated for items difficulty index more than 80 and less than 20 and items Discrimination index more than 0.8 and less than 0.2; DI=Difficulty index; DP=Discrimination power, PBS=Point Bi-Serial Correlation, S=Selected item, R=Rejected item

Reliability statistics of the knowledge test: A test is reliable when it produces consistency the same results when applied to the matched sample. The final set of 50 statements which represent Knowledge was administered on a two point continuum to a fresh group of 30 farmers of non-sample area. Reliability was calculated by using the formula of Spearman and Brown (1910).

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

Where, r_{hh}=Pearson correlation between odd and even numbered item

Reliability score of the knowledge test

To quantify the reliability different methods were worked out, but before this 'case processing summary' was calculated to check the valid responses and exclude the invalid one. It was found that all the 30 cases (responses from 30 non-sample farmers) were valid and none of the response of the response was excluded.

Table 2: Case Processing Summary

		n	%
Cases (Responses from non-sample farmers)	Valid Responses	30	100.0
	Excluded Responses	0	.0
	Total	30	100.0

List –wise deletion based on all variables in the procedure
n=no. of respondents
%=Percentage

The coefficient of correlation between forms (odd and the even items was 0.867 and spearman –Brown Coefficient for both equal length and unequal length were 0.929, thus showing high reliability of the knowledge test. Reliability was re-authenticated By Guttman split-half coefficient value, which was 0.801 (Table 3), there by testifying the reliability of the test.

The method of reliability triangulation was suggested by Lal*et al*. (2016) while suggesting methodological pathway of the scale development.

Table 3: Reliability Statistics

	Total Number of items	**30**
Correlation between Forms		.867
Spearman-Brown Coefficient	Equal Length	.929
	Unequal Length	.929
Guttman Split-Half Coefficient		.801

Reliability method was used to find out the reliability of the test. In this method, all the 30 items were first randomly arranged and then divided into two equal halves one containing the odd items and other one containing the even items. The testwere administered to thirty millet respondents and two sets of knowledge scores obtained were correlated.

Validity of the Knowledge test

The two methods employed to assess the validity of the test were jury opinion and point bi-serial correlation. Content validity was ensured initially by administered every item to different experts of the subject for evaluating the representation of universe by the test, its relevance and appropriateness. For establishing internal consistency of each item, point bi-serial coefficient (rphi) was estimated by using the formula suggested by *Garret* (1966).

The calculation point bi-serial (r_{pbi}) correlation of the every item determined the construct validity of the test. The item with significant correlation coefficient either at 1 to 5 per cent level were included in the standard knowledge of millet farmers as depicted in Table 2. Finally 32items were selected based on the items difficulty and discrimination power.

Conclusion :

Knowledge is regarded as the essential component of the three domains of educational activities identified by Bloom *et al*. (1956). Since this has a significant impact on cultivation practices of millet farmers and also on their behavior patterns, it is crucial to have a clear understanding of their knowledge regarding package of practices in order to involve the farming community in any matter pertaining to them. With this in mind, a valid knowledge test tomeasure the knowledge of the millet farmers wascreated, it was covering every aspects of package of practices of major millets of Bundelkhand region e.g Pearl millet, sorghum millet, barnyard millet and foxtail millet.

References :

Bloom, B.; Englehart, M.F.; Hill, W. and Krathwohl, D. Taxonomy of educational objectives: The classification of educational goals. Handbook I: Cognitive domain.1956.

Buch, N. From oppression to assertion: women and Panchayats in India, New Delhi, Routledge. J. Rural. Devel.2012; 33 : 73-82.

Chamoli, V., Badoni, A., Bahuguna, N., & Joshi, N. Finger millet (Eluesinecoracana):-Nutritional status, health benefits and processing status-A review. *Journal of Pharmacognosy and Phytochemistry*.2018; *7*(5S), 80-83.

Taylor, J. R., &Duodu, K. G. (Eds.).*Sorghum and millets: chemistry, technology, and nutritional attributes*. Elsevier.2018.

Chatterjee,D.; Jha,S.K. and Maiti,S. Development of knowledge test regarding method of preparation of traditional dairy products. *Indian Res. J. Ext. Edu*. 2020; 20 (2&3): 17-21.

Devarani, L. and Bandhyopadhyay, A.K. Development of gender-disaggregated knowledge test for measuring knowledge level of farmers in improved rice cultivation. *Indian Res. J. Ext. Edu.*2014;14 (1) : 30-35.

Devkota, R., Khadka, K., &Gartaula, H. Gender and labour efficiency in finger millet production in Nepal. In *Transforming gender and food security in the global south*.Routledge. 2016. pp. 100-119.

English, H.B. and English, A.C.A comprehensive dictionary of psychological and psychoanalytical terms.New York, Longmans Green and Co. 1961.

Garrett, H.E. Statistics in Psychology and Education. David McKay company Inc. and Longman Group Ltd., New York. 1966.

Gupta, A., & Kumar, R. Management of seed-borne diseases: an integrated approach. *Seed-borne diseases of agricultural crops: detection, diagnosis & management*.2020;pp717-745.

Jagannath, D. Knowledge level of farmers on organic farming in Tamil Nadu.*Indian Res. J. Ext. Edu.*2010; 12 (3) : 70-73.

Kane-Potaka, J. Leveraging the International Year. *Case Studies: Insights on Agriculture Innovation 2021 (IAAS Series)*.2022;pp.121.

Kane-Potaka, J., Anitha, S., Tsusaka, T. W., Botha, R.,Budumuru, M., Upadhyay, S.&Nedumaran, S. Assessing millets and sorghum consumption behavior in urban India: A large-scale survey. *Frontiers in sustainable food systems*.2021; *5*, 680777.

Kirar, B.S. and Mehta, B.K. Extent of knowledge of tribal farmers about rice production technology.*Indian Res. J. Ext. Edu*., 2009;9 (1) : 32-35.

Kumar, S.; Singh, S.R.K. and Sharma, R.C. Farmers knowledge level on organic farming in Madhya Pradesh .*Indian Res. J. Ext. Edu*.2014; Vol. 14 (3) : 131-133.

Lindiquist, E.F. Educational Measurement.American Council of Education, Washington1951.

Lu, T. L. D. A green foxtail (Setariaviridis) cultivation experiment in the Middle Yellow River Valley and some related issues. *Asian Perspectives*.2002;pp.1-14.

Malik, N. and Rathi, P.K. knowledge level of farmers about recommended practices of pearl millet cultivation: a study of Aligarh district of Uttar Pradesh.*International Journal of Agricultural Sciences*. 2019;Vol. 11(23): pp. 9248-925.

Mishra, A. K.; Aktar, N. and Tarika, S. Role of the Panchayati Raj Institutions in rural development (An analytical study of Uttar Pradesh).2011;7 : 44-47.

Moyo R, Salawu. A. A survey of communication effectiveness by agricultural extension in Gweru district of Zimbabwe. *Journal of Rural Studies.* 2018;(60) 32-42.

Netrapal, M., andRathi, P. K. Knowledge level of farmers about recommended practices of pearl millet cultivation: A study of Aligarh district of Uttar Pradesh. *International Journal of Agriculture Sciences.*2019; *ISSN*, 0975-3710.

Prathap. P, Pommusamy. K. Effectiveness of four Mass Media Channels on the knowledge gain of Rural Women.*Spring.*2006; Vol. 13,p.p: 73-81.http://ssrn.com/abstract=1966865

Ray, G.L. and Mondal, S. Research methods in social sciences and extension education.Kalyani Publishers, Noida (U.P.).2014.

Report of the Committee for Doubling Farmers Income.*Department of Agriculture, Cooperation and Farmers Welfare, Ministry of Agriculture& Farmers Welfare*.2017;Vol.8th . pp. 1-178.

Rogers, E.M. Diffusion of innovations.*Free Press*.2009.

Singh, V. Powers and function of Panchayati Raj Institutions (PRIs) in Himachal Pradesh.Scholars*J .Arts. Hum. Soc. Sci*.2015;3 : 305-31.

Sinha, S.; Sankhala, G. and Prasad, S. Construction of knowledge test to measure the knowledge level of dairy farmers vis-a-vis environment friendly dairy farming practices.*Indian J. Ext. Edu*. 2020; 56 (1)6-11.

Spearman, C. Correlation calculated from faulty data. *British journal of psychology*.1910; *3*(3), 271.

Sullivan, K., Dunton, N.J. Development and validation of the stroke knowledge test. *Top Stroke Rehabil*.2004; 11(3):19-28. doi: 10.1310/red5-v47t-8mjn-jy9h.Pmid: 15480951.

Tripp, R. and Pal, S. Information and agricultural input markets: pearl millet seed in Rajasthan. Journal of International Development.2000; 12: 133-144. https://doi.org/10.1002/(SICI)1099-1328(200001)12:1<133::AID-JID625>3.0.CO;2-J

Verma, A. P., Meena, H. R., Sawant, M. N., & Bhatt, A.A Test to Measure Commercial Dairy Farmer's Knowledge towards Brucellosis in Dairy Animals. *Int. J. Curr. Microbiol. App. Sci*. 2019; *8*(2), 847-854.