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An attitude scale on genetically modified (G.M.) crops

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Abstract

Genetically Modified crops are the fasted adopted agricultural technology in the history of agricultural development. It is 100 times folds from 1.7 to 190 million hectares since last two decade from 1996 to 2018. It is a promising, relevant, safe and efficient technology with low-input and high-output agriculture for crop improvement and agricultural development where conventional breeding tools have not been successful. It is an important technology to improve agricultural crops with desirable traits for their nutritional value, nutrient and water use efficiency, productivity, and tolerance/resistance to biotic and abiotic stresses. But with the passing of time some Scientific Community, farmers organization and NGOs are having negative and positive attitude towards G M crops. That's why there is need of a scale by which we can measured the Attitude of farming Communities towards it. Hence a scale on attitude has been developed based on the summated rating scale that consist 15 items of all the dimensions of G M crops.

Keywords: Genetically modified crops, attitude, NGOs

Introduction

Genetically modified crops play a significant role in world as well as in India by introducing desirable genes or nucleic acid sequences of interest in the plant genome through the process of genetic engineering. In India Bt cotton is the only one genetically modified crops that officially permitted by the government of India for its commercial cultivation since 2002. Cotton is the main commercial crop in the world. It plays a significant role at national and international economy and employment from a small farm to large corporate level by its production, marketing and processing sectors, besides providing the basic inputs for ginning and pressing, textile industry by exporting and importing. In India 7.2 million famers are growing G M crops (Bt cotton) in 11 million ha area. In total cotton production near about 95% area is under Bt cotton India right now. And 13 crops have waiting for their Approval for their commercial Cultivation by GEAC. In that series DMH-11 is a variety of Indian mustard was ready for cultivation but due to some reason it is not in main line of cultivation. With the passing of time the knowledge and attitude of farmers or users has change it may be due to the technical failure of technology or some others reason, to know the what were the main factor that lead to changing, attitude and knowledge of the farmers towards it. To know the attitude of farmers towards G M crops researcher had developed an attitude scale.

Definition of Scale: Originally the word 'scale' come from the Latin word *scala*, meaning a ladder or flight of steps, a scale represents a series of ordered steps at fixed intervals used as a standard of measurement. Scales are used to rank people's judgments of objects, events, or other people from low to high or from poor to good. A Scale is a continuum from highest to lowest points and has intermediate points in between these two extremities. The scale points are related that the first point indicates a higher position than the second; the second point is higher than the third point and so on.

The process of creating the indicators is called scaling. "Scaling is the assignment of objects to numbers according to a rule." Stevens (1946). A scale is the combined set of points that anchor the measurement tool. The scale is a concept, device or producer used in arranging measuring or quantifying event, object or phenomenon in any sequence. The scale is a device by which we can measure object or variables.

Research Methodology

This Research was conducted in Khandwa District of Madhya Pradesh. And 5 five blocks namely Khandwa, Chhagaon Makhan, Harshudh, Punasa and Pandhana were selected purposively in that 40 farmers were selected purposively from each block and finally 200 respondents.

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To know the attitude of farmers towards Genetically Modified crops the scale was prepared and developed with the help of summated rating scale it is also known as Likert Scale of attitude measuring. It consists following steps of scale development.

- 1) Developed a theory
- 2) Generate Initial pool of items
- 3) Editing (addition and deletion of items)
- 4) Selection and collection of items
- 5) Evaluate scale reliability, validity and generability
- 6) Final scale

Developed a theory

In construction of attitude scale on genetically Modified crops researcher had developed a concept and theory related to the object. And formulate a conceptual frame work with possible dimensions through all the related and available resources on the basis of his/her level of thinking and understating.

Generate Initial pool of items

In this step of scale construction were selected a numbers of statements related to the object or items from different available sources. Like books, review papers, research papers, popular articles and report from different national and international research institutions. And know the responses from all the selected statements in the form of agree and disagreement manner from different resources persons.

Editing (addition and deletion of items)

In this step of scale development selected statement were screen out in qualitative way from the quantitative statements. The statements were edited by following criteria suggested by Thurston and Chave (1928), Wang (1932), Likert (1932) and Edward and Kilpartrick (1948).

1. Avoid statements that refers to the past rather than present.
2. Avoid statements that are factual/ numerical.
3. Avoid statements that can be interpreted more than one way.
4. Avoid statements that are irrelevant to psychological aspect under consideration.
5. Avoid statements that are likely to be endorsed by almost everyone/ almost none.
6. Select statements that are believed in covering the entire range of affective / scale of interest.
7. Keep the language of statements simple, clear and direct.
8. The statement should be short rarely exceeding 20 words.
9. Each statement should have only one complete thought.
10. Statements containing universal such all, always, None and never often it reduces ambiguity and it should be avoided.
11. World such as only just, merely and others of a similar nature should be used with care and moderation in writing statements.
12. The statements should be in the straight forward form.
13. Avoid the world that may not be understood by those who are to be given the completing scale.
14. Avoid the use of double negative.

Selection and collection of items

A total 96 items were selected and it sends to 60 judges for their agreement and disagreement on five point continuums strongly agree, agree, undecided, disagree and strongly disagree. This agreement were given a numeric value strongly agree=4, agree=3, undecided=2, disagree=1 and strongly disagree =0 for positive statements, strongly agree=0, agree=1, undecided=2, disagree=3 and strongly disagree=4 for negative statements. And summing all the obtained score given by respondents to the respective statements. Critical value was obtained by using the critical value statistical analysis technique. And at last 15 final statements were selected on the basis of score from the critical value ratio technique.

Evaluate scale reliability, validity and Generability

Reliability

Next step of scale construction was testing the reliability and validity of scale. Reliability is an important component of scale construction it is used to measure the consistency and repeatability performance again and again of an instruments for which it was developed. There were numbers of techniques available for testing it. In present study spilt-half method was used to test the reliability of the scale. In this method selected statements of scale were categories into two groups 30- 30 based on odd and even. The correlation between the two halves tests must be corrected to obtain the reliability coefficient for the whole test (Nunnally, 1978; Bollen, 1989) [2]. And the value of the scale was $r = 0.86$. If the value of a scale is more that $r = 0.75$ then it is more acceptable and reliable.

Validity

It may define as the extent to which the instrument measures what it purports to measure. In this research content validity was used to measure the validity of the scale. According to Bollen, for most concepts in the social sciences, no consensus exists on theoretical definitions, because the domain of content is ambiguous. Consequently, the burden falls on the researcher not only to provide a theoretical definition of the concept accepted by his/her peers but also to select indicators that thoroughly cover its domain and dimensions. Content validity as a qualitative type of validity where the domain of the concept is made clear and the analyst judges whether the measures fully represent the domain, Bollen (1989) [2].

Result and Discussion

Critical ratio technique was used to shorting and selection of most appropriate items. Total 96 items were framed before finalized the final statements. And final items were selected on the basis of maximum t-value. Those statements having the highest t-value were selected. Out of 96 statements 15 final statements were selected for the scale construction. And the selected 15 items were presented as following.

Table 1: Final selected statements

S No	Statements	Extent of Agreement				
		SA	A	UD	D	SD
1	G M crops can play an important role in agricultural development by increasing agricultural production.					
2	G M crops are capable of reducing the input cost of insecticides and pesticides.					
3	Socio economic condition of farmers is improved by cultivating the G M crops					
4	Farmers who have cultivated G. M. crops experienced more positive results than negative.					
5	Adoption of genetic modified crops by a farmer leads to continued boost to research					
6	Farmers are facing no of problems during the cultivation of G M crops than the traditional cultivation.					
7	All the recommended agronomical practices for the genetically modified crops are same as the normal crops cultivation					
8	I know about the controversy over the G M crops among the farming community.					
9	Government should put emphasis on release of G M crops for commercial cultivation.					
10	Areas under the G M crops are continuously increasing while some person/organization/institute/ are spreading propaganda about it					
11	There are no any future treat on environment by continue cultivation of G M crops.					
12	Farmers are not satisfied with Bt cotton cultivation.					
13	No of suicidal case are increasing with increasing the area of G M crops.					
14	It is more reliable crops.					
15	Genetically modified crops will be the best alternative to primitive cultivars.					

Conclusion

To know the attitude of farmers towards genetically modified crops the scale was developed. It was developed through summated rating scale or likert method of scale construction. This scale was used to measure the attitude of farmers towards Genetically Modified crops in Khandwa District of Madhya Pradesh. It covers all the aspects of the G M crops like Economic Social, Political and future threats. (Yadav, 2017) ^[8] was also developed a scale to know the attitude of farmers. This scale was covered all the dimension of G M crops in present situation along with the future aspect of it. This scale was containing the high correlation coefficient value $r=0.86$ it indicate the high significant to measuring the attitude on G M crops. It will also help to the researcher, policy makers and scientific community for developing the most appropriate adaptive technology according to the farmers need.

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