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TECHNOLOGICAL GAP AMONG THE FARMERS REGARDING RECOMMENDED SORGHUM PRODUCTION TECHNOLOGY

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ABSTRACT

In India and other Asian and African countries, millets commonly include sorghum, pearl millet, and a range of small millets (Vetriventhan et al., 2020). India is the sixth largest producer of sorghum globally (www.smartfood.org). Sorghum is mainly used for food, fodder, alcoholic beverages and production of bio fuels. Sorghum is also known as "Global Grain" due to its multipurpose uses being a 4F (food, feed, fodder and fuel) crop. Despite of its multiple uses, the area under sorghum in India has declined from 18.61 m. ha in 1969-70 to 4.96 m. ha in 2017-18. There is wide gap between national productivity and yield potential of the improved sorghum technologies developed from the research institutes. Productivity of the crop can be enhanced by adopting the improved practices. The extent of technological gap in different production components of the technology contributes differently to the yield gap. Keeping in view the afore mentioned facts, the study on Technological Gap among the farmers regarding recommended sorghum production technology was undertaken the middle of Gujarat. A sample of 300 sorghum growers were selected from all 14 villages of Vadodara district by using proportionate random sampling. Ex-post-facto research design was used. The results of the study show that higher (87.64 per cent) technological gap in use of plant protection measures , 75.30 per cent technological gap in use of seed treatment, 63.18 per cent technological gap in weed management and 61.93 per cent technological gap in use of FYM were found in adoption of recommended sorghum production technology as majority of the sorghum growers faced constraints of high cost of farm inputs (pesticide, insecticide, FYM), non availability of seed, good quality of FYM & fungicides at proper time, inadequate knowledge about sorghum production technology, non-availability of labor at proper time for weeding & harvesting during adoption of recommended sorghum production technology. Hence, more emphasis should be given to supply inputs in time, sufficient in quantity at affordable price to farmers.

Keywords : *technological gap, millet, farmer, sorghum, constraints*

INTRODUCTION

It is clearly captured that among 14,000 edible plants, only three crops, namely, rice, maize, and wheat, contribute 60% of caloric intake. On the other hand, to achieve the goal of eliminating all forms of malnutrition by 2030, interventions are required to replace the major portion of the diet currently occupied by rice, wheat, and maize with highly nutritious grains such as sorghum, pearl millet and a range of small millets. The Government of India sponsored the proposal for International Year of Millets (IYM) 2023 which was accepted by the United Nations General Assembly (UNGA). The declaration has been instrumental for the Government of India to be at the forefront in celebrating the IYM. PM Narendra Modi has also shared his vision to make IYM 2023 a 'People's Movement' alongside positioning India as the 'Global Hub for Millets.'

In India and other Asian and African countries, millets commonly include sorghum, pearl millet, and a range of small millets (Vetriventhan *et al*., 2020). India is the sixth largest producer of sorghum globally (www.smartfood.org). Sorghum is mainly used for food, fodder, alcoholic beverages and production of bio fuels. Sorghum is also known as "Global Grain" due to its multipurpose uses being a 4F (food, feed, fodder and fuel) crop. Being used as a grain and energy crop, it is also widely used for the production of forage and silage for animal feed; because of its broader leaves with high palatability and provides green fodder over a longer period of time specially, in lean period. Sorghum is also used in brewing industry for the production of ethanol, starch and syrup. It is used as livestock feed and fodder mainly in United States and Europe, for grain and fodder in Africa and India, for making alcoholic beverage in China and Africa and many other uses in different parts of the world. In the last two decades the nature and composition of utilization of sorghum grain has undergone a change from staple food to industrial

uses such as livestock and poultry feed, potable alcohol, starch and ethanol production (Kleih *et al*. 2000). Sorghum has the potential for grain production even under low rainfall and they sustain adverse agro-climatic conditions. Sorghum is an excellent source of energy, contains 349 k cal, 10.4 g of protein, 1.9 g of fat and 72.6 g of carbohydrate and also has good amount of minerals particularly iron (4.1 mg/100g) and zinc (1.6 mg/100g). Sorghum being a good source of nutrient and a common food grain for most of the population; it can be well exploited for combating the deficiency of nutrients. In addition, sorghum is cultivated in nutrient poor soils in frequently drought-prone areas, it offers food and fodder security through risk aversion on sustainable basis. Despite of its multiple uses, the area under sorghum in India has declined from 18.61 m. ha in 1969-70 to 4.96 m. ha in 2017-18. There is wide gap between national productivity and yield potential of the improved sorghum technologies developed from the research institutes. Productivity of the crop can be enhanced by adopting the improved practices as recommended by the Agricultural Universities, Department of Agriculture and ICAR Research Institutes. Technological gap primarily depends up on application of technology by making the use of available resources. It is intimately related with the application of science and technology in the farming. Therefore, increase in agricultural production, economic and social benefits are directly dependent on the extent to which farmers use the improved technology (Vinaya & Tapan, 2023). The extent of technological gap in different production components of the technology contributes differently to the yield gap. Keeping in view the afore mentioned facts, the study on Technological Gap among the farmers regarding recommended sorghum production technology in Middle Gujarat was undertaken with following objectives.

OBJECTIVES

(1) To study the profile of the farmers

(2) To find out the technological gap among the farmers regarding recommended sorghum production technology

(3) To ascertain the relationship between profile characteristics of the farmer and their technological gaps in sorghum production technology

(4) To document the major constraints experienced by the farmers in the adoption of recommended sorghum production technology

METHODOLOGY

The present study was undertaken in the middle of Gujarat. Ex-post-facto research design was used.

The Vadodara district was selected purposively as Vadodara district is leading district in area (549ha) and production (608MT) of total sorghum crop in middle Gujarat. Three talukas (Dabhoi, Waghodia&Desar) of the Vadodara district were selected based on maximum area of total sorghum cultivation. Eight villages from Dabhoi taluka, three villages from Waghodia taluka and three villages from Desar taluka were selected based on maximum area of total sorghum cultivation. A sample of 300 sorghum growers were selected from all 14 villages of Vadodara district by using proportionate random sampling. For the Pre-tested interview schedule was used.

Technological gap among the farmers regarding recommended sorghum production technology (Technological gap had been conceived as the difference between recommended sorghum production technology and the extent of adoption of this recommended sorghum production technology at farmer's level) were calculated by following formula

$$\textbf{Technological Gap} = \frac{\text{Maximum score} - \text{Actual score}}{\text{Maximum score}} \times 100$$

RESULTS AND DISCUSSION

Profile of the sorghum growers

Table 1: Distribution of the sorghum growers according to their profile (n = 300)

Sr. No.	Characters	Category	Frequency	Percent
1	**Age (Years)**	Young(≤35)	51	17.00
		Middle(36-50)	213	71.00
		Old(≥51)	36	12.00
2	**Education**	Illiterate	09	03.00
		Primary education	63	21.00
		Secondary education	117	39.00
		Higher Secondary education	90	30.00
		College level and above	21	07.00

Sr. No.	Characters	Category	Frequency	Percent
3	**Family Size**	Small(≤ 4 members)	93	31.00
		Medium(5 to8 members)	195	65.00
		Large(≥9members)	12	04.00
4	**Occupation**	Only Agriculture	114	38.00
		Agriculture and animal husbandry (AH)	168	56.00
		Agriculture and business	09	03.00
		Agriculture and service	06	02.00
		Agriculture and service and animal husbandry (AH)	03	01.00
5	**Farming Experience (Years)**	Very Low (≤5)	27	09.00
		Low(6-10)	51	17.00
		Medium(11-15)	78	26.00
		High(16-20)	108	36.00
		Very High (>20)	36	12.00
6	**Annual Income(₹)**	Up to ₹ 1,00,000	159	53.00
		₹ 1,00,001 to ₹ 2,00,000	87	29.00
		₹ 2,00,001 to ₹ 3,00,000	18	06.00
		₹ 3,00,001 to ₹ 4,00,000	15	05.00
		₹ 4,00,001 to ₹ 5,00,000	12	04.00
		Above₹5,00,000	09	03.00
7	**Landholding**	Marginal(below1.0ha)	99	33.00
		Small(1.0 to 2.0 ha)	147	49.00
		Semi-Medium(2.01to4.0 ha)	33	11.00
		Medium(4.01to 10.0 ha)	12	04.00
		Big (>10.0)	09	03.00
8	**Livestock Possession**	Low(≤ 2)	189	63.00
		Medium(3-5)	84	28.00
		High(≥6)	27	09.00
9	**Extension contact (During the last two year)**	Very low (8.0 to 11.2 score)	15	05.00
		Low (>11.2 to 14.4 score)	66	22.00
		Medium (>14.4 to 17.6 score)	168	56.00
		High (>17.6 to 19.20.8 score)	42	14.00
		Very high (>20.8 to 24.0score)	09	03.00
10	**Scientific orientation**	Poor (14.0 to 25.2 score)	15	05.00
		Below average(>25.2 to 36.4 score)	54	18.00
		Average(>36.4 to 47.6 score)	165	55.00
		Above average(>47.6 to 58.8 score)	63	21.00
		High(>58.8 to 70.0 score)	03	01.00
11	**Economic motivation**	Poor (6.0 to 10.8 score)	09	03.00
		Below average(>10.8 to 15.6 score)	48	16.00
		Average(>15.6 to 20.4 score)	162	54.00
		Above average(>20.4 to 25.2 score)	75	25.00
		High(>25.2 to 30.0 score)	06	02.00

The data presented in Table 1 indicated that slightly less than three-fourth (71.00 per cent) of respondents belonged to middle age group, followed by young age (17.00 per cent) and old age (12.00 per cent) groups, respectively. It is evident from the data in Table 1 that 39.00 per cent of the respondents had obtained secondary level of education,

followed by higher secondary level of education (30.00 per cent) and primary level of education (21.00 per cent). While, 07.00 per cent of them had college level and above education and only 03.00 per cent of the respondents were illiterate. It could also be interpreted from Table 1 that 65.00 per cent of the respondents having medium family size of 5 to 8 members with the diversified occupation of agriculture and animal husbandry (56.00 per cent),having high experience in farming (36.00 per cent) and having an annual income of up to one lakh (53.00 per cent). It is also interpreted from Table 1 that 49.00 per cent of the respondents were having small landholding and slightly more than three-fifth (63.00 per cent) of them having less than three animals under livestock possession. The performance of the respondents was mostly average for scientific orientation (55.00 per cent) and for economic motivation (54.00 per cent). While, extension contact (56.00 per cent, 22.00 per cent) responses were concentrated in medium and low criteria (Table 1).

Knowledge regarding sorghum production technology

Knowledge plays an important role in covert as well as overt behaviour of an individual. Knowledge was measured with the help of teacher made test developed for the purpose. The result regarding overall knowledge of respondents about their sorghum production technology is given below:

It is clear from Table 2 that more than half (52.00 per cent) of the sorghum growers had medium level of knowledge regarding sorghum production technology, followed by 22.00 per cent, 21.00 per cent, 03.00 per cent and 02.00 per cent had low, high, very low and very high level of knowledge regarding sorghum production technology, respectively. It is therefore concluded that great majority (74.00 per cent) sorghum growers had medium to low level of knowledge regarding sorghum production technology. The probable reasons for this type of finding might be due to their low education level and medium to low level of extension contact. These findings are more or less similar to the findings of Pandey *et al*., (2023), Raval *et al*., (2023) and Abhishek *et al*., (2023) .

Table 2: Distribution of the sorghum growers according to their knowledge regarding sorghum production technology (n = 300)

Sr. No.	Knowledge	Sorghum Growers	
		Frequency	Per cent
1	**Very Low** (Up to 10.4 score)	09	03.00
2	**Low** (>10.4 to 20.8 score)	66	22.00
3	**Medium** (>20.8 to 31.2 score)	156	52.00
4	**High** (>31.2 to 41.6 score)	63	21.00
5	**Very High** (>41.6 to 52.0 score)	06	02.00

Technological gap among the farmers regarding recommended sorghum production technology

Components-wise technological gap about sorghum production technology

Table 3: Different components-wise technological gap with respect to selected sorghum production technology (n = 300)

Sr. No.	Components of sorghum production technology	Technological gap (%)	Ranks
1	**Gap in preparatory tillage**	09.10	IX
2	**Gap in use of seed and sowing technique**	26.20	VIII
3	**Gap in use of seed treatment**	75.30	II
4	**Gap in use of FYM**	61.93	IV
5	**Gap in use of chemical fertilizer**	41.11	VII
6	**Gap in weed management**	63.18	V
7	**Gap in intercultural and thinning operation**	63.25	III
8	**Gap in plant protection measure**	87.64	I
9	**Gap in harvesting technique**	31.16	VI
	Composite technological gap	50.98	

1. **Gap in preparatory tillage:** It can be concluded form the findings presented in Table 3 that technological gap in respect of preparatory tillage practices which rank nine was only 9.10 per cent in sorghum production technology.

2. **Gap in use of seed and sowing technique:** It can be noticed from the findings that technological gap in seed sowing technique was 26.20 per cent in sorghum production technology.

3. **Gap in use of seed treatment:** It is seen from the findings that the extent of technological gap in use of the seed treatment which rank second was 75.30 per cent in sorghum production technology.

4. **Gap in use of FYM:** It is highlighted from the findings that the extent of technological gap in use of FYM which rank fourth was 61.93 per cent in sorghum production technology. Non availability of good quality of FYM at required time may be one of the reasons for this adoption gap.

5. **Gap in use of chemical fertilizer:** The technological gap in use of chemical fertilizers which rank seventh was 41.11 per cent. High cost of chemical fertilizer may be one of the reasons for this adoption gap.

6. **Gap in weed management:** The extent of gap in weed management which ranks fifth was 63.18 per cent in sorghum production technology. Non-availability of labour at proper time for hand weeding and inadequate knowledge of sorghum growers about scientifically use of herbicide may be the reasons for this adoption gap.

7. **Gap in intercultural and thinning operation:** It is clear from the findings that the extent of gap in intercultural and thinning operations which rank third was 63.25 per cent in sorghum production technology. Non-availability of labour at proper time for thinning operations and inadequate knowledge about intercultural & thinning operations may be the reasons for this adoption gap.

8. **Gap in plant protection measures:** The extent of gap in use of plant protection measures which rank first was found to be 87.64 per cent in sorghum production technology. It was highest among the entire technological gap. High cost of pesticides or insecticide and inadequate knowledge about scientific plant protection measures may be the reasons for high adoption gap.

9. **Gap in harvesting:** It is seen from the findings that the technological gap in harvesting was 31.16 per cent in sorghum production technology. Due to non-availability of labors and threshing machine at proper harvesting time may be the major reasons for this adoption gap.

10. **Composite technological gap:** Composite technological gap indicate from the findings was about 50.98 per cent in all nine recommended management practices of sorghum production technology. It means only half of the cultural practice was adopted by the sorghum growers and because that they get less yield. This might be due to the facts that sorghum growers possess inadequate knowledge about the recommended plant protection measures, recommended seed treatment, recommended doses of weedicides, recommended dose of chemical fertilizer, recommended seed rate. They were using more or less the recommended rate/dose of these practices. Therefore, it is clearly revealed from the findings of this study that required technologies are less adopted by the sorghum growers, however adoption of easy and low-cost technologies is higher, which might be the proper reason of observed findings.

Overall technological gap

On the basis of score obtained by the sorghum growers, they were grouped in to five categories viz., (i) very low, (ii) low, (iii) medium, (iv) high and (v) very high technological gap. The data regarding this aspect are presented in Table 4.

Table 4: Distribution of the sorghum growers according to their overall technological gap

(n=300)

Sr. No.	Overall technological gap	Frequency	Per cent
1	**Very low** (Up to 20 per cent)	15	05.00
2	**Low** (>20 to 40 per cent)	90	30.00
3	**Medium** (>40 to 60 per cent)	147	49.00
4	**High** (>60 to 80 per cent)	48	16.00
5	**Very high** (>80 to 100 per cent)	00	00.00

The data in Table 4 clearly indicate that nearly one-half (49.00 per cent) of sorghum growers had medium technological gap, followed by low (30.00 per cent), high (16.00 per cent) and very low (05.00 per cent) technological gap in adoption of sorghum production technology, respectively. Whereas, none (00.00 per cent) of sorghum growers had very high technological gap.

The possible reason for these might be that majority of the sorghum growers were not aware about many practices. Further, due to many reasons like lack of knowledge and technical guidance, lack of finance, high cost of chemical fertilizers and insecticides and shortage of labour were their limitations and hence they could not adopt many improved cultivation practices of sorghum crop.

Another reason might be that poor education, low income, small and marginal farmers and low extension contact of sorghum growers were responsible for overall technological gap. Less number of the respondents using recommended technology of sorghum, which has direct effect on low yield, therefore it is suggested that State Dept of Agriculture, SAUs, NGOs, should take intensive efforts for promoting the sorghum growers to adopt recommended sorghum production technology by using advanced communication media for effective implementation. These findings are more or less similar to the findings of Chaudhari *et al*., (2022), Kachchhava *et al*., (2023) & Dodiya *et al*., (2023).

It is apparent from Table 5 that the independent variables studied viz., education, extension contact, scientific orientation, economic motivation, and knowledge had negative and highly significant correlation with overall technological gap of sorghum growers in adoption of sorghum production technology, whereas age of the sorghum growers had positive and highly significant correlation with overall technological gap.

Rest traits viz., size of family, occupation, experience, annual income, land holding and herd size had negative and non-significant relationship with the overall technological gap of sorghum growers in adoption of sorghum production technology.

Relationship between selected characteristics of the sorghum growers and their overall Technological Gap in Sorghum Production Technology

Table 5 : Relationship between selected characteristics of sorghum growers and their overall technological gap in sorghum production technology

(n = 300)

Sr. No.	Independent Variables	Correlation-Coefficient ('r' value)	('P' value)
X_1	**Age**	0.246**	0.0001
X_2	**Education**	-0.181**	0.0008
X_3	**Size of family**	-0.046NS	0.2136
X_4	**Occupation**	-0.0184NS	0.3755
X_5	**Experience**	-0.0188NS	0.3728
X_6	**Annual income**	-0.0252NS	0.3318
X_7	**Land holding**	-0.129NS	0.3084
X_8	**Herd size**	-0.0182NS	0.3767
X_9	**Extension contact**	-0.458**	0.0001
X_{10}	**Scientific orientation**	-0.240**	0.0001
X_{11}	**Economic motivation**	-0.363**	0.0001
X_{12}	**Knowledge**	-0.562**	0.0001

NS = non-significant at 0.05 level,

** = significant at 0.05 level,*

*** = significant at 0.01 level*

Constraints experienced by the farmers in adoption of recommended sorghum production technology

Table 6: Distribution of the farmers on the basis of constraints faced by them in adoption of recommended sorghum production technology

(n = 300)

Sr. No.	Constraints	Frequency	Per cent	Rank
A	**Constraint in Preparatory tillage**			
1	High cost of tractor for preparatory tillage	258.00	86.00	II
2	Non-availability of bullocks' pair for preparation of land	99.00	33.00	XXII
3	Non-availability of plough and harrow for preparation of land	69.00	23.00	XXIV
B	**Constraint in Seeds and sowing technique**			
1	Inadequate knowledge about Recommended varieties	168.00	56.00	XIV
2	Non availability of seed at proper time	252.00	84.00	IV
3	High cost of seed of improved varieties	192.00	64.00	XX
C	**Constraint in Use of seed treatment**			
1	Non-availability of fungicides or culture at proper time	285.00	85.00	IV
2	Lack of technical knowledge about seed treatment	201.00	67.00	IX
D	**Constraint in Use of FYM**			
1	High cost of FYM	243.00	81.00	V
2	Non availability of good quality of FYM at required time	234.00	78.00	VI
3	Lack of technical knowledge about preparation of FYM	168.00	56.00	XXIV

Sr. No.	Constraints	Frequency	Per cent	Rank
E	**Constraint in Use of chemical fertilizers**			
1	High cost of chemical fertilizer	264.00	88.00	I
2	Non-availability of chemical fertilizer at required time	138.00	46.00	IXX
3	Inadequate knowledge about the proper NPK does	186.00	62.00	XI
F	**Constraint in Weed management**			
1	Inadequate knowledge about scientifically use of herbicide	144.00	48.00	XVII
2	Non-availability of labour at proper time for hand weeding	192.00	64.00	X
G	**Constraint in Intercultural and thinning operations**			
1	Non-availability of labour at proper time for thinning operations	114.00	38.00	XX
2	Inadequate knowledge about intercultural & thinning operations	102.00	34.00	XXI
H	**Constraint in Use of plant protection measures**			
1	High cost of pesticide or insecticide	219.00	73.00	VIII
2	Inadequate knowledge about scientific plant protection	174.00	58.00	XII
3	Non availability of insecticides or pesticides at proper time	171.00	57.00	XIII
I	**Constraint in Harvesting practices**			
1	Non-availability of labours at the time of harvesting	234.00	78.00	VI
2	Non-availability of threshing machine at proper time	141.00	47.00	XVIII
3	High charges for threshing of sorghum	96.00	32.00	XXIII

(1) Constraints leading to technological gap in recommended land preparation (Preparatory tillage practices)

Table 6 depicts the data regarding constraints leading to technological gap in recommended land preparation practices. It can be concluded that the problem of high cost of tractor for preparatory tillage was expressed by 86.00 per cent of the respondents. Whereas, 33.00 per cent and 23.00 per cent of the respondents experienced the problem of non-availability of bullock pair for preparation of land and the problem of non-availability of plough and harrow for preparation of land, respectively.

(2) Constraints leading to technological gap in recommended seeds and sowing technique

It is apparent from Table 6 that not available of seed at proper time was major problem expressed by 84.00 per cent of the respondents. Whereas, in case of high cost of seed of improved varieties was expressed by 64.00 per cent of the respondents. Inadequate knowledge about recommended varieties was expressed by 56.00 per cent of the respondents. These constraints have led to the observed technological gap in this context.

(3) Constraints leading to technological gap in recommended in seed treatment

Table 6 indicates that 85.00 per cent of the respondents experienced the problem of non- availability of fungicides or culture at proper time, followed by 67.00 per cent of the respondents expressed the lack of technical knowledge about seed treatment. These were the major reasons expressed by sorghum growers which led to observed technological gap in seed treatment.

(4) Constraints leading to technological gap in recommended in use of FYM

Table 6 reveals that 81.00 per cent of the farmers expressed the problem of high cost of FYM, followed by 78.00 per cent of the respondents experienced the problem of Non availability of good quality of FYM at required time. Lack of technical knowledge about preparation of FYM/ compost is also major cause expressed by 56.00 per cent of the respondents. These were the major constraints expressed by sorghum growers, which led to technological gap in FYM application.

(5) Constraints leading to technological gap in recommended in use of chemical fertilizers

It is manifested from Table 6 that 88.00 per cent respondents expressed that chemical fertilizers are very costly, 62.00 per cent of the respondents experienced the inadequate knowledge about the proper NPK does and 46.00 per cent of the respondents expressed non-availability of chemical fertilizer at required time as the main constraints leading to technological gap in application of chemical fertilizer.

(6) Constraints leading to technological gap in recommended weed management

Table 13 reveals that 64.00 per cent of the respondents

expressed non-availability of labour at proper time for hand weeding. Whereas 48.00 per cent of the respondents expressed the Inadequate knowledge about scientifically use of herbicide. These were the major constraints leading to technological gap in weed management.

(7) Constraints leading to technological gap in recommended intercultural and thinning operations

Table 6 revealed that 38.00 per cent of the respondents expressed non-availability of labour at proper time for thinning operations and 34.00 per cent of the respondents expressed inadequate knowledge about intercultural & thinning operations. These were the major constraints leading to technological gap in intercultural and thinning operations.

(8) Constraints leading to technological gap in recommended plant protection measures

Scrutiny of the data presented in Table 6 highlights on the constraints for technological gap in plant protection measures. In this context, the high cost of pesticides or insecticides, inadequate knowledge about scientific plant protection and non-availability of insecticides or pesticides at proper time were the important constraints expressed by 73.00 per cent, 58.00 per cent and 57.00 per cent of the respondents, respectively. These were the major constraints leading to technological gap in application of plant protection measures.

(9) Constraints leading to technological gap in recommended harvesting practices

Table 6 revels that 78.00 per cent of the respondents expressed the non-availability of labours at the time of harvesting. Whereas 47.00 per cent of the respondents expressed the problem of non-availability of threshing machine at proper time and 32.00 per cent of the respondents expressed the high charges for threshing of sorghum. These findings are more or less similar to the findings of Desai *et al*. (2023).

The major suggestions given by the farmers to overcome constraints in adoption of recommended sorghum production technology

Table 7: Distribution of the farmers on the basis of their suggestions to overcome constraints in adoption of recommended sorghum production technology (n = 300)

Sr. No.	Suggestions	Frequency	Per cent	Rank
1	Provide the information/training about scientifically preparation of FYM / compost.	168.00	56.00	VI
2	Supply of inputs (i.e. seed and fertilizers) should be provided in time & sufficient in quantity.	252.00	84.00	I
3	Crop loan should be provided in time.	219.00	73.00	IV
4	Information should be providing timely about pest and disease management.	186.00	62.00	V
5	Provide the information about proper scientifically herbicide application.	144.00	48.00	VIII
6	Cost of seeds, fertilizers and pesticides should be reduced.	225.00	75.00	II
7	Provide the information about proper scientifically seed treatment.	168.00	56.00	VI
8	There should be co-operative banks and transport facilities in local area.	150.00	50.00	VII
9	Organize crop demonstrations regularly.	225.00	75.00	II

It was observed from Table 7 that 84.00 per cent of the respondents suggested to supply inputs (i.e. seed and fertilizers) in time & sufficient in quantity. Whereas, 75.00 per cent of the respondents suggested that cost of seeds, fertilizers and pesticides should be reduced and crop demonstrations should be organized regularly. Majority (73.00 per cent) of respodents suggested that crop loan should be provided in time, 62.00 per cent of the respondents suggested that information should be provide timely about pest and disease management, 56.00 per cent respondents suggested to provide the information/training about scientifically preparation of FYM /compost and to provide the information about proper scientifically seed treatment. Moreover, 50.00 per cent of the respondents suggested that the co-operative banks and transport facilities should be there in local area and 48.00 per cent of the respondents suggested to provide the information about proper scientifically herbicide application.

CONCLUSION

Majority of the sorghum growers were in the middle

age group having secondary to higher secondary level of education, medium family size, engaged in agriculture and animal husbandry, medium to less farming experience, up to one lakh of annual income, small to marginal size of land holding and below six animals herd size.

Majority of the sorghum growers had medium to low level of extension contact,scientific orientation, economic motivation, knowledge of sorghum production technology and overall technological gap in adoption of sorghum production technology.

The independent variables studied viz., education, experience, annual income, land holding, extension contact, scientific orientation, economic motivation, and knowledge had negative and significant correlation with overall technological gap of sorghum growers, whereas age of the sorghum growers had positive and significant correlation with overall technological gap. Rest traits viz., size of family, occupation and herd size had negative and non-significant relationship with the overall technological gap in adoption of sorghum production technology.Majority of sorghum growers faced constraint of high cost of farm inputs (chemical fertilizer, pesticide or insecticide, FYM, tractor), Non availability of seed at proper time, Non-availability of fungicides or culture at proper time, Inadequate knowledge about sorghum production technology, Non-availability of labour at proper time for weeding & harvesting. Majority of sorghum growers offered suggestions likes to supply inputs (i.e. seed and fertilizers) in time & sufficient in quantity, cost of seeds, fertilizers and pesticides should be reduced ,crop demonstrations should be organized regularly, crop loan should be provided in time, information should be provide timely about pest and disease management, to provide the information/training about scientifically preparation of FYM /compostto provide the information about proper scientifically seed treatment and the co-operative banks and transport facilities should be there in local area.

CONFLICT OF INTEREST

No conflict of interest among researchers.

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