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RESEARCH PAPER

Knowledge of foxtail millet growers regarding improved cultivation practices in Bagalkot district of Karnataka

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Abstract: The present study was conducted in Bagalkot districts of Karnataka state during the year 2019-2020. Ilkal and Hunagunda taluks of the Bagalkot district were selected for the study based on the availability of a greater number of farmers involved in foxtail millet growers as a criterion. Both primary and secondary data was collected for the proposed study. The total sample constitutes 120 foxtail millet growing farmers comprising of 30 farmers from Amaravadi, 30 farmers from Kelur, 30 farmers from Ramavadagi and 30 farmers from Karadi from 4 villages of two taluks in Bagalkot district. Ex-post facto research design was followed for the study. A majority (43.33%) of the foxtail millet growers belonging to medium to high levels of knowledge regarding improved recommended cultivation practices. Education, Mass media participation, Extension participation, Extension contact, innovative proneness, Farming experience, Management orientation, scientific orientation and Risk orientation of foxtail millet growers had significant to highly significant association with the knowledge level regarding improved recommended cultivation practices. The twelve personal, socio-economic, psychological and communication characteristics of the foxtail millet growers had contributed to the tune of 65.70 per cent of the variation in the knowledge level regarding improved recommended cultivation practices.

Key words: Extension, Farming, Foxtail Millet, Knowledge

Introduction

Millets are a group of highly variable small seeded grasses, widely grown around the world as cereal crops or grains for fodder and human food. Generally, these are rainfed crops grown in areas with low rainfall and thus resume greater importance for sustained agriculture and food security. The crop is favoured due to its productivity and short growing season under dry, high-temperature conditions. The minor millets like finger millet (*Ragi*), foxtail millet (*Navane*), Little millet (*Samai*), Barnyard millet (*Oodalu)*, Proso millet (*Baragu*) and Kodo millet (*Haraka*) are important crop species. Millets offer nutritional security and hence there is a need for promoting millets. Most of the millets contain about 10 per cent protein, 3.5 per cent lipids. The nutritional composition of foxtail millet per 100 g is, fat (4.3 g), mineral (3 g), protein (12.3 g), calcium (31 g), carbohydrate (60.9 g), phosphorous (290 mg%) and dietary fiber (14 g). Foxtail millet has higher quantities of protein, fat and fiber compared to other major cereals, minerals like calcium and iron are similar to other cereals.

Millets hold great potential in contributing substantially to food and nutritional security of the country and thus they are not only a powerhouse of nutrients, but also are climate resilient crops and possess unique nutritional characteristics. Millets which are also known as "famine reserves" for their prolonged and easy storability under ordinary conditions are of great relevance. They are most suitable for mixed and intercropping, thus offer sustainable resources use, food and livelihood security to farmers. By any nutritional parameter, millets are much ahead of rice and wheat. Therefore, millets are the solution for malnutrition that affects a vast majority of the Indian population. In recognition of this, these grains are now considered as nutritious grains. The unique nutritional properties of millets, with high fiber, quality protein and minerals composition being called as "nutri-cereals".

World millet production, in 2016-17 increased to approximately 3 million tonnes resulting in 33.4 million tons. In the year 2017-18 there has been a decline in world millet production to 29 million tons. However, in the subsequent years the production revealed to 30.3 million tons. Millet is intensely produced in India and Nigeria. These three countries produce 63.7% of world millet production. India solely produced 10.6 million tons of 30-million-ton world millet production in the year 2017-18. India ranks first in millet production in the world followed by Nigeria produced 5 million tons of millet production in 2017-18 year, while Niger produced 2.9 million tons. (Anon, 2012).

The minor millets occupy a large area in the state of Karnataka. Their cultivation over long period across varied agro-climatic situations in conjunction with selection pressure to improve them to suit to different growing conditions and consumption practices has resulted in vast diversification of genotypes in the state. Karnataka is one of the major producers of millets such as ragi, jowar, bajra, foxtail with an area of 20,038 ha, production of 10,906 tonnes and a productivity of 573 kg/ha and little millet with an area of 14425 ha, production of 14,132 tonnes and at a productivity of 1031 kg/ha (Anon, 2018a) is spearheading an initiative to place

these nutrient-rich cereals on the global food plate. Though millets such as ragi and foxtail have gaining momentum in recent years with health-conscious consumers waking up to has witnessed a volatile trend. Interestingly, farmers in Karnataka have doubled acreage to around 40,000 hectares under minor millets majorly for foxtail because of promotions in relation to foxtail nutritional value and its comparatively higher yield than other millets (Anon, 2018b). With the modern agriculture placing more and more emphasis on high yielding crops and their varieties for increasing production, productivity and profit, the cultivation of small millets is being abandoned. Although, minor millets are nutritionally superior, the non-availability of refined and processed millets in ready-to-use form has restricted their use on a larger scale (Shanthakumar *et al*., 2010). Millet grains offer many opportunities for value addition and diversified utilization which may create income enhancement opportunities for the farmers. This research will address some of these issues with a view to strengthen the role of small millets in food security and income generation.

A large number of technologies have been developed in foxtail millet cultivation but the farmers are not adopting to the fuller extent. There is a gap between the recommended package of practices advocated by the scientist and actual use by the farmers in their fields. It has been observed in the field that there are farmers who are aware of the improved cultivation practices and have adopted the same on their fields and it is also found that there are farmers who are lagging behind in the adoption of improved cultivation practices due to lack of adequate knowledge. Hence, the present study is carried out with the objectives to study the knowledge level of foxtail millet growers and their relationship between personal, socio-economic, psychological and communication characteristics about the recommended cultivation practices of foxtail millet.

Material and methods

The present study was conducted in Bagalkot district of Karnataka state during the year 2019-2020. Out of the nine taluks of the district, Ilkal and Hunagunda taluks were selected for the study. A list of all the foxtail millet growing villages in Ilkal and Hunagunda taluks were prepared in consultation with the concerned Assistant Director of Agriculture (ADA), Karnataka Department of Agriculture. From the selected taluks, four villages were randomly selected in each taluk. Ten marginal farmers, ten small farmers and ten big farmers were randomly selected for the study. Thus, the total sample constitutes 120 foxtail millet growing farmers comprising of 30 farmers from Amaravadi, 30 farmers from Kelur, 30 farmers from Ramavadagi and 30 farmers from Karadi from 4 villages of two taluks in Bagalkot district. Thus, totally 120 respondents constituted the sample for the study.

District	Taluks	Villages	Number of respondents
Bagalkot	Ilkal	Amaravadi	30
		Kelur	30
	Hunagunda	Ramavadagi	30
		Karadi	30

Ex-post facto research design was followed for the study. Based on the objectives of the study an interview schedule was prepared.

Knowledge level

Knowledge in the present study is referred to the body of information understood and retained by the farmers regarding improved foxtail millet cultivation practices. A teacher made test as suggested by Anastasi (1961) was employed to assess the knowledge level of the respondents regarding the improved foxtail millet cultivation practices. A list of 14 knowledge items was prepared by referring to the package of practices book published by the University of Agricultural Sciences, Raichur and Dharwad. Each practice was framed in a question form to obtain the response from the respondents. For each question alternative answers were given. The answers to the question were quantified by giving one score to 'Yes answer' and zero score to 'No answer'.The maximum possible score one could get was 14 and the minimum was zero. The summation of scores of the correct answers for a particular respondent indicates his/her knowledge level about improved cultivation practices of foxtail millet. The respondents were grouped into low, medium and high knowledge categories using mean (9.03) and standard deviation (1.02) as measure of check.

Category	Criteria	Score
Low	Less than (mean - 0.425 SD)	<8.59
Medium	In between (mean ± 0.425 SD	8.59-9.46
High	More than (mean + 0.425 SD)	>9.46

The collected data was tabulated, scored and analyzed using mean, standard deviation, chi-square test and multiple regression test.

Results and discussion

Knowledge level of growers about recommended cultivation practices of foxtail millet

Table 1 reveals that 43.33 per cent of respondents belonged to medium knowledge level category., whereas, 30.00 per cent of the respondents were in high knowledge level category and 26.66 per cent of respondents were in low knowledge level category. From the above data it is clear that 43.33 per cent of the respondents have the medium level of the knowledge of foxtail millet recommended cultivation practices. As we know that millets were growing since from many hundred years ago, the recommended cultivation practices that were following by the farmers were practices that were practicing by their ancestor. Followed by the 30.00 per cent of the respondents were high in

Table 1. Overall knowledge level of growers about recommended cultivation practices (n=120)

Category	Frequency	Percentage
Low (<8.59)	32	26.66
Medium (8.59 to 9.46)	52	43.33
High (>9.46)	36	30.00
	Mean=9.03 Sd=1.02	

*F = Frequency, % = Percentage

the knowledge of cultivation practices, this is because many farmers were having the good contact with the RSKs which helps to know the recommended cultivation practices. The government new scheme made the RSKs, KVKs and AEECs to conduct the demonstrations in the field level this all together helped the farmers to get the information about recommended cultivation practices.

Other reason might have made the majority farmers to strive themselves to acquire more knowledge about improved recommended cultivation practices through participation in extension activities field days, demonstrations, group meetings, Krishimelas and field visits and exposure to mass media. Further, the study also revealed that most of the respondents studied middle to high school and majority of them had a farming experience of more than 16 years. These factors might have contributed more for possession medium to high level of knowledge of foxtail millet farmers about recommended cultivation practices. And 26.66% of the respondents have the low level of the knowledge of recommended cultivation practices this is because many farmers growing the foxtail millet in their land it is just because just to get the incentive from the RSKs.The findings of the work are similar with the work of Khuspe and Kadam (2012) and Kebede and Amare (2018).

Practice-wise knowledge of growers about recommended cultivation practices of Foxtail millet

An appraisal of Table 2 revealed that a vast majority (89.16%) of the farmers had correct knowledge about the improved local variety best suited for the region as every farmer tries to acquire knowledge about improved varieties to get assured yield. Farmers have more knowledge about local varieties than recommended varieties this is because farmers depend on the other farmers for the seeds purpose or else, they will use previously grown seed as the source of seed for next year.

Further, the results also revealed that cent per cent of the farmers had correct knowledge about the time of sowing. 78.33 per cent of respondents had correct knowledge on the recommended seed rate. 80.83 per cent of farmers had correct

Table 2. Knowledge level of growers about different cultivation practices of Foxtail Millet (n=120)

Recommended Cultivation practices			Known		Unknown	
			F	%	F	%
Varieties						
a) SiA-2644			45	37.5	75	62.5
b) HMT-100-1			49	40.83	71	59.17
c) Local variety			107	89.16	13	10.83
Time of sowing (June-July)			120	100.00	0	00.00
Seed rate @ 2 to 3 kg/acre			94	78.33	26	21.67
Spacing (25-30 cm * 5 -7.5 cm)			97	80.83	23	19.19
Depth of sowing (3 to 4 cm)			112	93.33	8	6.66
Inter cropping (Green gram/ red gram/ niger) @4:2			105	87.50	15	12.50
Fertilizer application						
Name of the fertilizer	Quantity of application	Time of application				
Organic fertilizers						
FYM	2.4 ton	2-3 weeks before sowing	120	100.00	00	00.00
Bio-fertilizer (Azospirillum)	200 gm	Seed treatment	12	10.00	108	90.00
Inorganic fertilizers						
Nitrogen	12 kg	50% at the time of sowing and 50% 30 DAS	120	100.00	00	00.00
Phosphorus	6 kg	At the time of sowing	120	100.00	00	00.00
Potash	6 kg	At the time of sowing	120	100.00	00	00.00
Intercultural operation			120	100	00	00.00
Weed management						
a) Hand weeding			110	91.67	10	8.33
b) Chemical weed control			98	81.67	22	18.33
Pest management						
a) Army worm (Monocrotophos 36% EC @2ml/lit)			81	67.50	39	32.50
b) Cut worm (Profenophos 50EC @ 1.5ml/lit)			109	90.83	11	9.17
Disease management						
a) Blast (Mancozeb @ 0.2%)			93	77.50	27	22.50
b) Grain smut (seed treatment with carbendazium @ 2g/kg)		112	93.33	8	6.67	

*F = Frequency, % = Percentage

knowledge about recommended spacing. This is low because farmer practice the line sowing only, which will lead to uneven spacing and uniform depth of seeds within the line and requires more quantity of the seed as compare to the recommended seed rate. A vast majority 93.33 per cent of the respondents had correct knowledge about depth of sowing these practices are important and critical aspects of cultivation of any crop. Therefore, majority of the respondents had full knowledge about this essential cultivation.

As high as 87.50 per cent of the respondents had correct knowledge about inter cropping, millets were growing since from many years hence farmer know about the other intercropping crops with the finger millet which were used as extra source of income to the famers and also helps the farmers to get good income when the price of millets were low or when the crop failed due to any other climatic conditions.

With respect to fertilizer application cent per cent of the respondents had correct knowledge about quantity of FYM application and as high as 90.00 per cent had incorrect knowledge on the time of bio-fertilizer application. Farmers were not aware about the importance of the bio-fertilizers and their availability hence the knowledge about the bio-fertilizer is less. With regards to recommended quantity of chemical fertilizers, cent per cent of the respondents had full knowledge on NPK usage. Further, the results also revealed that cent per cent of the farmers had correct knowledge about intercultural operations. Regarding weed management, 91.67 per cent of them had correct knowledge about hand weeding and 81.67 per cent of them had correct knowledge chemical weeding.

Further the results also revealed that majority of the respondents had correct knowledge about pests, diseases and their management measures. As high as 90.83 per cent of the farmers had correct knowledge on profenophos 50EC @ 1.5ml/lit for control of cut worm, whereas 67.50 per cent knowledge about seed treatment is being observed in management of army worm. 93.33 per cent of the farmers had correct knowledge about seed treatment with carbendazium @ 2g/kg which was used for grain smut control.

Relationship between selected independent variables with their knowledge level of foxtail millet growers about the improved cultivation practices

The co-efficient of correlation of each of the socio-personal, economic and psychological variables with knowledge level of foxtail millet farmers is furnished in Table 3. It could be revealed from table that among 12 independent variables of knowledge level of foxtail millet farmers, five variables namely, Education, Mass media participation, Extension participation, Extension contact and innovative proneness showed positive and significant relationship at 0.01 level of probability, Whereas Farming experience, Management orientation, scientific orientation and Risk orientation and showed positive and significant relationship at 0.05 level of probability with their knowledge level of foxtail millet farmers. The remaining variables namely, Age, Annual income and Size of land holding did not establish any significant relationship with their knowledge level of foxtail millet farmers.

Table 3. Relationship between independent variables and knowledge level of foxtail millet growers about improved cultivation practices (n=120)

Independent variables	Knowledge level (r value)
Age	0.086 NS
Education	0.531**
Farming experience	0.235*
Annual income	0.591 NS
Size of land holding	0.015 NS
Mass media participation	0.475**
Extension participation	0.419**
Extension contact	0.702**
Innovative proneness	0.490**
Management orientation	0.329*
Scientific orientation	0.118*
Risk orientation	0.170*

NS- Non-Significant; *= Significant at 5%; **=Significant at 1%; r=Correlation co-efficient

The correlation test confirmed that, there was positive and significant relationship at five per cent between Farming experience, Management orientation, scientific orientation and Risk orientation showed with knowledge level. The variables like Education, Mass media participation, Extension participation, Extension contact and innovative proneness had positive and significant relationship at one per cent with the knowledge level of foxtail millet farmers. Other variables like Age, Annual income and Size of land holding had positive and non-significant with the knowledge level. Because of which it was not possible to discuss the results separately for each of the variables studied. Therefore, an attempt is made to discuss the findings by considering a cluster of significantly correlated variables under personal, social-economic and psychological related characteristics in order to get a clear meaning.

Similar findings were reported by Maraddi (2006) and Kharatmol (2006),Gopala Y.M. *et al* (2012) and Sabanna (2013).

Step wise regression analysis of the different independent variables with knowledge level of foxtail millet growers

The step wise regression analysis was undertaken to determine the extent of contribution of personal, socio-economic, psychological and communication factors on knowledge level of foxtail millet farmers and the results are presented in Table 4. The results reveal that 65.70 per cent of the variation in the knowledge level of foxtail millet farmers could be explained by socio-economic, psychological and communication characteristics of members included in the study. R^2 value of 65.70 with significant 'F' value 13.11 revealed the significance at one per cent level of regression equation in the prediction of results.

It may be further observed from the Table 4 that variables such as Education, Farming experience, Mass media participation, Extension contact and Management orientation and had significant contribution at five per cent level with

Table 4. Step-wise regression analysis of the independent variables of foxtail millet growers with their knowledge level

(n=120)

Independent variables	Regression coefficient (B)	Standard error	T' values
Age	0.137	0.186	0.749 NS
Education	1.495	0.735	1.845*
Farming experience	1.024	0.376	1.182*
Annual income	0.045	0.574	0.228 NS
Size of land holding	0.046	0.122	0.416 NS
Mass media participation	1.362	0.258	1.108*
Extension participation	1.195	0.263	1.485**
Extension contact	1.483	0.714	1.569*
Innovative proneness	1.060	0.242	1.276 NS
Management orientation	1.847	1.367	1.598*
Scientific orientation	0.778	0.376	2.128**
Risk orientation	1.122	1.086	0.114**

R^2=0.657 ; F= 13.11**

NS- Non-Significant; *= Significant at 5%; **= Significant at 1%

knowledge level of foxtail millet farmers. Whereas, the variable such as Extension participation, Scientific orientation and Risk orientation was significant at one per cent in multiple regression analysis. The above three variables were found to be important in developing better knowledge level of foxtail millet growers. The results are in conformity with the findings of the results are in partial conformity with the findings of Nagaraj (2015).

Conclusion

The findings reveled that a majority (43.33%) of the foxtail millet growers were having medium to high level of knowledge about recommended cultivation practices, whereas 26.66 per cent of the foxtail millet growers had low level of knowledge. The results indicated the scope for the Karnataka State Department of Agriculture, Farm Universities and other concerned agencies to further improve the knowledge level of foxtail millet growers about recommended cultivation practices. The agencies could provide ample opportunities for the foxtail millet growers to participate in extension activities for acquiring knowledge on improved recommended cultivation practices, leading to adoption of the same in the farmer's field for getting higher crop yield and income. The agencies should also advantageously use mass media on a very scale for rapid communication of farm information.

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