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RESEARCH ARTICLE

Knowledge Level of Finger Millet Growers about Nutrient Management Practices in Krishnagiri District of Tamil Nadu

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ABSTRACT

Finger millet is an important small millet crop among other millets in India. In Tamil Nadu, it covers an area of 1,04,426 ha with a production of 349.63 lakh tonnesand an average productivity of 3348 kg ha^{-1}. Nutrient application in finger millet can effectively increase the yield. As the nutrient management practices in finger millet plays an important role in yield increase, an ex-post facto study was conducted to study the knowledge level of finger millet growers about recommended nutrient management practices. The study was conducted in Thally and Kelamangalam blocks of Krishnagiri district with a sample size of 120 finger millet growers. It was found that most respondents possessed a medium to high level of knowledge about recommended nutrient management practices and also, it was found that training was the most influencing factor on the knowledge level of the respondents. Hence, the state department of agriculture has to carry out necessary extension interventions such as result demonstration, training programmes and field visits to increase the knowledge level of the farmers on recommended nutrient management practices in finger millet cultivation.

Keywords : *Finger millet; Nutrient management; Knowledge level; Soil testing; Organic manure*

INTRODUCTION

Millets play a major role in the country which contributes 60 per cent of the total area to rainfed agriculture. Out of the total minor millets produced in India, Finger millet (*Eleusine coracana L.*) accounts for about 85% of production (Sakamma *et al*., 2018) and it has the highest productivity among small millet crops. The major finger millet growing states are Karnataka, Tamil Nadu, Andhra Pradesh, Orissa, Jharkhand, Maharashtra, Uttaranchal, and Gujarat of 1.27 million hectares with a production of 2.61 million tonnes and average productivity of 1489 kg ha^{-1} (Agriculture Statistics at a Glance 2017).

Finger millet is a vital dryland crop grown mainly by small farmers due to its resilience and ability to withstand aberrant weather conditions and generally grown in soil having poor water supplying capacity and nutrients. Under these subsistence farming conditions, the crop expresses lesser yield. But there are improved varieties of finger millet that respond to added nutrients. However, under appropriate soil fertility conditions, an irrigated crop needs relatively higher quantities of mineral nutrients to achieve potentially higher yield goals set by farmers.

Gawade *et al.* (2013) observed that different organic manures, namely poultry manure, farm yard manure and vermicompost applied @ 1.32, 3 and 1.5 t ha^{-1} equivalent to 20 kg N ha^{-1} registered yield of finger millet of 2211, 1740 and 1942 $kgha^{-1}$, respectively as against 1536 kg ha^{-1} in unfertilized control. In finger millet highest grain yield (1412 kg ha^{-1}) was achieved from the treatment with 100% recommended dose of fertilizer @ 40-20-20 kg N, P205 and K20 ha^{-1} compared to control (without any nutrient) with grain yield of 637 kg (Harika *et al*.,2019). In another experiment conducted on alfisols of Karnataka on precision nutrient management in finger millet, higher grain yield was reported (3238 kg ha^{-1}) with the application of soil test based NPK and compost 10 t ha^{-1} for the targeted yield of 4 t ha^{-1} over that of control (2385.7 kg ha^{-1}). (Saraswathi *et al*.,2018)

Nutrient management plays a crucial role in improving the productivity of finger millet. However, in India per hectare, consumption of fertilizers is inadequate particularly in finger millet cultivation. Though finger millet can grow and give considerable yield under subsistence conditions without any extraneous source of nutrients, applying mineral fertilizers can improve production and grain productivity, especially under irrigated conditions. In this context, the study was taken to assess the knowledge level of the finger millet growers on recommended nutrient management practices.

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MATERIALS AND METHODS

The study was conducted in the Krishnagiri district of Tamil Nadu, which has the largest area under finger millet cultivation with the highest production in the state. In Krishnagiri finger millet is grown under irrigated conditions, whereas it is rain-fed in other parts of the state. Krishnagiri consists of ten blocks, out of which Thally and Kelamangalam blocks were purposively selected based on the highest area under finger millet cultivation. From two blocks total of ten villages were randomly selected for the study. A sample of 120 respondents was selected from the selected villages using a proportionate random sampling technique.

The ex-post facto research design was adopted for this study which is most suitable to achieve the objective of the study. The knowledge level of the respondents on the recommended nutrient management practices, was measured with the help of a teacher-made test developed for the study consisting of twenty questions with correct or incorrect responses. A score of two and one were given to correct and incorrect responses, respectively. The data was collected from the selected respondents by personal interview method using a well-structured and pre-tested interview schedule. The data collected were coded, tabulated and analyzed using percentage analysis and Cumulative Square Root of Frequency to categorize the respondents into low, medium and high based on their knowledge level on recommended nutrient management practices in finger millet cultivation.

Further effort was made to find out the factors influencing the knowledge level of respondents. Correlation analysis and multiple linear regression analysis were used to find out the association and contribution of profile characteristics of respondents with the knowledge level. The profile characteristics of the finger millet growers contain twelve factors such as age, educational status, occupational status, farm size, farming experience, training undergone, information source utilization, perception about soil fertility, perception about use of organic manure, attitude towards soil testing, attitude towards nutrient management practices and progressiveness.

RESULTS AND DISCUSSION

Knowledge level of the finger millet growers on recommended nutrient management practices

About twenty knowledge questions were framed covering all the aspects of nutrient management practices and the data were collected. The data collected are presented in Table 1. Results illustrate that almost cent per cent (99.17 per cent) of the respondents possessed correct knowledge that soil is the source from where the plants receive their nutrients.

Table 1. Distribution of respondents based on their knowledge level on recommended nutrient management practices in Finger millet

(n =120)*

Practices	Number	Per cent
Source of nutrients received by the plants	119	99.17
Primary nutrients	36	30.00
Necessary of Soil testing	102	85.00
Place of soil testing	32	26.67
Best method of nutrient management	116	96.67
Recommended dose of bio-fertilizer for seed treatment	0	0.00
Recommended quantity of FYM / compost for nursery	63	52.50
Recommended quantity of FYM / compost for main field	105	87.50
Blanket recommendation of NPK for Finger millet	0	0.00
Number of splits for N fertilizer application	112	93.33
Right time of top dressing of N fertilizer	102	85.00
Split application of P and K fertilizers	47	39.17
Best method of fertilizer application	114	95.00
Incorporation of FYM and fertilizers in the soil	65	54.17
Name of a green manure crop	111	92.50
Name of a micronutrient fertilizer	9	7.50
Recommended quantity of MN mixture	0	00.00
Name of a bio-fertilizer	15	12.50
Recommended quantity of bio-fertilizer	0	0.00
Reclamation for acidic / alkaline soils	0	0.00

* - Multiple responses obtained

An overwhelming majority of the respondents (96.67 per cent) possessed adequate knowledge on the best method of nutrient management followed by the best method of fertilizer application (95.00 per cent) and incorporation of FYM / fertilizers in the soil (54.17 per cent). The results clearly showed that most of the respondents had sufficient knowledge on the basics and general information on nutrient management.

Most of the farmers were highly experienced, gained knowledge through training and had highly favorable attitude towards nutrient management practices. This might be the reason for high knowledge on basic information. At the same time,only 30.00 per cent of the respondents possessed knowledge on primary nutrients such as N,P and K due to the fact that the farmers

were applying nutrients over decades without any knowledge on the technical aspects.

Soil testing

More than four-fifths (85.00 per cent) of the respondents had correct knowledge on the necessity of soil testing. One-fourth (26.67 per cent) of the respondents had knowledge of the place of the soil testing laboratory. The rest of the respondents lacked the knowledge on the site of soil testing laboratory. This was due to the fact that the majority of the farmers were old aged and medium level of information source utilization. Lack of awareness on the benefits of soil testing among the farmers was also one of the main reasons for the poor knowledge on soil testing practices.

Organic manure application

An overwhelming majority (92.50 per cent) of the respondents had correct knowledge on the name of a green manure crop followed by recommended quantity of FYM / compost for nursery application (87.50 per cent) and recommended quantity of FYM / compost for main field application (52.50 per cent). Majority of the respondents had high level of perception towards usage of organic manure and also had high level of farming experience. This might be the possible reason for high level of knowledge on organic manures

Inorganic fertilizer application

Among the inorganic fertilizers, none of the respondents possessed knowledge on the blanket recommendation of NPK fertilizers, and this is because most of the respondents were old aged and also possessed less than middle school education so that they were not in a position to calculate the fertilizer dosages. Though the respondents don't know the recommended quantity of NPK, a vast majority of the respondents (93.33 per cent) had correct knowledge on the number of split application of nitrogenous fertilizers followed by the right time of top dressing of nitrogenous fertilizers (85.00 per cent) and, P and K fertilizers cannot be applied as split application (39.17 per cent). This was because most of the respondents were experienced and gained the knowledge by their experience.

Bio-fertilizer application

In the case of bio-fertilizers, no one had correct knowledge on the recommended dose of bio-fertilizer for seed treatment and recommended quantity of bio-fertilizer for soil application. A very meager percentage of respondents (12.50 per cent) only had correct knowledge on the name of a bio-fertilizer. Even though the bio-fertilizer had several benefits on crop production and the environment, farmers were not interested in bio-fertilizers. This is because the farmers were not aware of the benefits of bio-fertilizers such as yield increase and other growth benefits which cannot be seen directly. At the same time, inorganic fertilizer application will show the result immediately.

Micronutrient application

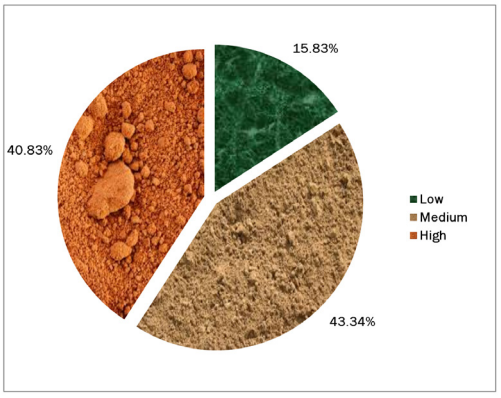
Less than ten per cent (7.50 per cent) of the respondents only had correct knowledge on the name of a micronutrient fertilizer. None of the respondents had knowledge on the recommended quantity of micronutrient mixture for finger millet cultivation. The farmers preferred to apply fertilizers in bulk quantity to attain higher yield. But the micronutrients were less in quantity and there are no visible effects on crop production, which might lead to poor knowledge of micronutrients.

In the case of soil problems, no respondents had knowledge on the reclamation for acidic / alkaline soils. It was because, the study area did not contain soil problems and also the majority of the farmers did not follow soil testing.

Overall knowledge level of finger millet growers on recommended nutrient management practices

The overall knowledge level of the respondents on recommended nutrient management practices was assessed and they were categorized into three groups *viz*., low, medium and high using the Cumulative Square Root of Frequency method, and the results are presented in Figure 1.

Figure 1. Distribution of respondents based on their overall knowledge level on recommended nutrient management practices in finger millet



From Figure 1 it is clear that just over two-fifths of the respondents (43.34 per cent) possessed the medium level of knowledge, followed by an almost equal percentage (40.83 per cent) of respondents with the high level of knowledge on recommended nutrient management practices. The remaining 15.83 per cent of the respondents had low level of knowledge. From this, it is clear that the majority of

the respondents (About 85.00 per cent) possessed medium to high level of knowledge on nutrient management practices.

The major reason for this finding could be that most of the respondents were literate, had medium to high farming experience, attended several training programs, had medium level of information source utilization, highly favourable attitude towards nutrient management practices, and highly progressive farmers. This is in line with the findings of Suryawanshi(2009).

Factors influencing the Knowledge level of respondents

Association between the profile characteristics with knowledge level of the respondents

To study the association between the profile characteristics and the knowledge level of the respondents, simple correlation co-efficient was carried out. The findings of the correlation analysis is presented in Table 2.

Table 2. Association of profile characteristics of respondents with their Knowledge level

Variable number	Variables	'r' value	P value
X1	Age	0.069	0.457
X_2	Educational status	0.298**	0.001
X_3	Occupational status	-0.025	0.787
X_4	Farm size	0.167	0.069
X_5	Farming experience	0.038	0.684
X_6	Training undergone	0.469**	0.000
X_7	Information Source Utilization	0.417**	0.000
X_8	Perception about soil fertility	0.401**	0.000
X_9	Perception about use of organic manure	0.395**	0.000
X_{10}	Attitude towards soil testing	0.181*	0.048
X_{11}	Attitude towards nutrient management practices	0.389**	0.000
X_{12}	Progressiveness	0.053	0.565

** Significant at one per cent level

* Significant at five per cent level

From Table 2, it is observed that out of twelve variables taken for the study, six factors, namely educational status (X_2), training undergone (X_6), information source utilization (X_7), perception about soil fertility (X_8), perception about use of organic manure (X_9), and attitude towards nutrient management practices (X_{11}) exhibited positive and significant association with the knowledge level of the respondents at one per cent level of probability.

Attitude towards soil testing practices (X_{10}) also showed positive and significant association with knowledge level at five per cent level of probability. The other variables namely age (X_1), occupational status (X_3), farm size (X_4), farming experience (X_5) and progressiveness (X_{12}) were found to be in-significant with the knowledge level of the respondent.

Educational status had a positive and highly significant relationship with the knowledge level. This might be because higher the education, the greater would be the knowledge level. The association of training undergone and information source utilization with knowledge level was found to be positive and highly significant. This revealed that the greater the degree of training attended, greater would be the knowledge level. And also, information source utilization would lead to high knowledge level of latest farm practices. Moreover, they might have received adequate technical knowledge and guidance from the training programmes and through various information sources like progressive farmers, extension officials, input dealers and other media sources.

Perception about soil fertility, perception about use of organic manure and attitude towards nutrient management practices were also found to have positive and highly significant relationship with knowledge level on nutrient management practices. Attitude towards soil testing was also found to be positive and had a significant relationship with the knowledge level of the respondents. The farmers with favourable opinion about soil fertility, nutrient management practices and soil testing were interested to learn technical aspects of nutrient management. Hence they had higher knowledge on nutrient management practices.

Contribution of profile characteristics towards knowledge level of the respondents

Correlation analysis will only explain the nature of the association between the profile characteristics of the respondents with their knowledge level. In order to find out the extentof contribution of each variable towards knowledge level of the respondents, multiple linear regression analysis was carried out and the findings are presented in Table 3.

From Table 3, it is clear that factors, namely training undergone (X_6), perception about soil fertility (X_8) and attitude towards nutrient management practices (X_{11}), were positive and significantly influenced the knowledge level of the respondents at one per cent level of probability.

The factors such as educational status (X_2) and perception about the use of organic manure (X_9) contributed positively and significantly towards the knowledge level of the respondents at five per cent level of probability. All other factors showed a non-significant contribution towards the knowledge level.

Table 3. Contribution of profile characteristics of respondents towards their Knowledge level

Variable number	Variables	Un standardized coefficient (B)	Standard Error	Standardized coefficient (Beta)	t value	P value
X_1	Age	-0.004	0.024	-0.022	-0.153	0.879
X_2	Educational status	0.097	0.037	0.231	2.598*	0.011
X_3	Occupational status	0.328	0.227	0.113	1.443	0.152
X_4	Farm size	0.013	0.093	0.010	0.143	0.886
X_5	Farming experience	0.025	0.021	0.184	1.213	0.228
X_6	Training undergone	0.281	0.092	0.248	3.037**	0.003
X_7	Information Source Utilization	0.097	0.055	0.157	1.774	0.079
X_8	Perception about soil fertility	0.153	0.057	0.206	2.695**	0.008
X_9	Perception about use of organic manure	0.132	0.051	0.203	2.570*	0.012
X_{10}	Attitude towards soil testing	-0.042	0.057	-0.054	-0.725	0.470
X_{11}	Attitude towards nutrient management practices	0.155	0.058	0.205	2.699**	0.008
X_{12}	Progressiveness	0.098	0.069	0.102	1.417	0.159

R2 = 0.493 ** - Significant at one per cent level

F = 8.677** * - Significant at five per cent level

Further, the Coefficient of Determination (R-square) was 0.493, which means that 49.30 per cent of variation in the knowledge level of the respondents was explained by all the twelve factors studied.

The 'F' value (8.677) was found to be significant at one per cent level of probability. Since the 'F' value was significant, the prediction equation for the cause and effect relationship was fitted for the knowledge level of the respondents as given below

$$Y_1 = 13.326 - 0.004\,(X_1) + 0.097^{*}\,(X_2) + 0.328\,(X_3) + 0.013\,(X_4) + 0.025\,(X_5) + 0.281^{**}\,(X_6) + 0.097\,(X_7) + 0.153^{**}\,(X_8) + 0.132^{*}\,(X_9) - 0.042\,(X_{10}) + 0.155^{**}\,(X_{11}) + 0.098\,(X_{12})$$

It could be stated from the equation that, the strength of the factors can be explained as *ceteris paribus, i.e.*, one unit increase in educational status (X_2), training undergone (X_6), perception about soil fertility (X_8), perception about use of organic manure (X_9) and attitude towards nutrient management practices (X_{11}) increase the knowledge level of the respondents by 0.097, 0.281, 0.153, 0.132 and 0.155 units respectively.

From the study, it could be concluded that educational status (X_2), training undergone (X_6), perception about soil fertility (X_8), perception about the use of organic manure (X_9) and attitude towards nutrient management practices (X_{11}) were the five factors significantly contributing to the knowledge level of the respondents.

Further, it has been found based on standardized coefficient that, training undergone (0.248) is the most important contributing factor for the knowledge level of respondents on nutrient management practices, followed by educational status (0.231), perception about soil fertility (0.206), attitude towards nutrient management practices (0.205) and perception about use of organic manure (0.203).

The training undergone is the most influencing factor for knowledge gain. The farmers attending trainings more frequently could gain more technical knowledge and hands-on experience on recommended nutrient management practices. So it is clear that the farmers who attended more training programmes had better knowledge on recommended nutrient management practices.

Education is an essential factor for mental maturity and it is required for knowledge gain of any new technology in the field of agriculture. Education might have provided the farmers greater scope to gain better knowledge on recommended nutrient management practices for finger millet cultivation. It was clear that the farmers who perceived soil fertility and organic manure as a favorable factor seeked in-depth knowledge on the nutrient management practices. Especially the farmers with a highly favourable attitude towards nutrient management practices should possess a higher level of knowledge.

CONCLUSION

The findings of the study clearly indicates that a vast majority of the finger millet growers were found to be have, medium to high level of overall knowledge on recommended nutrient management practices. Whereas in practice wise knowledge, majority of the respondents had correct knowledge on the basics of nutrient management practices such as the source of nutrients from which the plants receive nutrients, the best method of nutrient management, the best method of fertilizer-application, recommended

quantity of FYM for the main field, name of the green manure crops and its importance, the number of splits of nitrogenous fertilizers and the right time of top dressing of fertilizers in the main field. A very low level of knowledge was observed on the recommended dose of bio-fertilizers, micronutrients and recommended dose of NPK fertilizers. It was found that the training undergone, educational status, perception of soil fertility and attitude towards nutrient management were the most influencing factors for knowledge gain.

To improve the knowledge of famers on nutrient management, the extension personnel has to use suitable extension strategies such as result demonstrations, field tours to successful farmer's fields, training programmes and providing appropriate study material in local language. These strategies can help in improve the knowledge of farmers on nutrient management practices, so that the farmers can be influenced to adopt recommended nutrient management practices..

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