

Original Research Article

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## Effect of Different Establishment Methods and Varieties on Yield, Quality and Nutrient Uptake of *Kharif* Finger Millet (*Eleusine coracana* (L.) Gaertn.)

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### ABSTRACT

#### Keywords

Yield. Nutrient uptake, Establishment methods and varieties.

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A field experiment was conducted on coastal lateritic soil of *Konkan* region to study the effect of different establishment methods and varieties on yield, quality and nutrient uptake of *Kharif* finger millet [*Eleusine coracana* (L.) Gaertn.] during *kharif* 2014 at Agronomy Farm, College of Agriculture, Dapoli. The experiment was laid out in strip plot design with three replications. Result revealed that transplanting method recorded significantly higher grain ( $23.58 \text{ q ha}^{-1}$ ) and straw ( $33.25 \text{ q ha}^{-1}$ ) yield and higher protein and nutrient uptake followed by treatments in which *awatni*, line sowing and broadcasting. Dapoli safed variety recorded significantly higher grain ( $23.28 \text{ q ha}^{-1}$ ) and straw ( $32.13 \text{ q ha}^{-1}$ ) yield and also protein and nutrient uptake followed by treatments in which Phulenachani, Dapoli 1 and PR-202. Thus, the study revealed that during *kharif* weather season variety Dapoli safed is sown under transplanting method under *Konkan* conditions for obtaining higher yield, protein and nutrient uptake from finger millet.

### Introduction

Finger millet (*Eleusine coracana* (L.) Gaertn.) is an important food grain crop of semi-arid tropics particularly of India and East Africa. This crop is generally grown on the moderate hill slope where rice cultivation is not possible. It requires minimum rainfall of around 350-400 mm for successful cultivation but can be grown successfully in the areas receiving rainfall up to 1000 mm. It can be grown on a wide range of soils from very poor to very fertile. However, well drained loam or clay loam soils are best for finger millet cultivation. The grain contain 9.2% proteins, 1.29% fats, 76.32% carbohydrates, 2.2% mineral, 3.90% ash, 0.33% calcium. Vitamin A, B and phosphorous are also present in

smaller quantity, iodine content in finger millet is reported to be the highest among food grain. Finger millet taste better than most other cereals. It has no major pest problem and so can be stored cheaply for a long time. The straw has an immense utility as fodder for both draught and milch animal.

It makes good fodder and contain up to 61% of total digestible nutrients (Upadhyaya, 2006). Another cause for low yield of finger millet is lack of suitable sowing methods and varieties in *konkan* condition. Therefore, to exploit high yielding potential of finger millet the field experiment was conducted.

## Materials and Methods

A field experiment was conducted at department of Agronomy, Dr. B.S.K.K.V., Dapoli during *Kharif* season of 2014 to study the response of finger millet (*Eleusine coracana* (L.) Gaertn.) varieties to different establishment methods under *Konkan* condition. The experiment was laid out in a strip plot design with three replications. The main plot treatments were four different varieties, viz., Dapoli safed ( $V_1$ ), Dapoli 1 ( $V_2$ ), Phulenachani ( $V_3$ ) and PR-202 ( $V_4$ ). The sub plot treatment comprised of four establishment methods, viz., transplanting ( $M_1$ ), line sowing ( $M_2$ ), *awatni* ( $M_3$ ) and broadcasting ( $M_4$ ). Thus, there were in all 16 treatment combinations. The plot of 4.2 m  $\times$  3.0 m size were prepared and marked manually. In transplanting and *awatni* methods used 30 days old healthy seedling for sowing and in line sowing and broadcasting methods used bold and healthy seeds for sowing. The calculated quantity of N and  $P_2O_5$  were applied through urea and Single Super Phosphate, respectively. Seeds were properly covered with soil in direct seeded methods to avoid damage from rainfall and birds. Weeding was done properly two times in direct seeded methods and one time in transplanting and *awatni* methods. In order to assess the effect of different treatments on the growth and yield of finger millet crop biometrical observations were recorded.

## Results and Discussion

### Effect of Finger millet varieties on yield and quality

The data in table 1 yield attributes revealed that the variety Dapoli safed recorded higher grain and straw yield of finger millet. The result revealed that significantly higher yield attributes were observed in Dapoli safed and their by grain yield (23.28 q ha<sup>-1</sup>) and straw yield (32.13 q ha<sup>-1</sup>) over Phulenachani ( $V_3$ ),

Dapoli 1 ( $V_2$ ) and PR-202 ( $V_4$ ).The present result consonance with those of Yadav *et al.*, (2014) in rice.

The data presented in table 1, variety Dapoli safed recorded higher protein content (9.09 %) in grain of finger millet followed by Phulenachani, Dapoli 1 and PR-202 which were at par with each other except PR-202. Thus, PR-202 recoded significantly lowest protein content (7.21 %) in grain of finger millet than all other varieties.

### Effect of Establishment methods on yield and quality

The data in table 1 revealed that transplanting method of establishment recorded significantly higher grain (23.58 q ha<sup>-1</sup>) and straw yield (33.25 q ha<sup>-1</sup>) over rest of the establishment methods followed by *awatni* (21.35 and 30.08 q ha<sup>-1</sup>). The increase in grain yield recorded under transplanting over *awatni*, line sowing and broadcasting of seeds were 10.44, 19.15 and 24.23 per cent, respectively. As a matter of fact the yield of unit area basis was higher with lower plant population. In other words lower yield plant<sup>-1</sup> was not nullified because of high number of plant in broadcasting, line sowing and *awatni*. The present results are in consonance with those of Ravi (1984) and Newase *et al.*, (1995) in finger millet and Tippangoudar (2009) in proso millet, respectively. Transplanting ( $M_1$ ) of finger millet recorded higher straw yield (33.25 q ha<sup>-1</sup>) over *awatni* ( $M_3$ ), line sowing ( $M_2$ ) and broadcasting ( $M_4$ ).

In the methods of establishment *awatni* recorded numerically higher value of protein content (8.35 %) in grain of finger millet followed by transplanting, line sowing and broadcasting which were at par with each other. Broadcasting method recorded lower protein content (7.47 %) in grain of finger millet than rest of the methods.

**Effect of finger millet varieties on nutrient uptake**

The data presented in table 2 showed that the Dapoli safed content higher N, P and K in grain and straw of finger millet followed by Phulenachani, Dapoli 1 and PR-202 which were at par within themselves except N content in grain which was significantly higher than other treatments. Varieties showed more growth and yield attributes is due to more nutrient uptake from soil which affect on yield. Since, uptake of nutrients in finger millet is a function of grain and straw yield and their nutrients content, the improvement in the content of these nutrients coupled with significantly increased grain and straw yield increased uptake of nutrients. The

result resembles the finding of Nain *et al.*, (2013) in rice.

**Effect of establishment methods on nutrient uptake**

The data presented in table 2 showed that Transplanting and *awatni* recorded almost identical and higher N, P and K content in grain and straw of finger millet over line sowing and broadcasting. This might be due to the fact that the crop absorbed proportionately higher amount of N, P and K due to their higher availability under comparatively lower plant population and less competition among the plants for growth resources.

**Table.1** Effect of different establishment methods and varieties on yield and quality (protein content) of *Kharif* finger millet

Treatments	Grain yield (q ha <sup>-1</sup> )	Straw yield (q ha <sup>-1</sup> )	Protein content in grain(%)
<b>Varieties</b>			
V <sub>1</sub> -Dapolisafed	23.28	32.13	9.09
V <sub>2</sub> -Dapoli 1	20.40	28.75	7.69
V <sub>3</sub> -Phule nachani	21.13	30.00	7.78
V <sub>4</sub> - PR-202	18.90	27.17	7.21
F. test	Sig.	Sig.	Sig.
S.Em. ±	0.19	0.34	0.51
C.D. at 5%	0.65	1.17	1.78
<b>Establishment methods</b>			
M <sub>1</sub> .Transplanting	23.58	33.25	8.33
M <sub>2</sub> . Line sowing	19.79	27.92	7.63
M <sub>3</sub> .Awatni	21.35	30.08	8.35
M <sub>4</sub> . Broadcasting	18.98	26.79	7.47
F. test	Sig.	Sig.	Sig.
S.Em. ±	0.69	0.66	0.50
C.D. at 5%	2.06	1.96	1.48
<b>Interaction effect</b>			
F. test	N.S.	N.S.	N.S.
S.Em. ±	2.31	2.72	0.90
C.D. at 5%	-	-	-
<b>General mean</b>	20.93	29.51	7.94

**Table.2** Effect of different establishment methods and varieties on nutrient uptake of *Kharif* finger millet

Treatments	N uptake (kg ha <sup>-1</sup> )		P uptake (kg ha <sup>-1</sup> )		K uptake (kg ha <sup>-1</sup> )	
	Grain	Straw	Grain	Straw	Grain	Straw
<b>Varieties</b>						
V <sub>1</sub> .Dapoli safed	30.45	20.14	4.92	4.30	19.82	49.53
V <sub>2</sub> .Dapoli 1	25.52	19.44	4.66	3.95	19.29	49.35
V <sub>3</sub> .Phule nachani	26.03	19.70	4.72	4.13	19.60	49.45
V <sub>4</sub> - PR-202	24.93	18.45	4.28	3.64	18.40	49.23
F. test	Sig.	Sig.	Sig.	Sig.	Sig.	Sig.
S.Em. ±	1.17	0.63	0.26	0.13	0.36	0.03
C.D. at 5%	4.06	2.20	0.91	0.45	1.24	0.10
<b>Establishment methods</b>						
M <sub>1</sub> .Transplanting	27.81	21.23	5.56	4.87	22.64	52.53
M <sub>2</sub> . Line sowing	26.56	19.65	4.46	3.90	18.29	53.70
M <sub>3</sub> .Awatni	27.55	20.85	5.11	4.23	20.00	55.60
M <sub>4</sub> . Broadcasting	25.02	16.01	3.45	3.01	16.18	35.73
F. test	Sig.	Sig.	Sig.	Sig.	Sig.	Sig.
S.Em. ±	1.69	0.61	0.25	0.10	0.59	0.04
C.D. at 5%	5.04	1.82	0.74	0.29	1.76	0.13
<b>Interaction effect</b>						
F. test	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.
S.Em. ±	4.92	1.72	0.94	0.33	2.09	0.09
C.D. at 5%	-	-	-	-	-	-
<b>General mean</b>	26.74	19.44	4.65	4.0	19.28	49.39

Transplanting increased uptake of N, P and K higher over *awatni*, line sowing and broadcasting of seeds. Since uptake is a function of grain and straw yield and their nutrient content, the improvement in content of these nutrients coupled with increased grain and straw yield increased the uptake of nutrients substantially. These results resemble the findings of Nanjappa *et al.*, (1987) in finger millet and Singh *et al.*, (2006) in rice.

In conclusion, from the results of the present investigation, it can be concluded that for obtaining higher yield, quality and nutrient uptake from finger millet variety Dapoli safed be sown under transplanting method during *kharif* season.

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