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INFLUENCE OF PLANT DENSITY ON FINGER MILLETS

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Proper agronomic practices are essential and also known for influencing the internal physicoorgans of the plant and also the population performance of the crop in an effort to enhance the yield. Several workers working on different crops indicated that higher plant density influence the grain yield of a crop. With this in view, two finger millets (HPB—7—6 and Shakti) having different duration were studied to as certain their performance in relation to number of seedlings/hill.

Materials and Methods

This study was initiated during *Kharif* 1976 on red sandy loam soils of Main Research Station, University of Agricultural Sciences, Bangalore, under irrigated cropping. The treatments included were viz; two finger millets (HPB—7—6 and Shakti) and four plant densities (1, 2, 3 and 4 seedlings/hill). There were eight treatment combinations and they were tried following a factorial laid out randomised block design with three replications. The well nourished 20 days old seedlings were planted as per the treatments following a spacing of 23cm x 10cm. The fertilizer dose of 100 N, 50 P_2O_5 and 50 K_2O kg/ha was applied in the form of ammonium sulphate, single superphosphate and muriate of potash, respectively. All the phosphorus and potash and 50 per cent of nitrogen was applied at the time of planting. The remaining nitrogen was split into two equal doses and applied at tiller initiation and heading stages. Irrigation was given as and when needed. The regular agronomic practices were followed. At harvest biometric observaticns were made on selected ten plants from all the plots and were subjected to statistical analysis.

Results and Discussion

The analysis of the performance of two finger millets through grain yield (Table 1) indicated that the finger millets could yield an average of 6625 kg/ha. There were significant differences between genotypes. Shakti out yielded (7175 kg/ha) significantly over the HPB—7—6 (6074 kg/ha). The main feature which seems important in a high yieldihg finger millet like shakti was that it had more number of productive shoots (4.0 per hill) at maturity. Such a higher productive shoots per unit area was possibly due to better utilization of available nutrients because of longer duration which might have helped in retaining relatively more ears. In addition it favoured the formation of bigger sized grains (3.0g/1000 grain) which ultimately led to heavier mean grain weight/hill.

Table 1 Number of seedlings hill on grain yield and its components of two finger millets

Treatment details	Grain yield kg/ha	Grain wt/hill g	Weight/ ear g	Grain wt.'ear g	No. of fingers/ ear	Ear length cm	1000 grain weight g	No. of productive shoots/ hill	No. of days to maturity	Grain production/ day kg/ha
1	2	3	4	5	6	7	8	9	10	11
Finger millets										
<a) HPB-7-6	6074	13.1	4.6	3.9	5.8	7.4	2.8	3.5	no	55.23
<b) Shakti	7175	17.5	5.2	4.5	6.4	7.6	3.0	4.0	130	55.19
C. D. at 5%	693	3.2	0.4	0.3	N.S.	N.S.	N.S.	0.3	!5	N.S.
No. of Seedlings/hill										
(a) 1	6506	14.8	5.0	4.5	6.2	7.4	2,9	3.5	120	54.22
<b) 2	6871	16.6	5.0	4:2	6.2	7.4	2.9	4.0	120	57.26
(c) 3	6696	15.4	4.8	4.1	6.0	7.5	2.9	4.0	120	55.80
(d) 4	6426	14.5	4.7	3.9	5.9	7·5	2.9	4.0	120	53.55
C. D. at 5%	275	1.1	0.2	0.1	N.S:	N.S.	N.S.	0.2	N.S.	2.17

The higher grain weight was possibly due to more ear weight (5.4g/ear), grain weight/ear (4.5g). This in turn was a consequence of more number of fingers/ear 6.5. In addition, it favoured the year length (7.6cm) though, there was no significant advantage. The grain yield was highly associated with the number of productive shoots (r = 0.889). The grain weight/hill showed stronger association (r=0.869) with grain yield as compared to weight'ear (r=0.789) and grain weight/ear (r=0.804). This study agrees with that of Krishnamurthy *et al*. (1974) and Thimmegowda *et al*. (1976) who found that the absolute productive shoots to be the determinent factor of yield difference in finger millet crop. The two finger millets studied also differed in their duration (HPB-7-6: 110 days and Shakti:140 days) and longer the duration higher was the grain yield (r = 0.883).

Optimum number of seedlings per hill is an important factor in an effort to enhance the grain yield. The yields obtained at two seedlings/hill was maximum (6871 kg/ha) as compared to three seedlings/hill (6696 kg/ha), one seedling/hill (6506 kg/ha) and four seedlings/hill (6426 kg/ha). This higher yield with two seedlings/hill was a consequence of higher grain weight/hill (16.6g).

Table 2 Interaction between finger millets and number of seedlings hill on yield and its components

Finger millets	Number of seedlings/hill 1	2	3	4	C. D. at 5%
			Grain yield, kg/ha		
HPB-7-6	5S26.0	5852.0	6296.0	6322.0	
Shakti	7185.0	7839.0	7096.0	6530.0	739,0
			Grain weight/hill, g		
HPB-7-6	11.9	12.5	13.9	13.9	
Shakti	17.6	20.6	16.8	15.0	3.2
			Weight/ear, g		
HPB-7-6	4.7	4.7	4.4	4.4	
Shakti	5.3	5.3	5.2	5.0	1.1
			Grain weight/ear, g		
HPB-7-6	4.0	4.0	4.0	3.6	
Shakti	5.0	4.4	4.2	4.2	1.3
			Number of fingers/ear		
HPB-7-6	5.9	5.9	5.8	5.6	
Shakti	6.5	6.5	6.2	6.2	N.S.
			Ear length, cm		
HPB-7-6	7.3	7.3	7.4	7.4	
Shakti	7.5	7.5	7.6	7.7	N.S.
			1000 grain weight, g		
HPB-7-6	2.8	2.8	2.8	2.7	
Shakti	3.0	3.0	3.0	3.0	N.S.
			Number of productive shoots/hill		
HPB-7-6	3.0	3.0	4.0	4.0	
Shakli	4.0	4.0	4.0	4.0	0.5
			Number of days to maturity		
HPB-7-6	110.0	110.0	110.0	110.0	
Shakti	130.0	130.0	130.0	130.0	11.0
			Grain production/day, kg/ha		
HPB-7-6	52.26	53.20	57.24	57.47	
Shakti	55.27	60.68	54.58	50.23	6.31

In addition it favours weight/ear (5.0g) and number of productive shoots/hill (4.0). The grain weight/hill has shown stronger association (r = 0 901) as compared to weight/ear (r=0.610) and number of productive shoots/hill (r = 0.579). However, number of fingers/ear, ear length, grain weight/ear, 1000 grain weight and days taken to maturity did not add much towards grain yield.

As the number of seedlings/hill increases, there was decrease in grain yield. This is because with more number of seedlings/hill, more plant population has been accomodated hence, more competition for moisture, mineral nutrients, light, space, heat etc; results in lower production/plant as compared to two seedlings/hill. Similar trend was also reported in corn by Haynes and Mayro (1956). Reducing seedlings/hill (one seedling/hill) registered a decline in yield. This may be due to reduction in the total plant stand itself. Thus two seedlings/hill appeared to be an optimum for higher yield. Regarding interaction the shakti with two seedlings/hill has recorded higher grain yield of 7889 kg/ha as compared to other combinations (Table 2). The grain weight/hill (20 6g), weight/ear (5.3g), grain weight/ear (4.4g) also followed the similar trend. While, the components like number of fingers/ear, ear length, 1000 grain weight number of productive shoots/hill and number of days to maturity did not add much.

However, in contrast to shakti, the HPB-7-6 has recorded the maximum grain yield of 6322 kg/ha at four seedlings/hill as compared to other treatments (5826 kg/ha to 6296 kg/ha) indicating the poor tillering ability (3.5/hill) as compared to shakti (4.0/hill). Thus the results indicated that the higher number of seedlings/hill helped in increasing grain yield especially in case of short duration and poor tillering HPB-7-6. On the other hand late maturing and good tillering shakti has produced higher grain yield with less number of seedlings/hill. Similar trend was also reported in paddy by Bains and Singh (1967). A different picture emerged when the grain production/day was considered. HPB-7-6 was able to register its superiority by producing 55.23 kg/ha day as compared to shakti (55.19 kg/ha/day). This is in contrast to the total grain yield/ha. However, there was no significant difference between HPB-7-6 and shakti in producing grains/day.

When number of seedlings/hill was considered, two seedlings/hill outyielded (57.26kg/ha/day) other treatments (53.55 kg/ha/day to 55.80 kg/ha/day). This is in line with total grain yield/ha in relation to number of seedlings/hill. When interactlon was considered, there was similar trend with grain yield.

Summary

Effect of plant density on two finger millets having different durations was investigated during *Kharif* 1976 at the Main Research Station, University of Agricultural Sciences, Bangalore. The absoulte productive shoots and the grain weight per unit area were found to be the determinent factors of yield

difference between the varieties. On an average two seedlings/hill appeared to be an optimum for higher yield. Higher plant density increased the grain yield in case of short duration and poor tillering HPB-7-6. On the other hand late maturing and good tillering shakti has produced higher grain yield with lower plant density.

സംഗ്രഹം

രണ്ടിനം 'ഫിംഗർ മില്ലെറ്റുകളെ' ഉപയോഗിച്ച് ബാംഗ്ലൂർ കാർഷിക സർവ്വകലാശാലയിൽ നടത്തിയ ഒരു പരീക്ഷണത്തിൽ രണ്ടു തൈകൾ വീതം നട്ടതു കൂടുതൽ വിളവു നൽകുന്നതായി കണ്ടു.

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