

Varietal Response to Spacing in the Italian Millet (*Setaria italica* Beauv.)*

by
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Synopsis: That varieties in the Italian millet differ in their response to variation in spacing has been made evident in the following experiment. Although spacing results in the increase of the number of tillers per plant, it is the closely spaced crop that gives more grain yield per acre.

In *Setaria italica* Beauv. both the tillering and the non-tillering varieties are cultivated. The tillering habit has been found to be a genetic character dominant to non-tillering habit (Charles Ratnaswamy *et al.* 1957). The Japanese workers have found that the tillering variety when grown with sufficient space produces more tillers and thereby gives more yield (Li *et al.* 1936). As such the optimum spacing of plants in the field under cultivation for an economic yield will vary according to the tillering habit of the variety. To get a fundamental knowledge in this direction, yield studies were conducted in the summer season, 1959 and the results obtained are reported in this paper.

Previous work: Li *et al.* (1936) found in a varietal trial of this millet that the closer the plants were set in the row the higher was the yield in that row no matter whether one is dealing with a free-tillering variety or non-tillering variety. Soil texture and fertility have been noted to influence tillering habit in an earlier study by the author (1956).

Materials and methods: Two strains and four economic cultures were chosen for the study and their important characters are presented below :

Strains	Tillering habit	Duration
Co. 2	... Non-tillering	Long duration
Co. 3	... Tillering	do.
S. I. 5112/4	... do.	do.
S. I. 5109/7	... do.	do.
S. I. 5031	... do.	do.
S. I. 4894	... do.	Short duration

The field with uniform fertility was chosen for the trial and it was manured with a basal dose of five tons of compost per acre. The trial was laid out in a replicated and randomised lay out with six varieties

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as the variants and five replications. The interspace between rows was kept constant to permit the normal intercultural operations. The spacings in the row were varied as 1", 2", 4" and 8". Data on the population of each variant, the number of tillers per plant, maximum height of the plants, length of the main panicle and the weight of the grain yield per plant were collected to study the effect of spacing in each variety on these characters.

Experimental data: The number of tillers per plant and the grain yield per plant and per acre under different spacings in both the tillering and the non-tillering varieties are presented in table I. The data on the quantitative characters studied for all the varieties are presented in table II. The grain yield of the varieties per acre in relation to population under each spacing are presented in table III.

TABLE I.

Performance of tillering & non-tillering varieties under different spacings.

Variety	Spacings	Tillers per plant	Grain Yield in ozs. per plant	Grain Yield in lbs. per acre
*Tillering variety (Co. 3, S. I. 5112/4, S. I. 5199/7, S. I. 5031, and S. I. 4894)	1"	1.87	0.057	1397
	2"	2.20	0.091	1126
	4"	2.81	0.180	1024
	8"	3.79	0.292	821
Non-tillering variety (Co. 2)	1"	1.18	0.055	1348
	2"	1.16	0.088	1089
	4"	1.27	0.171	973
	8"	1.40	0.287	807

* Mean for all the tillering varieties.

TABLE II.

Performance of the varieties in relation to spacing.

Spacings	Tillers per plant	Length of the main panicle in cms.	Height of the main tiller in cms.	Weight of grain yield in oz. per plant
1"	1.76	10.6	61.2	0.056
2"	2.03	11.9	64.6	0.089
4"	2.55	15.1	70.3	0.175
8"	3.43	18.3	80.5	0.289

TABLE III.

Grain Yield & Population in relation to spacing.

Spacings	Grain Yield per acre in lbs.	Percentage of increase	Population in lakhs
1"	1380.1	169.2	3.92
2"	1101.4	135.0	1.98
4"	995.3	122.0	0.91
8"	815.6	100.0	0.45

Discussion: From the data presented in table I on the tillering behaviour of both the tillering and the non-tillering varieties, it will be seen that in the case of the tillering variety spacing increases the number of tillers per plant while in the other it is not so. In respect of the grain yield, spacing increases the individual yield irrespective of the tillering nature of the crop. The increase in grain yield in the most spaced plants amounts to 69.2% over the least spaced plants. Although the grain yield per plant increases with the spacing, the yield per acre decreases as the spacing increases. Regarding the effect of spacing on the quantitative characters of the plants it may be noted from table II that 95%, 73% and 196% increases in the number of tillers per plant, length of the main panicle, and grain yield per plant respectively in the most spaced crop, have not been sufficient enough to pull up the acre yield to that of the least spaced crop. The feeding zone of the roots appears to have influenced the grain yield of the individual plant. The grain yield has gone up in the most spaced plants because of the increase in the feeding zone compared to the least spaced crop. The increase in grain yield per plant in the most spaced crop, as such, indicates the possibility of improving further the grain yield of the individual plants in the least spaced crop by increasing the application of concentrated manures. From the data presented in table III it will be seen that the grain yield per acre is actually more in the least spaced crop because of the increase in population in both the types of varieties. In the least spaced crop, the loss in grain yield per plant has been compensated by the increase in total population which has pulled up the grain yield per acre. The closer spacing of 1" between plants has recorded the maximum yield of 1380.1 lbs. per acre with an increase of 69.2% over the crop with a spacing of 8" between the plants.

Summary: In the Italian millet an experiment was conducted to study the effect of spacings of 1", 2", 4" and 8" between plants in the same row on the yield and other related characters. Spacing increases the

number of tillers per plant in the tillering variety. The closer the plants were set, the lower was the individual yield in that row but the higher was the grain yield per acre. The compensation offered by the increase in the number of panicles per plant in the most spaced crop is far from being sufficient to pull up the grain yield per acre to that of the least spaced crop. The least spaced crop has recorded the maximum grain yield of 1380.1 lbs. per acre with an increase of 69.2% over the most spaced crop. The increase in grain yield per plant in the most spaced crop indicates the possibility of improving in the least spaced crop the grain yield per plant further by applying more fertilizers.

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