https://doi.org/10.29321/MAJ.10.A03984

Studies on the Relationship between Grain Yield and Tiller Sequence in Ragi (*Eleusine coracana* Gaertn.)*

by

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Synopsis: As a result of study on the relationship between grain yield and tiller sequence in *ragi*, it has been concluded that closer planting gives higher yield in the case of varieties in which the main stem contributes a major share of the total produce per plant. In strain Co. 7, the yield contribution is evenly distributed between the main culm and the productive tillers, hence wider spacing is more economic for this strain.

Introduction: The primary object of the plant breeder is to improve the productive capacity of a particular crop and as such, a study on the fundamental aspect of tiller sequence and grain yield in *ragi* was taken up to find out the tiller contribution to the total grain yield. *Ragi* is one of the important food crops in the Madras State, cultivated over an area of 10 lakhs of acres with an average annual production of 5 lakhs tons of grain. In a preliminary studies conducted on the optimum spacing to be adopted for ralising the maximum yields, it was found that increased spacing (9″ x 9″) gave an increased number of productive tillers, indicating that the reduction in population is more than compensated for by the increase in the number of tillers, and a possible correlation between yield and tillering was indicated (Samathuvam, 1961). Since there is varietal difference in the capacity of the different strains to tiller, studies on the relative contribution of the different tillers to the yield were taken up on the short duration (85–100 days) strains and cultures.

Review of Literature: Dungan (1931) reported that in corn the removal of the tillers was accompanied by a reduction in grain yield. Smith (1933) studied the physiological relationship between the tillers and the main stem of wheat plant and came to the conclusion that tillers are not completely independent units and that it is necessary to deal with the whole plant when considering the yield of wheat. Rosenquit (1941) studied the effect of tillers in corn upon the development of the main stalk. He concluded that tillers and main stalk of grown corn plants interchange water and nutrients. The grading down in yield of tillers from the first to the last as recorded by Labanauskas (1956) in the case of oats was found to be true also with barley (Bonnet and Wood Worth 1931).

* Received for publication on 15—2—1962.

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Materials and Methods: During the summer and monsoon seasons of 1960, *ragi* strains AKP-1, AKP-2 and Co. 7 and the two early selections E. C. 4713 and E. C. 4728 were grown in observation plots for a detailed study of the relative contribution of the main panicle and successive tillers to the total yield of grain per plant. The seedlings were planted 6" x 6" apart and tiller counts were made at flowering time in a total number of fifty plants in each of the varieties grown in two seasons. The flowering dates of the main panicle and the sequence of the tillering were recorded. The panicles of the main stem and tillers were labelled, harvested and threshed and the weight of grains obtained for the main stem and the tillers were recorded separately for each of the varieties sown and studied. Varietal differences were observed in the extent of contribution of the main panicle and the successive tillers to the total yield per plant. Data on the relative yields of the main panicle and tillers for the five varieties of *ragi* for the two seasons are furnished in the table.

Grain weight in Grams.

Strain Number	Main panicle	Tiller Number 1	Tiller Number 2	Tiller Number 3
Summer Season 1960:				
AKP. 1	... 2.85 ± 0.66	2.64 ± 0.40	1.10 ± 0.37	0.96 ± 0.63
AKP. 2	... 3.23 ± 0.42	1.84 ± 0.52	1.70 ± 0.50	1.62 ± 0.84
E. C. 4713	... 2.99 ± 2.50	2.72 ± 0.73	1.51 ± 0.41	1.11 ± 0.45
E. C. 4728	... 4.38 ± 0.63	2.33 ± 0.40	1.45 ± 0.46	1.00 ± 0.40
Co. 7	... 3.72 ± 0.82	2.73 ± 0.75	3.11 ± 0.89	3.32 ± 0.42
Main Season 1960:				
AKP. 1	... 3.30 ± 0.73	2.62 ± 0.80	1.73 ± 1.00	1.32 ± 0.47
AKP. 2	... 3.21 ± 1.40	1.72 ± 0.65	1.76 ± 0.66	1.08 ± 0.45
E. C. 4713	... 6.04 ± 1.30	4.72 ± 1.30	2.96 ± 2.10	2.70 ± 1.10
E. C. 4728	... 4.74 ± 0.48	3.06 ± 1.20	2.11 ± 0.82	1.48 ± 0.45
Co. 7.	... 5.08 ± 1.90	4.26 ± 1.50	4.44 ± 1.50	4.43 ± 1.60

The percentage of the grain yield to the total yield per plant was worked out for the two seasons and the average is given below:

Yield contribution expressed as a percentage to the total yield per plant.

Selection Number	Main panicle	Tiller Number 1	Tiller Number 2	Tiller Number 3
AKP. 1 ...	40.67	27.17	18.02	14.14
AKP. 2 ...	39.45	21.77	21.27	17.51
E. C. 4713 ...	37.71	28.08	18.77	15.44
E. C. 4728 ...	44.88	26.25	17.22	11.65
Co. 7 ...	28.41	22.30	24.27	25.02

Discussion: The yield trends were similar for both the seasons. The data reveal that varietal differences exist in the relative yielding capacity of the main stem and successive tillers. It may be seen from the above that the maximum yield contribution is by the main stem although there is difference in the contribution. The yield of main panicle is 44.88% of the total yield of plant in the case of E. C. 4728, while it is only 28.41% in Co. 7. It is interesting to note the variations in the decline in yield contribution of the tillers in relation to the total yield. The lower percentage of contribution to yield by the tillers was observed in all the varieties except Co. 7 in which the variations in the yields of the main stem and the successive tillers are not as striking as they are for the other varieties. The major contribution in Co.7 is not from the main panicle but it is distributed almost equally between the main stem and the three tillers.

Summary: For varieties in which the main stem contributes a major share of the total yield it is suggested that closer planting may be more advantageous. In the case of a strain like Co. 7, however, in which the yield contribution is evenly distributed between the main culm and the productive tillers, wider spacing to encourage the formation of 2 to 3 tillers may prove to be more economic. The gradual drop in yield of the tillers in the varieties other than Co.7 and the variations observed in the contribution to yield in them point out the need for a detailed study of the correlation between flowering and tillering habits. Based on these findings it will be possible to fix the agronomic practices so as to encourage or discourage the tillering habit depending on the actual contribution of the tillers to the total yield of grain.

Acknowledgment: The help and guidance rendered by Sri V. Srinivasan, Millets and Pulses Specialist and Sri A. Subramaniam, Assistant Millets Specialist are gratefully acknowledged.

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