

109. Agro-physiological Studies on Low-tillering Rice : an Ideotype for Increasing Grain Yield Potential.

I. Varietal Differences in Tillering Ability.

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Objective :

To evaluate the tillering behavior of low and high tillering rice plants and determine the responses of plant spacing and nitrogen (N) level on the tillering and grain yield of rice varieties with different tillering abilities.

Materials and Methods :

Four rice entries having different tillering abilities and panicle types were used in a greenhouse and a field experiments at IRRI in 1987 and 1988 (Table 1). In the greenhouse, one 10-day-old seedling was transplanted per 1/5,000 a pot by completely randomized design with 22 replications. In the field, the experimental design was split-plot design combining 2 plant spacings (20x20cm and 50x50cm) and 2 nitrogen levels (0 and 100kg N/ha) as the mainplot and 4 rice entries as the subplot with 3 replications.

Results and Discussion :

1) High tillering rice IR58 had earlier, higher rate and longer period of tillering as compared with low tillering IR25588 (Fig. 1). The tillering periods of IR58 and IR25588 were 36 and 27 days, respectively. Different tiller orders had also different tillering periods. Tillering period of the primary, secondary and tertiary tillers in IR25588 were 26, 17 and 5 days, respectively, while those of IR58 were 30, 28 and 8 days, respectively.

2) The percent effective tiller in low tillering IR25588 (85.3%) was higher than that in IR58 (67.4%) (Table 2).

3) Tillering response to spacing in terms of tillering ability based on the maximum tiller number per hill was higher in the high tillering (IR58 and IR37025) than in the low tillering varieties (IR25588 and UPLR) in wet and dry seasons (Fig. 2)

4) Grain yield response to spacing was higher in low tillering (IR25588 and UPLR) than high tillering varieties (IR58 and IR27025) in both seasons (Fig. 3).

This result implies that a low tillering rice may have better grain yield performance than a high tillering variety at close planted spacing or/and direct seeded rice.

Table 1. General characteristics of rice entries used (averaged over 1987 WS and 1988 DS).

Entry	Tillering ^a ability (max. tiller no./hill)	Panicle ^b type (spikelet no./panicle)	Height ^b (cm)	Growth duration (days)
IR25588	Low (37)	Panicle wt. (91)	Short (88)	Short (104)
IR58	High (62)	Panicle no. (71)	Short (87)	Short (103)

Table 2. Percent effective tiller on different tiller orders in a plant. IRRI, 1987 DS.

Variety	Effective tiller (%)			
	Main culm	Primary	Secondary	Tertiary Total
IR25588	100.0	92.9	86.5	62.1 85.3
IR58	100.0	89.3	69.5	30.2 67.4

^aMaximum tiller number at 50x50 cm spacing with 100 kg N/ha.

^bData from 20x20 cm spacing with 100 kg N/ha/

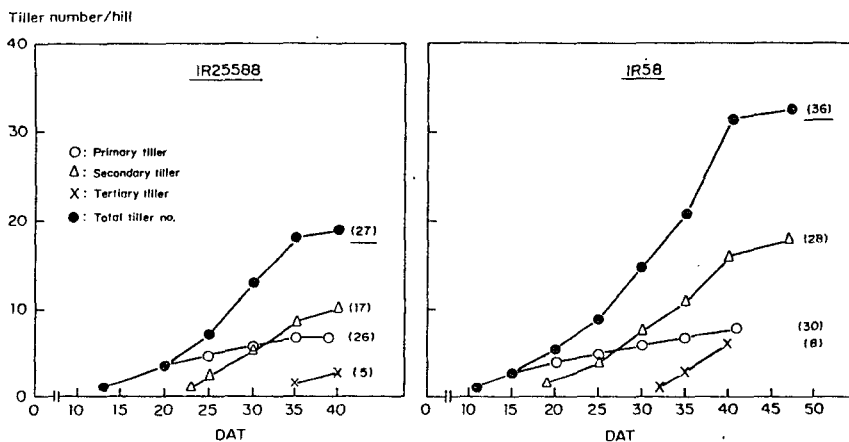


Fig. 1. Tillering behavior of different tiller orders in low tillering (IR25588) and high tillering (IR58) varieties. Figures in parenthesis indicate the length of tillering period in days, of each tiller order. IRRI, 1987 dry season.

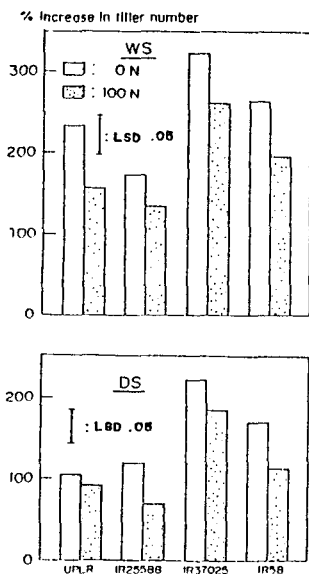


Fig. 2. Tillering response of low and high tillering varieties to different plant spacings (from 20x20 to 50x50 cm) based on the maximum tiller number per hill. IRRI, 1987 WS and 1988 DS.

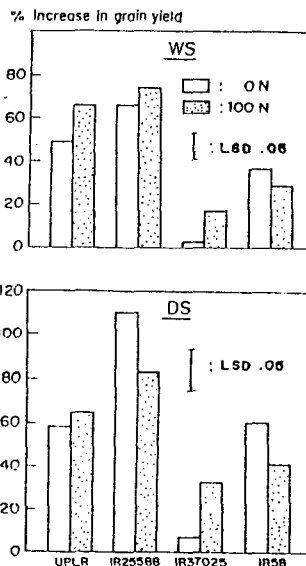


Fig. 3. Grain yield response of low and high tillering varieties to different plant spacings (from 50x50 to 20x20 cm) IRRI, 1987 WS and 1988 DS.