B-42: Changes in apical development and varietal reactions to transplanting shock in lowland rice

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Experiments were conducted to study the physiological and morphological changes in apical development of rice under broadcast sown and transplanted conditions. Results show that transplanting shock increases the differentiation of leaf primordia, but the physiological development stages remained unchanged over time. Thus increased rice yields under transplanted conditions could probably be attributed to the increased leaf area, which enhances higher assimilation and more favourable sink source relationship. However pre-and post-spikelet abortion was observed under both transplanted and broadcast sown conditions even though rate is higher in broadcast sowing.

Transplanting rice always results in increased yields, if managed properly. Thougy it increase tillering, the effect on individual rice stems (tillers) has not seen investigated. This study was thus aimed at investigating the phyliological and morphological changes that occur in apical development of rice stems under broadcast and transplanted conditions.

Greenhouse experiments were conducted at the Regional Agricultural Research Station, Angunukolapalessa, during Yala 1992 (experiment 1) and Maha 1992/93. (experiment 2). Rice Variety At 85-2 which has a growth duration of 105 days was used.

Uniform seedlings (18 days old) were selected and planted, in plastic pots (0.3 m^2), containing the moist equivalent of 10 kg oven dried lowland rice soil (Low humic gley soils). Eight plants per pot were transplanted to simulate field planting at 15 x 20 cm spacing (2-3 plants per hill). Twenty pots were transplanted per replicate and an equal number of pots were broadcast sown at the rate of 50 kg seeds/ha at the same time as the nursery sowing. Pots were irrigated to have 2.5 cm standing water always and fertilization was done according to Dept. of Agriculture recommendations.

Sampling was done once a week during the vegetative stage and at maturity, but 2-3 times a week during the reproductive stage. An initial sample of 10 plants was reduced to a model sample of 6 plants by discarding the 2 biggest and 2 smallest plants.

The apical development stage was identified using the technique of Kirby and Appleyard (1984) and by reference to rice development stages. The number of differentiated primordia were counted at each sampling under a dissecting microscope.

A similar experiment (experiment 3) was conducted using 6 rice varieties: Bg 350, At 353, At 354, Bg 380, Bg 400-1 and At 402 up to the age of panicle initiation.

Results of experiments 1 and 2 show that major physiological development stages of the plant did not change appreciably. Physiological panicle initiation was observed between 37 to 45 days and maximum spikelet number stage between 60 to 63 days after sowing under both treatments. The plant development under these 2 stand establishment methods followed the same trend. However transplanting shock increased the leaf primordia differentiation during both seasons and higher number of leaves were produced improving the sink source relationship.

The total number of leaves produced varied between seasons, which could be attributed to the micro-climatic differences during Maha 1992/93 and during Yala 1992.

Cumulative pre- and post-flowering spikelet abortion was also greater under broadcast sowing (69 - 79%) compared to transplanting (54 - 69%). This could be attributed to source limitation to sustain the differentiated spikelets under broadcast sowing. Under transplanting higher number of leaves increased the source availability to sustain differentiated spikelets.

Experiment 3 where 6 rice varieties: At 353, At 354, Bg 350, At 402, Bg 400-1 and Bg 380 were tested, transplanting shock increased the number of leaves from 9, 9, 9, 12, 12 and 10 to 13, 14, 14, 15, 15 and 16 respectively. This increased the photosynthetic assimilate production, an absolute advantage for a source limiting crop. Physiological panicle initiation was however delayed by about 5 days in all the varieties due to transplanting.

Results indicated that the transplanting shock of rice increase the differentiation of leaf primordia number irrespective of variety and could vary with the season of cultivation and the variety.