Entry No. IRRC-0049

Category	: International Rice Research Conference
Select Theme	: Systems physiology
Keyword 1	: Yield potential
Endorsement email	:
Keyword 2	:
Keyword 3	:
Title of Entry	: In search of the processes that drive to smaller rice plants in aerobic soil conditions
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Select only one type of presentation	: 15 minute oral presentation
Abstract	: Many studies report that rice crops grown in aerobic irrigated conditions were shorter, with smaller leaf size and smaller crop leaf area, than those grown in flooded conditions. In rice plants, there are two transitions between stable phases in the rate of leaf appearance. The first five leaves of the main stem appear quickly, then the following leaves until approximatively leaf 12 appear at an intermediate rate, and the last leaves appear even more slowly. Previous observations showed that in aerobic conditions, the rate of appearance is slower and the second transition in the leaf appearance kinetics occurs earlier than in flooded conditions. Experiments were carried out to better understand the mechanisms underlying the rate of leaf appearance and to search for possible relationships between this rate and the leaf size. Neither change in the maximum rate of leaf elongation nor change in the maximum length of the leaf meristematic division zone was synchronized with the second change of the rate of leaf appearance. A linear relationship between the final length and the maximum length of the division zone (reached after 3.5 phyllochrons) was confirmed until leaf 11. Thus, the number of divisions per cell line in the division zone increased with leaf rank during the fixed interval of 3.5 phyllochrons, from 2.5 to 3 division cycles per phyllochron, and induced through exponential amplification the ascending part of the well-known bell profile of the leaf length. Under less favorable conditions, the leaf length profile and the related division zone length profile stayed at lower values only due to a small reduction in the rate of cell division in the leaf meristem. No variation in the leaf developmental processes accompanied the change of the phyllochron whose origin must strictly come from a change in the apical meristem. Small changes in the rate of cell division could be responsible for the significant and sustained size reduction observed in plants in aerobic or

unfavorable conditions. This result opens an exciting field for future researches on the possibility of switching-off this detrimental reaction of plants.

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