

**VARIATION OF SELECTED SHOOT CHARACTERS OF SRI LANKAN RICE VARIETIES OF 2 ½ AND 3-MONTH AGE CLASSES DURING THE COURSE OF VARIETAL IMPROVEMENT FROM 1951 TO 2010**

**K.G.P.K. Vijebandara and W.A.J.M. De Costa\***

*Department of Crop Science, Faculty of Agriculture, University of Peradeniya, Sri Lanka*

*\*janendrad@gmail.com*

Rice varietal improvement in Sri Lanka started in 1950s with the development of H4, the first Old-Improved Variety (OIV). Development of New Improved Varieties (NIVs) started in 1960s with Bg11-11. This study's objective was to examine the variation of key shoot characters in the short-duration (2 ½ - 3-month) rice varieties during the course of rice varietal improvement from 1951 up to 2010.

Two traditional varieties (TVs, Suwandel and Kaluheenati) and eight improved varieties representing each successive decade of the varietal improvement programme were selected as H4 (representing 1950s), H7 (1960s), Bg94-1 and Bg34-6 (1970s), Bg300 and Bg750 (1980s), Bg304 (1990s) and Bg250 (2000s). Plants were grown in 15 L pots on Low Humic Gley soil at Peradeniya from September to December 2013. Lowland conditions were maintained with recommended fertilizer application and pest and disease control. Key shoot characters related to morphology, physiology and growth were measured at the late vegetative and booting stages.

Highly-significant ( $p < 0.0001$ ) inter-varietal variation was shown in light-saturated leaf net photosynthetic rate ( $P_{max}$ ), stomatal conductance ( $g_s$ ), transpiration rate ( $E_l$ ) and transpiration efficiency ( $T_E$ ). Interestingly, OIVs had significantly greater  $P_{max}$ ,  $g_s$  and  $E_l$  followed by TVs and NIVs. In contrast,  $T_E$  showed the opposite trend with the highest in NIVs and lowest in the OIVs. . Across the different varieties, there was a highly significant ( $p = 0.0006$ ) negative correlation ( $r = -0.888$ ) between  $g_s$  and  $T_E$ . Significant varietal variation was present in total leaf area per plant (LAP) ( $p = 0.0015$ ) and specific leaf weight (SLW) ( $p < 0.0001$ ). NIVs had significantly greater LAP, while OIVs had significantly greater SLW than the other varietal groups. At the varietal level, a significant ( $p = 0.0163$ ) positive correlation ( $r = 0.731$ ) was observed between  $P_{max}$  and SLW, indicating a positive relationship between leaf thickness and photosynthetic capacity per unit leaf area. Furthermore, there was a negative correlation ( $r = -0.255$ ) between LAP and SLW, indicating a negative relationship between total leaf area and leaf thickness. Average angle (i.e. relative to the vertical plane) of the top two leaves below the flag leaf at the late vegetative stage showed highly-significant ( $p < 0.0001$ ) variation among individual varieties and variety groups. NIVs showed the lowest average leaf angle followed by OIVs and TVs. Significant ( $p = 0.0319$ ) negative correlations was observed between leaf angle and total plant biomass at booting ( $r = -0.676$ ) and total leaf area per plant ( $r = -0.600$ ). Flag leaf N showed highly-significant ( $p < 0.0001$ ) varietal variation, which was not related to varietal groups. In summary, results of this study showed that improvement in canopy architecture and leaf area have played a greater role than photosynthetic capacity per unit leaf area (i.e.  $P_{max}$ ) during rice varietal and yield improvement from TVs through OIVs to NIVs.