Effect of High Temperature on Growth, Pollen Fertility and Yield Parameters of Selected Rice Varieties in Sri Lanka

R.M.C.Y. Rajapaksha[1], T.K. Illangakoon[2], S.R.W.M.C.J.K. Ranawana[1] and P.W. Jeewanthi[1]

[1]*Department of Export Agriculture, Uva Wellassa University, Badulla, Sri Lanka*
[2]*Rice Research and Development Institute, Bathalagoda, Sri Lanka*

Temperature is one of the main environmental parameters affecting growth and development of rice. The mean surface air temperature has increased globally by ~0.74 °C in the last century and will further be increased by ~1.1- 6.4 °C by the end of this century. Therefore, identification and development of heat tolerant rice varieties is an urgent need. This study was conducted to screen twenty rice varieties including newly improved and traditional cultivars for high temperature tolerance based on their growth and yield parameters. Heat tolerant rice variety, N22 was used as the control. The experiment was conducted inside a temperature chamber (35-42 °C) using Randomized Complete Block Design with three replicates for each variety. Eighteen days old seedlings were established with the spacing of 15 x 20 cm as one plant per hill and 40 seedlings per replicate. Growth parameters, pollen fertility, days to 50% heading and 85% maturity, and yield were recorded. Cluster analysis was performed to group the varieties. Accordingly, Kalu heenati was grouped with N22 and was categorized as heat tolerant cultivar. The filled grain percentage and yield per plant of them were 53.5% and 2.19, respectively. Bg 300, Bg 304, Bg 305, Bg 310, Bg 94-1, Bg 352, Bg 357, Bg 358, Bg 359, Bg 360, Bg 366, Bg 369, Suwandal, Pachchaperumal and Pokkali were grouped together and categorized as moderately heat tolerant compared to N22. Sulai, Bg 370 and Madathawalu were grouped together and had the lowest pollen fertility, filled grain percentage and the yield per plant revealing its high susceptibility to elevated temperature. Since none of the tested improved rice varieties were tolerant to high temperature, further research is needed to develop heat tolerant rice varieties for changing future climate.

Keywords: Filled grain percentage, Heat tolerance, Pollen fertility, Rice, Yield per plant