CE.AGR.6

RESPONSE OF GROWTH, BIOMASS PARTITIONING AND NUTRIENT UPTAKE OF LOWLAND RICE TO ELEVATED TEMPERATURE AT THE VEGETATIVE STAGE

L. M. Rankoth, W. A. J. M. De Costa

Department of Crop Science, Faculty of Agriculture, University of Peradeniya

Global warming due to increased concentrations of greenhouse gases in the atmosphere has already shown many negative impacts on agricultural crop production. Therefore, the present study was conducted with the objective of determining the influence of elevated growing temperature on vegetative growth of three representative rice varieties (Bg250, Bg300 and Bg352) commonly grown in Sri Lanka.

The study was conducted in growth chambers under controlled environmental conditions in the Department of Crop Science of the Faculty of Agriculture, University of Peradeniya. Plants were grown in hydroponic culture under two temperature regimes, namely, daily mean temperatures of 28^{o}C (32/26^{o}C day/night) and 32^{o}C (36/28^{o}C) during the vegetative phase.

All varieties showed significant reductions in per plant total dry weight, root dry weight, total root length, leaf area and specific leaf area in response to increased daily mean temperature from 29^{o}C to 32^{o}C. Notably, root weight ratio also decreased significantly thus showing reduced biomass partitioning towards roots at elevated temperature. Despite the reduction in root dry weight and root length under elevated temperature, total P and K uptake per plant did not differ significantly between the two temperatures. This was because of the significantly higher P and K uptake per unit root dry weight and per unit root length under elevated temperature. However, total N uptake per plant decreased significantly in response to elevated temperature despite significantly greater N uptake per unit root dry weight and per unit root length at elevated temperature. There was a significant inter-varietal variation in growth and nutrient uptake parameters between the three tested varieties in response to elevated temperature. This indicates the presence of a genetic basis for those responses. The majority of negative effects of elevated temperature were lowest in Bg300 while being greatest in Bg250.

Based on the overall results of the study, it can be concluded that there will be significant negative impacts on vegetative growth of rice due to an increase in the daily mean temperature from 28^{o}C to 32^{o}C. The significant inter-varietal variation in response to elevated temperature in rice means that different varieties of rice will be affected by global warming in varying magnitudes. This varietal variation in response to elevated temperature can be employed in breeding new varieties which are better adapted to elevated temperatures that are expected in the future.