

## **IMPACT OF TEMPERATURE AND WATER STRESS ON GROWTH AND YIELD OF RICE (*Oryza sativa* variety ‘Suwandel’)**

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As the global climate changes rapidly due to many activities, the temperature on the earth is also on the increase. As a consequence the plants could be exposed to water and temperature stress caused by elevated evapotranspiration. When the external temperature is increased above an optimum temperature, plants respond negatively showing a sharp decline in growth and development. This would result in an adverse reduction in the yield of crop plants.

Rice is the staple food of 60% of the world population. It is cultivated in tropical regions of the world where climatic conditions today are optimally suitable for this plant. ‘Suwandel’ is a traditional variety of rice which is very popular among consumers as it has an exquisite aroma and a milky taste.

This study was carried out to investigate the impact of temperature stress and water stress on the growth and yield parameters of rice, taking the variety ‘Suwandel’ as the model plant.

The research was conducted in the Open University premises of Nawala in two locations: polytunnel in which the maximum temperature was maintained at 35 °C using a thermostat and two exhaust fans, and plant house at ambient temperature conditions. The plants maintained in the polytunnel were under temperature stress. Plants in both locations were maintained under two water regimes viz., 100% soil moisture content and 50% soil moisture content (under water stress).

The rice plants obtained through seeds were thinned to make four plants per pot. There were four sets of plants with three replicate pots. All the pots were maintained under completely randomized design, and vegetative parameters (plant height and chlorophyll content) and yield parameters (number of productive tillers/plant, length of the panicle, number of grains /plant, grain yield /plant in grams, number of unfilled grains and number of filled grains / plant and test weight ) were recorded.

ANOVA carried on the parameters of growth indicated that plant was affected only by temperature stress while both temperature stress and water stress have affected the chlorophyll content. Number of productive tillers/plant was affected by both temperature and water stresses. In addition, number of grains / plant and number of filled grains/ plant had a negative impact mainly from the water stress. This indicated that either temperature stress or water stress or interaction of both has adversely affected both the vegetative parameters and yield parameters of the rice variety selected. Rice being a water loving plant has been subjected to stress which caused a substantial reduction in the vegetative and yield parameters.

Therefore, it can be inferred that *Oryza sativa* variety ‘Suwandel’ would not be able to withstand the temperature stress and the water stress that would occur due to climate change.

Hence, it is recommended to breed more, high yielding rice varieties which are able to withstand stress, as the population of the world is increasing at a fast rate. In addition, it would be very beneficial to the consumers if the variety ‘Suwandel’ could be improved to tolerate stress while maintaining its desirable characteristics.

Keywords: Climate change, temperature stress, water stress, *Oryza sativa*, vegetative parameters, yield parameters

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