Response of rice (*Oryza sativa* L.) plant upon drought stress

Chandrasekhar Sahu[1*], Udit Nandan Mishra[1], Deepak Kandher[1]
[1]M S Swaminathan School of Agriculture, CUTM, Odisha, India
[*]Corresponding author: chandrasekhar.sahu@cutm.ac.in

Abstract

Growing population needs immediate attention in terms of quantum jump in the crop yield especially rice since it is consumed as a staple food worldwide. Variability in the field and environmental conditions has challenged the farmers and agricultural scientists to co-op up with full potential of rice production and its yield underlying the suboptimal conditions. Stress contributes majorly towards the yield penalty out of which stress due to abiotic factors (drought, submergence, salinity, temperature) imparts maximum percentage. Changing climate has resulted in erratic rainfall pattern causing water scarcity in the agricultural field and subsequently drought stress. Prolonged drought stress results in generation of internal reactive oxygen species (ROS), membrane damage, reduced height, imbalanced assimilate partitioning, impaired cell division, elongation and vegetative phase which ultimately lead to deterioration of rice grain quality and quantity irrespective of the genotypes. Further, this review has highlighted the impact of drought stress on rice plants' response in terms of their morphology, physiology and yield.

Key Words: Rice, Abiotic stress, Drought

INTRODUCTION

Cereal is one of the main foodstuffs for an increasing human population. The total human population depends on wheat, rice and maize approximately 50% of calories consumed (Zibaee, 2016). Although rice is second to the planted area, it is the main source of food in Asian countries, particularly in south-eastern parts, where it is economically cultivated by farmers and workers growing it on millions of hectares in the entire region (Gomez, 2001). In the past, rice has been grown in the South and Southeastern Asian and Chinese river valleys over 10000 years since rice served as the main food for humans. Although Asia is the principal rice crop, it was harvested on other continents, such as Latin America, Europe, certain parts of Africa and even the United States (Zibaee, 2013). Most crop plants grow in suboptimal environments, preventing plant growth and reproduction to their full genetic potential (Bray, 2000). The difference from the maximum cultivation yield and the mean yield for that crop is analysed. This is underlined. The effect on international agriculture is huge, and it has been suggested that abiotic stress factors like heat, cold, drought, salinity, and nutrient stress decrease their average output of over 50 percent on most major plants (Wang et al., 2003). Drought is one of the most significant abiotic stresses affecting and reducing worldwide production and productivity of food crops by up to 70% (Thakur et al., 2010; Akram et al., 2013). Plants' response to drought stress is complicated and changes in morphology, physiology, and

ISSN: 2395-6216