

Effect of Ortho-Silicic Acid Exogenous Application on Wheat (*Triticum aestivum* L.) under Drought

Ratnakumar P.^{1,*}, Deokate P.P.¹, Rane J.¹, Jain N.², Kumar V.², Berghe D.V.³, Minhas P.S.¹

¹ICAR-National Institute of Abiotic Stress Management (NIASM), Malegaon, Baramati-413115, Pune, Maharashtra, India

²Privi Life Sciences, Mumbai, India

³Faculty of Pharmaceutical Sciences, University Antwerp, 2610, Antwerp, Belgium

*Corresponding author email id: pratnakumar@gmail.com

Online published on 15 June, 2016.

Abstract

Drought is considered to be one of the most important constraints that limit wheat production especially under dryland conditions. Enhanced uptake of silica is known to alleviate drought effects but only a small fraction, in the form of ortho-silicic acid (OSA) $[\text{Si}(\text{OH})_4]$ is soluble and available in soils. Since, the mechanism in Si-alleviated damage caused by drought stress remains unclear; the present study was carried out to assess the efficacy of foliar sprays with OSA in alleviating drought in wheat. Foliar sprays with various concentrations OSA viz., 0, 8, 16, 32 ppm were used at different plant growth stages such as vegetative, booting and seed development stage. Drought was imposed by withhold normal irrigation from crop booting stage to physiological maturity. Foliar application of 32 ppm of Si showed an impact in terms of increase in relative water content, leaf chlorophyll content and lower canopy temperatures. Root growth and root length density were increased under with 32 ppm foliar application with Si. K and P content in straw and seed of wheat were increased with foliar application of Si and a strong ($r=0.93$) relationship in-between K content in straw and seed was observed under drought conditions. The yield in terms of seed weight got increased with OSA concentrations under drought conditions. The percent of increase was an average of 10% over control under stress condition. Therefore, OSA had strong impact on alleviating drought and minimized the yield losses in wheat under drought conditions.