

Effects of Soil Moisture Stress on the Catalase Enzyme Activity of Selected Chilli (*Capsicum annuum* L.) Cultivars during the Flowering Stage and the Impact on Yield

S. Mahendran

Department of Agricultural Biology, Eastern University, Sri Lanka
thevamahen@yahoo.com

Abstract: An experiment was conducted to determine the effects of soil moisture stress on the catalase enzyme activity of three chilli cultivars namely; MI2, KA2 and 'Arunalu'. Moisture stress was imposed for a period of 15 days during the flowering stage. Control plants were watered regularly to Field Capacity at 5 days interval. The treatments were arranged factorially following the Randomized Complete Block Design with six treatments and four replications. The probability level of significance was maintained at $p < 0.05$. A number of ten leaves representing ten plants were randomly collected from each replicate of the treatments on the 15th day from the commencement of the stress to determine the catalase activity. A similar procedure was followed for the control treatments as well after watering. The quantity of H_2O_2 produced was calculated using standard $KMnO_4$ and the activity of this enzyme was expressed as μg of H_2O_2 $g^{-1}m^{-1}$. Moisture stress significantly increased the catalase activity of all the chilli cultivars 'Arunalu' showed the lowest H_2O_2 content followed by KA2 and MI2. In other words, the catalase activity was significantly highest in the 'Arunalu' cultivar followed by KA2 and MI2. In addition, the catalase activity was significantly higher in KA2 than MI2 chilli cultivar. Catalase is an important enzyme which converts H_2O_2 into non toxic form. During photorespiration, the H_2O_2 is produced. H_2O_2 is highly toxic to plants and thus reduce the tolerance capacity of the plants to abiotic stress. Higher catalase activity resulting in lower hydrogen peroxide accumulation indicates higher drought tolerance. Based on the above observation, 'Arunalu' was able to develop better stress tolerance than the other two cultivars. It was also observed that moisture stress significantly reduced the yield of all the chilli cvs. The highest reduction was observed in the MI2 followed by KA2 and 'Arunalu'. There was no significant difference in the yield of KA2 and 'Arunalu'. These two cultivars were able to produce substantially high yield under water deficit situation. The stress tolerance feature of 'Arunalu' characterized by high catalase activity would have helped maintain the growth and development despite a severe drought condition. Thus 'Arunalu' was able to survive and produce well under this situation.

Keywords: Catalase, Soil moisture stress, Yield