



Effects of some PGRs on seedling emergence and CAT and POD activity of maize under low temperature stress

Hamid Reza Eisvand*, Nasim Fathi and Darioush Goudarzi

Faculty of Agriculture, Dep. of Agronomy and Plant Breeding, Lorestan University, Iran

Abstract

Low soil temperature is one of the reasons for poor germination and establishment of maize. The aim of this study was to evaluate the possibility of improving the seedling emergence and performance of maize under low temperature stress. A pot experiment was conducted on *Zea mays* (single cross 704) at 14 °C as cold stress and seed treatments were priming with 200, 300 and 400ppm of GA₃; 100, 200 and 300ppm of salicylic acid (SA) and ascorbic acid (AA) with a hydro priming treatment and non-primed seed. Results showed that priming with SA 100ppm and AA 100ppm could strongly improve the emergence percentage and rate. SA100ppm and AA 100ppm improved root dry weight better than other treatments. The CAT activity in root was not affected by priming treatments but POD activity increased only by GA₃ 300ppm. In leaf, CAT and POD activity increased by priming with GA₃, SA and AA. There was a negative correlation between CAT activity in root and seedling emergence percentage. There was no correlation between CAT activity in leaf and CAT in root. Meanwhile POD activity in leaf and root was positively correlated.

Keywords: chilling; emergence; maize; phytohormone; seedling.

Eisvand , H. R. , N. Fathi and D. .Goudarzi. 2015. ' Effects of some PGRs on seedling emergence and CAT and POD activity of maize under low temperature stress' .*Iranian Journal of Plant Physiology* 5 (3), 1393-1402.

Introduction

Wheat, rice and corn are the most important food suppliers in the world respectively (FAO, 2012). There is no doubt that climate affects crop production. Low temperature is one of the most important limiting factors in the productivity of plants. Maize (*Zea mays* L.) is a thermophile crop and low temperature frequently causes injuries to maize seed germination and seedling

growth, thus it is detrimental to early spring planting (Parera and Cantliffe, 1994). Optimum temperature for germination of corn is 25-28 °C (Farooq et al., 2008). Temperature from 12 to 15 °C could induce chilling stress in the maize (Hola et al., 2003).

Plants have developed an antioxidant defense system that is including key enzymes such as CAT, POD and SOD (Ashraf, 2009). Many studies have linked chilling tolerance to antioxidant capacity in maize. Exposure to low temperatures causes an increase in CAT, GR and guaiacol peroxidase activities (Prasad, 1996, 1997). Similarly, decreased CAT, APX and MDHAR activities were found to be associated with chilling sensitivity during the early stages of development

*Corresponding author

E-mail address: eisvand.hr@lu.ac.ir

Received: January , 2014

Accepted: May, 2015