Eisvand, H.R., Moori, S., Ismaili, A. and Sasani, S. (2016), *Seed Sci. & Technol.,* **44**, 2, 1-15.
http://doi.org/10.15258/sst.2016.44.2.05

Effects of late-season drought stress on physiology of wheat seed deterioration: changes in antioxidant enzymes and compounds

H.R. EISVAND[1], S. MOORI[1], A. ISMAILI[1] AND S. SASANI[2]

[1] Department of Agronomy and Plant Breeding, Lorestan University, Iran (E-mail: eisvand.hr@lu.ac.ir)
[2] Agricultural Research Institute, Kermanshah, Iran

(Accepted March 2016)

Abstract

The present work was carried out to reveal the effects of late-season drought stress on the seed antioxidant potential and deterioration. In the field, two irrigation regimes were applied (control and late-season drought). Produced seeds were subjected to accelerated ageing (40 ± 2°C, 100% RH for 0, 24, 48, 72 and 96 hours) and then a standard germination test. Seed germination was decreased by drought. Accelerated ageing decreased germination of seeds from both control and drought-stressed plants. Late-season drought, increased seed deterioration susceptibility according to malondialdehyde content and electrical conductivity tests. There was a negative correlation between germination and electrical conductivity as well as malondialdehyde content. Superoxide dismutase (SOD), catalase (CAT), ascorbate peroxidase (APX) and glutathione reductase (GR) activities decreased continuously with increasing ageing period. However, accelerated ageing increased the monodehydroascorbate reductase and dehydroascorbate reductase. Activities of peroxidase, dehydroascorbate reductase, monodehydroascorbate reductase and APX were higher in the seeds from drought-stressed plants than in the control ones. Ascorbate / dehydroascorbate and reduced glutathione / oxidised glutathione ratios was decreased by the late-season drought. Total ascorbate was lower in the seeds from control plants than stressed ones. All accelerated ageing levels except 24 hours, increased total ascorbate in the drought-stressed seeds. Total glutathione content had a negative trend with increase in the duration of accelerated ageing. The results suggest a relationship between seed deterioration in seeds from both control and drought-stressed plants with a decrease in important reactive oxygen species scavenging enzymes (except peroxidase) and an increase in lipid peroxidation.

Introduction

Drought is the most important abiotic stress, decreasing crop production in the arid and semiarid regions of the world. Wheat is one of the most important crops and is cultivated in diverse climates. In the Mediterranean, hot and dry conditions occur at the end of the growing season and decrease the grain-filling period, thereby reducing the quality of seeds (Guóth *et al.*, 2009). Even for irrigated wheat, late-season drought-stress significantly reduces the quality and quantity of grain yield in Iran (Najafian, 2009).

Seed dry weight depends on the duration of the seed-filling period. Providing photoassimilates for grain-filling is difficult due to reduced photosynthesis under drought-stress (Santiveri *et al.*, 2002). Phillips and Edwards (2006) explained that the decrease in