

Consequences of ultrasonic waves radiation and 24-epi-brassinolid foliar application for reduction of water deficit stress on qualitative properties of red beans (Akhtar)

Authors:

**Amir Younesian¹,
Hossein Ajam Norouzi¹,
Manouchehr Gholipoor²,
Afshin Soltani³**

Institution:

1. Department of Agriculture, Gorgan Branch, Islamic Azad University, Gorgan, Iran.
2. Faculty of Agriculture, Department of Agronomy, University of Shahrood, Iran.
3. Faculty of Agriculture, Department of Agronomy, Gorgan University of Agricultural Sciences and Natural Resources, Iran.

**Corresponding author:
Hossein Ajam Norouzi**

ABSTRACT:

This experiment was conducted to study the possible alleviation of drought stress effects on red bean (Akhtar) by ultrasonication and 24-epi-brassinolid foliar application simultaneously at two sites, one in the research field located in Agricultural Research Center in Shahrood and the other in bean farm, 40 km of Shahrood city in 2015 as split factorial in complete randomized block design with three replications. Experimental factors included irrigation of main terrace at three levels of normal irrigation, mild stress and severe stress respectively (60, 90 and 120 mm evaporation from evaporation pan). Stress levels were applied after 4-leaf stage and ultrasound waves treatments (in two levels of nonuse of seeds irradiation and use of irradiation for 3 minutes at 32°C) and 24-epi- brassinolid foliar application (in two levels of non-use of foliar application and foliar application at a rate of 0.1 mg/L at 50% flowering during two stages) which were located in sub-terraces. The evaluated properties included grain yield, qualitative traits of superoxide dismutase content, peroxidase, catalase, proline and ascorbate. The results showed that with severe water stress (comparison of severe stress and lack of stress), grain yield showed a significant decrease in both the experiment sites however 24-epi-brassinolid foliar application and use of ultrasonic waves at both normal and stress conditions increased the seed yield. The same condition was established for evaluated enzymes. Thus it could be stated that irradiation of ultrasonic waves and 24-epi-brassinolid foliar application for cultivating beans play an important role in the increment of competitive strength of plant at water deficit conditions.

Keywords:

Water deficit, irrigation, ultrasonic waves, brassinolide, grain yield