

## Effects of polyethylene glycol on proline levels in two sugar beet cultivars

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**ABSTRACT:** To evaluate the physiological traits, proline and two Jolge and Rasoul beet varieties under drought stress experiment in a randomized complete block Rasoul on hydroponic culture at 5 levels (0, -1.4, -2.9, -4.18 and -7.11 MPa), respectively, of the levels (0, 98, 148, 197 and 322 grams per liter) polyethylene glycol 6000 and 3 replications was conducted in 2012, in Ardebil. Proline in two periods of 10 days and 20 days after stress was measured and compared to that proline leaves in both cultivars and both figure to increase significantly and increases during stress, proline leaves the gain reaches a figure of Jolge Rasoul more than the increase in the maximum concentration of proline was 322. Increase of proline in osmotic potential to absorb and hold water for the plant, along with increasing protein to prevent protein decomposition of and power plant can be a good indicator for selecting cultivars are resistant to drought. Proline in Jolge variety with maximum tension adjustment is more than a Rasoul figure. Resulting in increased resistance to environmental stress and are suitable for growing in water scarce regions.

**Keywords:** Sugar beets, polyethylene glycol, proline

### INTRODUCTION

Multiple environmental stresses encountered by plants during their growth are each of these tensions can grow depending on sensitivity and phase species, have different effects on growth, metabolism and function they have (Heidari, 2006). Important stress factors and yield of crop growth, especially in arid and semiarid regions of the world is Reduction in photosynthesis due to stomatal closure (reduced growth) and the shortage of assimilates for grain filling reduced grain filling period is the most important effects of drought on plant (Reddy et al., 2004).

Stress causes the formation of superoxide radicals, hydrogen peroxide, O<sub>2</sub> and H<sub>2</sub>O<sub>2</sub>; hydroxyl radicals are (OH) (Sairam and Saxena, 2000 and Turkan et al. 2005). The activity of reactive oxygen species (ROS), causing damage such as, Fat oxidation, Changes in membrane structure, Disrupt the integrity of the, changes in protein structure, Inactivating Enzymes, Discolor or loss of pigments like chlorophyll, Attacking water molecules such as DNA and proteins is impaired in these disciplines (Mittler, 2002; Mohanty, 2003 and Habibi et al., 2004).

Plant accumulation of proline, polyamines, trehalose, increased activity of the enzyme nitrate reductase, increased storage of carbohydrates and protein can withstand the stresses created (Hong, 2000). Iran is located in arid and semi arid land and is one of the environmental stresses that cause temporary or permanent damage to a lot of the time. According to the country is facing a drought of 10 years, at least 2 times (Heidari Sharif Abad, 2004). Physiological responses of varieties of sugar beet drought stress can help identify effective mechanisms.

### MATERIALS AND METHODS

This research in 2012 was conducted in the laboratory of Islamic Azad University, Ardabil. Sugar beet crop factor of two varieties (Jolge and Rasoul) 5 levels (0, -1.4, -2.9, -4.18 and -7.11 MPa), the amount of the order (0, 98, 148, 197 and 322 grams per liter) polyethylene glycol 6000 medium hydroponic four replicates were grown and after 10 and 20 days samples randomly dish out claims proline leaf method (Bates et al, 1973) were measured.

The results of using SPSS software and Excel software charts were plotted and analyze.



### RESULTS AND DISCUSSION

Results relating to the effect of drought stress on proline leaves of two varieties of sugar beet Jolge and R. Figures 1 and 2 at the 10 and 20 days of drought stress are presented two varieties proline their leaves during drought stress significantly increased. But a much more Jolge varieties 197 g and 322 g of proline in concentrations levels of stress.

Proline concentration increased stress may indicate a possible role of these amino acids in osmoregulation

is (Martin et al., 1993). Kao, 1981, reported that in mature leaves decreased protein degradation and increased concentration of free amino acids such as proline. The sugar beet cultivars under drought stress on proline concentration decreases (Kulshreshtha et al., 1987). Proline concentration increased under drought stress in susceptible Rasoul can be attributed to the further decomposition of proteins. Increase in the number of proline in drought resistance is justified Jolges. The two varieties of the Jolge varieties for cultivation in areas with limited water resources is a better mix performance.

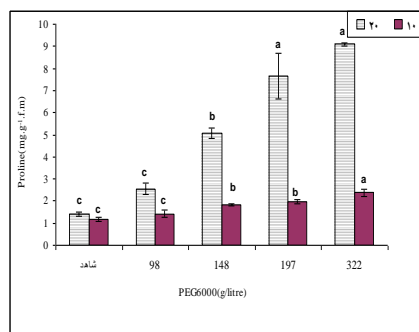


Figure 1. Changes in proline content in leaves of different concentrations of PEG Jolge cultivars 10 and 20 days after stress

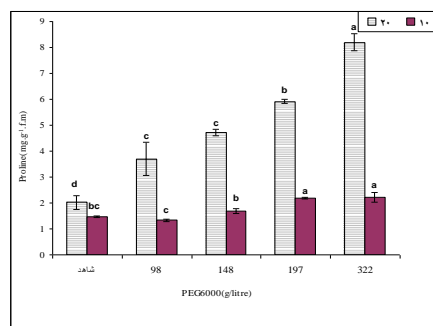


Figure 2. Changes in proline content in leaves of different concentrations of PEG Rasoul cultivars 10 and 20 days after stress

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