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Effect of Drought Stress Induced by Polyethylene Glycol on Seed Germination of Four Wild Almond Species

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Abstract: Effects of drought stress induced by polyethylene glycol (PEG) on germination of four wild almonds were evaluated. The seeds of *Prunus scoparia* Spach, *P. eleagnifolia* Spach, *P. lycioides* Spach and *P. dulcis* Mill (No. 24 Zarghan) were collected and stratified at 4±1 °C for 4 weeks. Stratified seeds were incubated in PEG solution with various osmotic potentials (0, -0.05, -0.1 and -0.5 MPa). The experiment was arranged in a completely randomized design with 4 replications, and germination capacity, mean and time of germination, germination rate, length of hypocotyls and radicles and also fresh and dry weight of seedlings were determined. Germination capacity, germination rate and growth parameters of all species were decreased by increase in PEG concentration and germination onset was also delayed. Furthermore the results indicated that osmotic stress depressed the hypocotyls growth more than radicle; and root systems were more drought tolerant. Although PEG adversely affected the germination of all 4 species, they responded differently to drought stress. *P. scoparia* showing higher germination capacity, germination rate and seedling length had the highest tolerance to drought stress and *P. eleagnifolia* in early phase of its seedling growth could not completely cope with drought stress. The germination results revealed the presence of drought resistant almonds with rich germplasm in Iran.

Key words: Almond, Drought Stress, Germination, PEG

INTRODUCTION

Iran is one the main origins of almond and also one of the major almond producers in the world (FAO, 2006; Rom, R.C. and R.F. Carlson, 1987). This country has one of the richest germplasm of almonds and after screening them for their effects on scion productivity, nut quality and tolerance to soil born diseases, these species can be used as rootstock for commercial almond growing (Baninasab, B. and M. Rahemi, 2007). These trees are currently grown in their native habitats and their products are used locally. For example, the kernel of *P. scoparia* is used after debittering and roasting or *P. eleagnifolia* is used as rootstock for plum. Furthermore in pastures and range lands, grafting various almond cultivars on these trees is a common practice.

However, the potentials of using these species as rootstock and their nuts for pharmaceutical and cosmetic purposes are high (Rouhi, V., R. Samson, 2007). It has been stated that it is possible to improve almond rootstocks by screening these species and make hybridization among them (Kester, D.E. and T.M. Gradiziel, 1996). Because of their high adaptation to unfavorable environmental conditions, they can be used in semi arid areas to control soil erosion (Baninasab, B. and M. Rahemi, 2007). They can also be used for afforestation and dedesertification only if they can survive under adverse conditions. To recommend these species for afforestation and dedesertification they should be able to reproduce in such environments. Their inability to regenerate under artificial conditions is the most important factor causing their loss after some years (Zhu, J., H. Kang, 2006). Vickers and Palmer (2000) reported that suitable conditions for seed germination and seedling growth are the most important factors that affect the natural regeneration of forests. Decrease in water potential in germination medium because of drought or salinity prevent water absorption needed for germination process to start (Almansouri, M., J.M. Kinet, 2001). According to Qkcu *et al*., (2005) seeds supplied with an insufficient moisture will show unsynchronized seedling emergence which is an important problem for nurserymen. Drought is one of the most important factors that limit trees growth in Iran. Therefore successful tree culture depends on the ability of seeds to germinate under low soil moisture conditions.

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