

Effect of salinity on germination and deployment of *Pistachio vera* var. *Badami*

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ABSTRACT

The pistachio a member of the Anacardiaceae produces seeds that are widely consumed as food. Pistachio is a desert plant, and is highly tolerant of saline soil. Excessive soluble salts and minerals in the water and soil solution which leads to the accumulation of salts in the root zone of the plant can not absorb enough water from the soil solution. This study was carried out to evacuate the effect of salinity on germination and deployment of Pistachio vera var. Badami which have large cultivation area in the Iran. Three months after planting, the nutrient solutions were salinized with NaCl to levels of 20, 40, 80, 120 and 160 mmol/L. By increasing the salinity from this level Badami cultivar showed the highest germination percentage.

Keywords: *Pistachio vera* var. *Badami*, salinity, germination

INTRODUCTION

The pistachio a member of the *Anacardiaceae* is a small tree originating from Central and the Middle East. Pistachio trees can be found in regions of Iran, Syria, Lebanon, Turkey, Greece, Xingjian (China), Tunisia, Kyrgyzstan, Tajikistan, Turkmenistan, India, Egypt, Italy (Sicily), Uzbekistan, Afghanistan (especially in the provinces of Samangan and Badghis), and the United States, specifically in California. It is indigenous to the eastern Mediterranean (Cyprus and Turkey to Israel and Syria), Central Asia (Turkmenistan, Uzbekistan, Afghanistan, Tajikistan, and Kyrgyzstan) and Xingjian [1]. The tree produces seeds that are widely consumed as food [2, 3]. *Pistacia vera* often is confused with other species in the genus *Pistacia* that are also known as pistachio. These species can be distinguished from *P. vera* by their geographic distributions (in the wild), and their seeds which are much smaller and have a shell that is soft.

Pistachio is a desert plant, and is highly tolerant of saline soil. It has been reported to grow well when irrigated with water having 3,000–4,000 ppm of soluble salts [4]. Pistachio trees are fairly hardy in the right conditions, and can survive temperatures ranging between –10 °C (14 °F) in winter and 48 °C (118 °F) in summer. They need a sunny position and well-drained soil. Pistachio trees do poorly in conditions of high humidity, and are susceptible to root rot in winter if they get too much water and the soil is not sufficiently free-draining. Long, hot summers are required for proper ripening of the fruit. They have been known to thrive in warm moist environments [5].

Salinity is the amount of soluble salts in the soil, the higher solubility of chalk. But if the salt concentration is not enough to significantly reduce water potential, ionic stress may be happen [6]. Excessive soluble salts and minerals in the water and soil solution lead to the accumulation of salts in the root zone of the plant which can not absorb enough water from the soil solution [7].

A wide range of salinity tolerance is in plants [8, 9]. Plants classified into sensitive, moderately susceptible, moderately tolerant and tolerant. The degree of salinity tolerance is different at germination stage

Salinity is one of the main problems of irrigated agriculture around the world. This problem is severe in many arid and semiarid regions. There are different ways for decreasing the effects of salinity in salt affected soils. These are: Reclamation of saline soils and waters and using of tolerant plants. Pistachio is one of the most popular crops of arid lands in Iran, which has been planted in these areas for thousands of years. At present over 50% of the world pistachio nut export belongs to Iran. Because of the moderate tolerance of this crop to salinity and extension of saline areas in Iran pistachio can be a suitable crop for many regions of this country.

This study was carried out to evaluate the effect of salinity on germination and deployment of *Pistachio vera var. Badami* which have large cultivation area in the Iran.

MATERIALS AND METHODS

Seed has been provided from gene bank Pistachio Research Institute in Rafsanjan. The experiments were performed using Complete Randomized Design (CRD) and results were analyzed using MSTAT software. It includes six levels of salinity, four-at three replicates (72 container) and the establishment stage five salinity levels, cultivars at three replicates (60 pots). Seeds were washed using liquid detergent for 5 minutes and then were sterilized at Tiran carboxy fungicide for 10 minutes. Culture dishes were fully covered with Whitman 42 filter paper and seeds put on. Seeds were planted in a container with distilled water and five other containers irrigated with solutions containing 20, 40, 80, 120 and 160 mM NaCl. Culture dishes were placed in the Germinator Persian Azma model 25 AG. Germination factor was assumed by 4.3 mm radicle [10]. The seeds were cultured in polyethylene dishes for establishment stage. Then seedling was transferred to plastic pots containing 4 kg perlite. Seedling growth period lasted three months (from mid-April to mid-June). After three months of planting, seedlings were grown length stem approximately 30 to 40 cm.

Germination percentage is calculated as follows. The cumulative number of germinated seeds on each count divided by the total number of seeds planted in the beginning of the experiment multiplied by one hundred.

RESULTS AND DISCUSSION

Highest germination percentage was observed at 2.7, 5.4 and 10.8 dS/ m. Rating of germination has been at 16.2 dS/ m and then distilled water. Lowest germination was obtained at 21.6 dS/ m with 4% which has been established 8 days after the onset of germination of seeds. In Badami cultivar germination didn't significantly reduce up to 10.8 dS/ m. These cultivars can be appropriate in saline soils.

As mentioned, salinity on plant increased osmotic pressure in the environment that prevents the absorption of water. This is also true of seed germination. Thus, with increasing salinity, seed germination and growth of the cells are not able to absorb water. And on the other hand, enzymes that are important in the activation and growth damaged or delayed. Therefore that It can be seen the germination rate does not change with increasing salinity.

Germination rate varies in different salinity. Highest germination rate was at 7.2 dS /m NaCl and then 5.4 dS/ m. 10.8, 16.2 and 21.6 dS /m were next. With increasing salinity up 7.2, germination rate decreased.

The germination rate of the seeds is reduced to the extent of salinity tolerance but slowly. It decreases with increasing salinity. This indicates that the extent of salinity tolerance in pistachio seeds and germination damage with increasing salinity threshold. However, this threshold varies for the different varieties. Samadi et al have been considered better germination at low salinity of the water as a sign of pistachio plant salt tolerance [10].

Parsa and Karimian indicated that the use of sodium chloride reduced the growth of Pistachios. Fandoghi cultivars demonstrated lower tolerance compared to Badami [11]. Mohammadabadi concluded that increasing salinity decreased dry weight, leaf area and evapotranspiration in three rootstocks [12].

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