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Investigate the effects of spermine on growth and answers orange seedlings under salt stress

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ABSTRACT: Polyamines (PAs) are low molecular weight ubiquitous nitrogenous compounds found in all living organisms. Because of the polycationic nature at physiological pH, PAs are present in the free form or as conjugates bound to phenolic acids and other low molecular weight compounds or to proteins and nucleic acids. The experiment was conducted in 2011at the greenhouse and laboratory was located in Shiraz (Iran). Orange seedlings were used in this study. To achieve this prestigious producer of greenhouse seedlings 6 months from Valencia varieties of citrus trees around the city of Shiraz was purchased and the plants were planted in the pots containing 8 kg of soil. Results showed that the overall weight of the dry weight of shoots was decreased with increasing salinity levels, but no significant difference between 0 and 800 mg per kg of soil salinity was observed. Shoots the lowest salinity level of 3200 mg per kg soil treatments sprayed with a solution of 0 and 0.1 mili molar polyamines was (no growth). Effects of polyamines showed that with increasing concentrations of polyamines foliar dry weight was increased.

Keywords: Length of Shoots, Weight of Shoots, Dry weight.

INTRODUCTION

Polyamines (PAs) are low molecular weight ubiquitous nitrogenous compounds found in all living organisms (Kaur-Sawhney, 2003). Because of the polycationic nature at physiological pH, PAs are present in the free form or as conjugates bound to phenolic acids and other low molecular weight compounds or to proteins and nucleic acids (Childs, 2003). Like hormones, Pas displaying high biological activity are involved in a wide array of fundamental processes in plants, such as replication and gene expression, growth and development, senescence, membrane stabilization, enzyme activity modulation and adaptation to abiotic and biotic stresses (Galston, 1997; Bais and Ravishankar, 2002; Zapata, 2008). The effects of irrigation and salinity on perennial tree crops are cumulative (Hoffman. 1989), particularly for citrus (Shalhevet and Levy 1990). Citrus trees have been classified as a salt-sensitive crop (Maas, 1993; Storey and Walker, 1999) as saline irrigation water reduces citrus tree growth and fruit yield (Garcia-Sanchez, 2006; Grieve, 2007; Prior, 2007). Negative effects of saline irrigation water on citrus growth and physiological process (Ca´mara, 2003; Camara-Zapata, 2004) are generally due to Cl^- rather than to Na+ toxicity (Romero-Aranda, 1998), osmotic or salt-induced oxidative stress (Arbona, 2003). Monitoring of soil solution is important where saline conditions may result from intentional deficit irrigation (Gonzalez-Altozano and Castel 1999) or from water-conserving irrigation scheduling based on soil moisture sensors (Boman. 2000). The osmotic adjustment in salinized citrus leaves is very effective because even when leaf water potential is reduced, the high leaf Cl^- and Na^+ concentration reduces the osmotic potential such that leaf turgor is maintained or even increased (Garcia-Sanchez and Syvertsen, 2006). It has been known for many years that citrus rootstocks differ in their ability to absorb the toxic ions, $Cl^–$, Na^+, and B, and to translocate ions to the canopy (Oppenheimer 1937; Cooper et al. 1951, 1952; Cooper and Gorton 1952; Cooper 1961; Embleton. 1973; Wutscher. 1973). Most of these studies were from short-term, comparatively high salinity trials, but results have been corroborated more recently for many rootstocks under field conditions (Levy and Shalhevet 1990, 1991; Garcia Lidon. 1998; Levy. 1999 a, b, c). Salt tolerance in citrus has been linked to the exclusion of toxicions from the shoot (Garcia-Sanchez, 2002). Thus, citrus rootstocks have a great influence on the amount of Cl^- and/or Na+ accumulated in the foliage of grafted trees (Storey and Walker, 1999).

MATERIALS AND METHODS

The experiment was conducted in 2011at the greenhouse and laboratory was located in Shiraz (Iran). Orange seedlings were used in this study. To achieve this prestigious producer of greenhouse seedlings 6 months from Valencia varieties of citrus trees around the city of Shiraz was purchased and the plants were planted in the pots containing 8 kg of soil. As substrate, a layer of soil surface horizons (30-0 cm) from ghalat district of Shiraz, procurement and testing of the soil, depending on the mix of soil, nutrients were added. To prepare the salt solutions of NaCl purity 99.5%, MERCK, Germany was used to build factories and solutions with concentrations of 800, 1600 and 3200 ppm was made. To prepare a solution containing spermine, spermine powder was manufactured by SIGMA American country represented using different concentrations (0.1 and 0.2 mili molar) were prepared from this material. The field experiment was laid out in randomized complete block design with factorial design with four replications.

RESULTS AND DISCUSSION

Length of Shoots

Interaction of different levels of salinity and dissolved sprayed with various concentrations of polyamines in shoots showed the greatest Length of treatment Shoots salinity level of 800 milligrams per kilogram of soil, sprayed with a solution of 0.2 mili molar polyamines was (61.75 cm) but no salinity treatments sprayed with 0.2 mili molar polyamines statistically significant differences were not significant. Shoots the lowest salinity level of 3200 mg per kg soil treatments sprayed with a solution of 0 and 0.1 mili molar polyamines was (no growth). Effect of different salinity levels alone showed that increasing salinity levels shoots was reduced so that most of the shoots shoot the lowest level without salinity and salinity levels of 3,200 milligrams per kilogram of soil. Effects of polyamines showed that with increasing concentrations of polyamines were sprayed shoots increased.

Table 1. Interaction of different levels of salinity and concentrations of polyamines on shoot Length (cm)

Polyamine	Salinity levels (mg/ kg)				mean
	0	800	1600	3200	
0	55.52b	51.94c	38.44e	0g	36.47b
0.1	54.39b	55.31b	41.41d	0g	37.77b
0.2	59.92a	61.75a	49.18c	35.27f	51.53a
mean	56.61a	56.33a	43.01b	11.75c	-

Any two means not sharing a common letter differ significantly from each other at 5% probability

Weight of Shoots

Results showed that the overall weight of the dry weight of shoots was decreased with increasing salinity levels, but no significant difference between 0 and 800 mg per kg of soil salinity was observed. The results showed that foliar polyamines on shoot fresh weight, shoot fresh weight were increased with increasing the concentration. Interaction of different levels of salinity and concentrations of polyamines on the weight of the shoots showed the greatest weight to the treatment salinity level of 800 mg per kg soil with a solution - sprayed with 0.2 mM polyamines, respectively (27.4 g), but salinity treatment without sprayed with 0.2 mM polyamines statistically significant differences were not significant. Shoots the lowest salinity level of 3200 mg per kg soil treatments sprayed with a solution of 0 and 0.1 mM polyamines, respectively.

Table 2. Interaction of different levels of salinity and concentrations of polyamines on shoot weight (cm)

Polyamine	Salinity levels (mg/ kg)				mean
	0	800	1600	3200	
0	19.94c	18.40d	10.43f	0h	12.19B
0.1	21.77b	19.53c	13.39e	0h	13.67B
0.2	25.46a	27.40a	18.50d	9.40g	20.19A
mean	22.39A	21.77A	14.10B	3.13C	-

Any two means not sharing a common letter differ significantly from each other at 5% probability

Dry weight of Shoots

Interaction of different levels of salinity and dissolved sprayed with various concentrations of polyamines on shoot dry weight showed the maximum dry weight of 800 mg per kg of soil salinity level treatments sprayed with a solution of 0.2 mM polyamines, respectively (12.37 mg).

Table 3. Interaction of different levels of salinity and concentrations of polyamines on shoot weight (cm)

Polyamine	Salinity levels (mg/ kg)				mean
	0	800	1600	3200	
0	9.20d	8.89d	5.11f	0h	5.8C
0.1	9.30d	9.20d	6.64e	0h	6.28B
0.2	11.45b	12.37a	10.53c	4.70g	9.76A
mean	9.98D	10.1A	7.42B	1.56C	-

Any two means not sharing a common letter differ significantly from each other at 5% probability

The lowest dry weight of 3,200 milligrams per kilogram of soil salinity level treatments sprayed with a solution of 0 and 0.1 mM polyamines was (no growth). Effect of different salinity levels alone showed that increasing salinity levels shoot dry weight, shoot dry weight was reduced so that the most relevant Salinity levels and the lowest salinity level of 3200 mg dry weight in kilograms the soil. Effects of polyamines showed that with increasing concentrations of polyamines foliar dry weight was increased.

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