

Determination of essential minerals in quinoa seeds cultivated under drought and salinity conditions

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Crop and food safety of many countries in arid and semi arid areas is threatened by climate change. A reduced productivity and decreasing crop quality are the most severe problems caused by increased drought and salinity. Therefore, it is important to find new crops which grow under severe climate conditions and which have a nutritional value equal or higher than cereals (Wheat, Barley, Corn, etc).

Chenopodium quinoa Willd, a pseudo-cereal and pseudo-grain originates from Andean region. It has intolerance to abiotic stresses and it can grow in saline soil as a halophyte plant and with limited water quantity and quality. Quinoa seeds also have excellent nutritive properties, are used to fight malnutrition and hunger and to maintain food security. All these positive properties make it a good candidate as an additional cash crop for Tunisian agriculture.

In this paper, we studied the effect of two different irrigation management strategies on the nutritional value of quinoa seeds. The first group grew under different deficit conditions with 100%, 70% and 50% irrigation. The irrigation water of the second group contained different amounts of salt (Fresh water: 0.9 g l⁻¹, 6 g l⁻¹ and 12 g l⁻¹). The variables analyzed were seed production and mineral content. We found out that a decrease of irrigation to 50% of the full amount induced an increase in seed yield from 10.94 g to 13.62 g per plant and from 2.25g to 2.51g 1000 seeds weight compared to the control (100% of full irrigation). The reduced irrigation did not negatively affect the accumulation of minerals; there was even an increase of some elements such as potassium and phosphorus. Furthermore, the irrigation with 6 g l⁻¹ of salt content increased seeds yield weight from

8.43 g per plant to 20.57 g per plant, the 1000 seeds weight from 1.85g to 2.34 g compared to the control without NaCl. The mineral composition of the plant irrigated with salty water showed an increase in sodium content in seeds but also an important variation of the majority of macroelements (P, K⁺, Ca²⁺, Mg²⁺).