

RESPONSE OF QUINOA TO NITROGEN FERTILIZER RATES UNDER SANDY SOIL CONDITIONS

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ABSTRACT

Quinoa (*Chenopodium quinoa* Willd.) is a very important cultivated food crop in the Peruvian and Bolivian Andes for more than 5000 years, recently attracting attention because of its high nutritional value and strong growth potential under the extreme harsh conditions of drought and soil salinity. Apart from the high protein content, the grains are also rich in amino acids, minerals and vitamins values, meet or exceed the requirements of human. The crop has been selected by the FAO as one of the main crops to play a major role in assuring food security in the 21st century because of this high nutritional value and its extreme resistance to adverse climatic conditions. Growing field crops under harsh conditions of arid environment in sandy soil and using irrigation water of high salinity is one of the biggest threats facing food security especially for small-scale farmers. Quinoa crop (*Chenopodium quinoa* Willd.), the newly introduced food crop can replenish part of food gap, since; the crop is drought, salinity tolerant and can grow in sandy soil of arid and semiarid regions and with other most harmful abiotic adverse factors that affect crop production. Field trial was carried out in Green Desert Egypt Association (GDEA) Farm in Wadi El-Natroon Region (Longitude 30.35°, latitude 30.4° and altitude 20m), located in Beheira Governorate, Egypt during 2008/2009 and 2009/2010 winter seasons to study the best nitrogen fertilizer rate of 0, 90, 180, 270 and 360 Kg N ha⁻¹ on growing quinoa (*Chenopodium quinoa* Willd.) under sandy soil and irrigated by 4400 m³ ha⁻¹ of underground water with salinity of EC = 3.6 dS m⁻¹ using mist irrigation system. Results revealed that fertilizing quinoa with 360 Kg N ha⁻¹ resulted in maximum plant height of 52.73 and 51.78 cm, grain yield plant⁻¹ of 10.070 and 8.177 g plant⁻¹, grain yield ha⁻¹ of 1203 and 1088 Kg ha⁻¹, biological yield ha⁻¹ of 2787 and 2322 Kg ha⁻¹ and field water use efficiency (FWUE) of 2.733 and 2.472 Kg mm⁻¹, while the maximum nitrogen use efficiency (NUE) values of 5.367 and 3.417 Kg Kg⁻¹ N were obtained when quinoa received only 90 N ha⁻¹ in first and second season, respectively.

Keywords: Quinoa, Nitrogen Fertilizer, Arid Environment, FWUE, NUE.