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Nutrient uptake and its distribution in faba beans grown in a hydroponic system influenced by nutrients and salinity treatment

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ABSTRACT

Several varieties of faba bean-(*Vicia faba* L.) including Artasi, Baladi, and Isbani are grown in Palestine in nearly every part of the country and are used as human food and animal feed. The objective of this study was to characterize the nutrient concentrations and their distribution in various parts of faba bean varieties grown in an nutrient film technique hydroponic growing system in response to nutrient and salinity addition in irrigation water. A field study was conducted in 6" polyvinyl chloride pipes in which three local faba bean varieties (Artasi, Baladi, and Isbani) were planted under hydroponic conditions. Six treatments were used including one control line, three nutrient additions lines (25%, 100%, and 300% Cooper), and two salinity additions (4.68 and 7.8 ds/m NaCl). It was found that variation in the elemental concentrations of nutrients occurred among the three varieties and different parts of the plants. The highest concentrations of macronutrients in response to the various treatments were found either in roots (mostly roots >> shoot > leaves > pods) or in leaves, however, this for micronutrients was found mostly in roots. The two highest concentrations of macronutrients in plants were calcium (203.0 mg/L) and potassium (69.02 mg/L). The two highest concentrations of micronutrients in plants were chloride (61.13 mg/L) and iron (4.75 mg/L). The highest concentration in roots was 130.29 mg/L (Ca), in shoots 132.20 mg/L (Ca), in leaves 203.00 mg/L (Ca), and in pods 63.93 mg/L (K). Five of the highest concentrations were found in the Artasi variety, followed by Baladi and Isbani (four times each). In response to salinity treatment, NO_3, SO_4, and PO_4 absorption were negatively affected among macronutrients. While Cu, Fe, Zn, and Mn among micronutrients were affected. In response to nutrient treatment, most macro and micronutrient elements improved contrary to salinity treatment.

Keywords: Faba bean (*Vicia faba*); Salinity; Nutrients; Pipe hydroponics; Nutrient uptake; Nutrient distribution

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