



**PHYSIOLOGICAL STUDIES ON CHILI
PEPPER(*CAPSICUM FRUTESCENS* L.)
PLANT**

By

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B.Sc. Agric. Sc. (Horticulture), Fac. Agric., Fayoum Univ., 2008
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ABSTRACT

The scope of the current study was to examine the main and interaction effects of NaCl as soil application, water regimes and salicylic acid as foliar spraying on growth and productivity of chili pepper (*Capsicum frutescens* L.) plants. Therefore, a pot experiment was conducted during the summer seasons of 2016 and 2017 in the Experimental Farm, Faculty of Agriculture, Fayoum University. The experimental layout was a split-split plot system in a Randomized Complete Blocks Design with three replications. Salinity levels (0.0, 3000, 6000 and 9000 ppm NaCl) were randomly distributed in the main plots and water stress treatments (100, 70 and 40 % based on field capacity) were assigned to sub plots whilst, salicylic acid concentrations (0, 100 and 200 ppm) were allocated in the sub-sub plots.

Gained results displayed that in both seasons of study the level of soil salinity at 9000 ppm NaCl or water stress of (40% F.C.) reflected the negatively significant influences on all growth attributes of chili pepper plants including plant height, stem diameter, No. of branches and leaves/plant, leaf area, fresh and dry weights of different plants parts, as well as fruits yield and its parameters including (No. of fruits/plant and fresh and dry weights of fruits). However, leaf thickness affected positively under the same levels of either salinity or drought stresses and resulted in the greatest values in this concern. Furthermore, irrigated chili pepper plants with (70% F.C.) improved fruit yield parameters and resulted in the highest fruits number/plants, fresh and dry weights of fruits/plant in both seasons of 2016 and 2017. Foliar application of salicylic acid at the concentration of 100 and/or 200 ppm was remarkable in the aforementioned traits in comparison with unsprayed plants.

Both soil salinity and water stress at any level of them significantly reduced the relative water content (RWC%), membrane stability index (MSI%) of leaves, contents of chlorophyll a, b and carotenoids. Whilst, increased total electrolyte leakage (EL%), in the two seasons of 2016 and 2017.

In this aspect, minimal values of relative water content (RWC%) & membrane stability index (MSI%), and maximal total electrolyte leakage (EL%) were recorded at soil salinity of 9000 ppm NaCl or drought stress at (40% F.C.) in both seasons of study. 200 ppm SA-application on the foliage of chili pepper plants led to an improvement of leaf physiological responses including relative water content (RWC%), total electrolyte leakage (EL%), membrane stability index (MSI%), chlorophyll a, b and carotenoids contents in comparison with the untreated plants, in both experimental seasons. The response of leaf N, P and K⁺ content was the lowest at soil salinity at (9000 ppm NaCl) or drought stress of (40% F.C.), however leaf total soluble sugar (T.S.S.), free proline and total phenolic contents were significantly increased at the same salinity or drought stress levels in compared to control. Leaf Cl⁻ and Na⁺ contents were significantly increased as a result of application of NaCl to soil particularly at (9000 ppm NaCl) and/or at water shortage of (40% F.C.), in 2016 and 2017. Foliar spraying of SA at 100 or 200 ppm truly increased leaf N, P and K⁺, leaf T.S.S., free proline and total phenolic contents over the unsprayed one and augmented leaf Cl⁻ and Na⁺ contents. The mean values of leaf Cl⁻ and Na⁺ contents were significantly the lowest when the plants sprayed with SA at (200 ppm), in the two experimental seasons, in this regard.

The accumulation of capsaicin content in fruits of summer chili pepper plants was significantly promoted under stress conditions (salinity or drought). In this concern, salinity level of 9000 ppm NaCl and drought stress at (40% F.C.) were significantly produced the maximum values of capsaicin content, in both seasons. As well as, foliar application of SA at the concentration of 100 ppm SA was responsible for statistically higher content of capsaicin in chili pepper fruits than the other concentrations, in both seasons.

