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INFLUENCE OF SALINITY ON TWO TOMATO CULTIVARS

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ABSTRACT

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INFLUENCE OF SALINITY ON TWO TOMATO CULTIVARS

Pot experiments, were conducted to investigate the effect of different levels of sodium chloride salinity on two cutivars of tomato (*Lycopersicom esculentum* Mill). The investigated cultivars were Castle rock and Edkawy.

The growth parameters (fresh and dry mass of different organs, number and area of leaves per plant and shoot/root ratios) were significantly reduced with increasing the salinity levels. The transpiration rates and the relative water contents (RWC) of both cultivars decreased significantly as salinity increased. In both tomato cultivars, the major effects of salinity were the increase in the contents of ash, sodium and chloride and a reduction of potassium, calcium and magnesium contents.

The accumulation of significantly higher content of proline in the leaves of Castle rock plants than in those of Edkawy was discussed in relation to their salt tolerance.

With increasing the salinity level, there were a reduction in the contents of chlorophylls a & b and an increase of carotenoids content. The percentage reduction of chlorophylls in Edkawy plants was lower than in Castle rock ones. The increase in the salinity induced gradual reduction of the total carbohydrate contents in the leaves and roots of Castle rock plants compared to those of Edkawy plants which showed the contrary.

Increasing salinity resulted in substantial reduction in the diameter of both stem and root of the two cultivars. However, in case of leaf, increasing salinity brought an increase in mesophyll thickness.

Key Words: Salinity - Tomato - Edkawy - Castle rock.

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INTRODUCTION

I. INTRODUCTION

Salinity has been recognized as a major factor limiting crop productivity in the arid and semi-arid regions of the world. Millions of hectares of lands throughout the world are too saline to produce economic crop yields and more land becomes non-productive each year because of salt accumulation.

Plants grown under high salinity levels appeared to be associated with certain metabolic state different from that of those grown under non-saline conditions. Although such stress may affect plant growth, many facts are still required with regard to the response and accumulation of some metabolic products and constituent ions by plants having different salt resistance mechanisms. It is possible that coastal areas to which abundant sea water is available could be meeting this need for extending in crop cultivation. If so, hundreds of millions of hectares of land in the world would be potential food producing areas (Mudie 1974, Flowers *et al.* 1977) and loss of irrigated land to farming as a result of salinizing could be reversed (Chapman 1975). But is there an unexploited potential in the use of new crops derived from plants native to saline habitats which could be grown in areas where saline water are available for irrigation and/or where the soils are saline? Much attention is being given to a search for new salt resistant plants. The U.S. salinity laboratory has classified a number of crops with regard to their salt tolerance (Richards 1954). Their criterion for high salt tolerance corresponding to a concentration of NaCl about one-third that of sea water. Obviously, the concern is world-wide and the crops getting most attention are those having salt resistance.

Generally, salinity resistance and/or tolerance is achieved by a complex of mechanisms and we have referred in our discussion to some facts and suggestions that may explain how these plants resist and endure high saline conditions. Several authors have drown attention to genotypic differences between salt-tolerant and salt-sensitive plants in respect to pertinent physiological and biochemical parameters.

Tomato (*Lycopersicon esculentum Mill.*) is one of the most important vegetable crops in Egypt with more than 300,000 feddan cultivated yearly (Saeid *et al.* 1988). According to major crop division, tomato is one of the vegetable crops which is classified as a medium salt tolerant one (Richards 1954, Larcher 1983). Detailed studies indicate that the genus *Lycopersicon* contains species and ecotypes with various degrees of salt tolerance (Rush and Epstein 1976).

A. Effect of Salinity on Growth Criteria:

Effect of salinity on growth of crops are well documented (Carter, 1975; Maas and Hoffman, 1977 and Epstein *et al.*, 1980).

For crop plants, differences in salt resistance exist not only among different genera and species, but even within species (Epstein, 1972, 1983; Epstein *et al.*, 1980 and Maas and Hoffman, 1977). These observations support the argument that crop plants can be adapted to saline environments, (Epstein *et al.*, 1980).

Shalhevet and Yaron (1973) estimated a yield reduction for *Lycoperscion esculentum* var. VF 145 of 10% for every 1.5 dS/m. They suggested that reduction in yield depend not only on the average salinity but also on the salt distribution in the plant root zone.

Dumbroff and Cooper (1974) stated that the most pronounced effect of salinity on growth of tomato was during the early seeding stage. They also found that buds and flowers formation were delayed