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Selection of Tolerant Crops to be used in Tropical Salt Affected Soils

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Abstract

Saline soils make up between 40 to 50 % of the soils worldwide expand near 3 ha min⁻¹. Cuba has around one million hectares affected by this problem. In Granma province, there are 228 thousand hectares, which represents 23 % of the whole area on the island. In these areas, the introduction of salt tolerant genotypes is an alternative to recover the salt affected soils. A series of experiments with the aim to evaluate and select salt-tolerant crops of cowpea (6 genotypes), tomato (8 genotypes) and bean (40 genotypes) were carried out under controlled, greenhouse and field conditions. The effect of 4 levels of salt stress (0.02, 3, 6 and 9 dS m⁻¹) was evaluated in controlled conditions using the germination percent, length of radicle, height of hypocotyl and dry matter of seedling parameters. The second experiment was established in a greenhouse to evaluate the effect of two salt levels (0.02 and 6 dS m⁻¹) on crops and measured physiological and biochemical parameters. The number of leaves, leaf width, tendril length, root and shoot dry matter, proline and glycine-betaine content and osmotic and water potential were also measured. Under field conditions the crops were cultivated to investigate the effect of salt stress on yield parameters. The results showed that all varieties evidenced decrease of parameters in presence of salt stress and the seedling damage was moderate in 3 dS m⁻¹ and severe in 9 dS m⁻¹. A linear, significant and negative dependence between salts levels and germination, physiological and biochemical parameters was found. Some affectations were found in the growth and biochemical variables due to the content of salts in all varieties. In relation to yield and its components, the results evidenced differences in tolerance levels to saline stress among varieties, being IT 86 D-715 (cowpea), Vita and Amalia (tomato), TR-VAM 2005 B-13 and TR-VAM 2005-14 (bean) the most tolerant ones. However, Cubanita-666 (cowpea), Vita and Amalia (tomato) and TR-VAM B-43 (bean) were strongly affected by salinity which revealed salt susceptibility. The results showed the great potential of these varieties to be used in salt affected soils.

Keywords: Crops, salt stress, tolerance