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IMPROVEMENT OF SALINITY TOLERANCE OF CITRUS SCION USING TOLERANT ROOTSTOCKS AND INTERSTOCKS

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By

ALIREZA SHAFIEIZARGAR

Thesis Submitted to the School of Graduate Studies, Universiti Putra Malaysia, in Fulfillment of the Requirements for the Degree of Doctor of Philosophy

March 2014

DEDICATION

To :

my wife, Mina

my son,Shayan

and

my daughter, Dorsa

Abstract of Thesis Presented to the Senate of Universiti Putra Malaysia in Fulfillment of the Requirement for the Degree of Doctor of Philosophy

IMPROVEMENT OF SALINITY TOLERANCE OF CITRUS SCION USING TOLERANT ROOTSTOCKS AND INTERSTOCKS

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ALIREZA SHAFIEIZARGAR

March 2014

Chairman: Assoc. Prof. Yahya Awang, PhD
Faculty: Agriculture

Soil salinity is one of the most serious environmental threats, that extremely restricts crop production. One of the most effective strategies to overcome salinity effects is by growing salt tolerance plant species. Citrus is a commercial fruit crop and grown exclusively in tropical and sub-tropical zones. It is a glycophyte. The objective of this study was to evaluate the responses of citrus to salinity stress and to estimate amelioration of salinity effects by using tolerant rootstocks, diploid and tetraploid interstocks.

Salinity tolerance of five citrus rootstocks namely Cleopatra mandarin (*Citrus reshni* Hort. Ex Tan.), Carrizo citrange [(*Citrus sinensis* (L.) Osbeck×*Ponicrus trifoliate* (L.) Raf.], Tiwanica (*Citrus taiwanica* Tan.& Shimada), Bacraii (*Citrus limettioides* × *Citrus reticulate*) and Shaker [(*Citrus limettioides* × *Citrus reticulate*)× *Citrus reshni*] during germination was tested at various NaCl concentrations. Salt stress affected seed germination, emergence spread, percentage of final emergence and percentage of seedlings survival. At germination stage, Cleopatra mandarin exhibited higher salt-tolerance than other species. In the subsequent study, the growth parameters, mineral concentration, physiological and biochemical traits of above-mentioned citrus species were studied to estimate the degree of salt tolerance. The results indicated that the lowest Na and Cl concentrations were observed in leaves of Shaker rootstock. Also results obtained showed that Shaker and Cleopatra mandarin rootstocks maintained higher RWC and proline content.

To allow the testing of resistant rootstock, a salt sensitive scion cultivar is needed. For this purpose, salt sensitivity assessment of two locally available citrus cultivars, Limau Nipis (*Citrus aurantifolia* Swingle) and Limau Kesturi (*Citrus microcarpa* Bunge) were subjected to NaCl salinity. The results demonstrated that cv. Limau Kesturi was more sensitive to salt stress than cv. Limau Nipis. Therefore, cv. Limau Kesturi was used as a salinity susceptible cultivar in combination with citrus rootstocks for further experimentation in determination of suitable rootstock that could induce salt resistance of the scion. Evaluation of the level of salt tolerance of Limau Kesturi plants budded on Cleopatra mandarin and Shaker rootstocks revealed that salt stress decreased leaf N, P, K concentrations and RWC, while Na, Cl, proline, MDA and H_2O_2 concentrations of budded Limau Kesturi increased on both

tested rootstocks. The results suggested that the Shaker exhibited higher tolerance to salt stress than the Cleopatra mandarin and therefore can be used as an appropriate rootstock. Based on the changes in leaf mineral contents and biochemical compositions in response of tetraploid and diploid Dez orange cultivars (*Citrus sinensis* (L.) Osbeck grown under saline condition, we noticed that tetraploid Dez orange had induced a higher level of salt tolerance in comparison to diploid Dez orange. Use of tetraploid Dez oranges as interstock for Limau Kesturi showed the tetraploid cultivar generate more tolerance plants against NaCl salt stress and the plant was able to keep acceptable concentrations of mineral contents, proline, MDA and H_2O_2.

Overall, evidences recorded from this study proved that among the rootstocks tested, Shaker, and tetraploid interstocked plants are more tolerant to salinity stress and therefore can be introduced as new source of plant materials for salinity tolerance in the citrus industry.

Abstrak tesis yang dikemukakan kepada Senat Universiti Putra Malaysia sebagai memenuhi keperluan untuk Ijazah Doktor Falsafah

MENINGKATKAN TOLERANSI SCION LIMAU TERHADAP KEMASINAN MENGGUNAKAN POKOK PENANTI DAN INTERSTOK

Oleh

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Pengerusi: Prof. Madya. YahyaAwang, PhD
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Kemasinan tanah adalah salah satu daripada ancaman alam sekitar yang paling serius dan telah menghadkan pengeluaran pertanian. Salah satu strategi yang paling berkesan untuk mengatasi masalah kemasinan ini ialah dengan menanam spesis tumbuhan yang tahan suasana yang masin. Limau ialah sejenis tanaman buah-buahan komersil dan lazimnya hidup dalam zon tropika dan sub-tropika. Tanaman ini adalah sejenis tumbuhan glikofit. Objektif kajian ini adalah untuk menilai gerakbalas limau terhadap kemasinan dan untuk menganggarkan pemulihan scion terhadap kesan kemasinan dengan menggunakan pokok penanti diploid dan bahan interstok tetraploid.

Toleransi kemasinan lima spesis pokok penanti citrus, iaitu Cleopatra mandarin (*Citrus reshni* Hort. Ex Tan.), Carrizo citrange [(*Citrus sinensis* (L.) Osbeck x *Ponicrus trifoliate* (L.) Raf.] , Tiwanica (*Citrus taiwanica* Tan. & Shimada), Bacraii (*Citrus limettioides* x *Citrus reticulate*) dan Shaker (*Citrus limettioides* x *Citrus reticulate*) x *Citrus reshni*] semasa percambahan dan pertumbuhan awal anak benih telah diuji pada pelbagai kepekatan NaCl. Kemasinan telah memberi kesan yang nyata terhadap percambahan, sebaran percambahan, peratusan percambahan akhir dan peratusan hidup anak benih. Pada peringkat percambahan, Cleopatra mandarin didapati mempunyai tahap toleransi kemasinan tertinggi berbanding dengan spesis yang lain. Dalam ujikaji berikutnya, parameter pertumbuhan, kandungan mineral, ciri fisiologi dan biokimia spesis limau telah dikaji bagi menilai darjah toleransi terhadap kemasinan seterusnya. Keputusan menunjukkan bahawa daun Shaker mengandungi Na dan Cl terendah berbanding dengan pokok penanti yang lain. Keputusan juga menunjukkan bahawa Shaker dan Cleopatra mandarin mengekalkan kandungan RWC dan prolin yang tinggi.

Bagi membolehkan ujikaji untuk menentukan pokok penanti yang tahan kemasinan, satu kultivar sion diperlukan. Untuk ini, penilaian sensitiviti terhadap ketegasan garam dua kultivar tempatan, Limau Nipis (*Citrus aurantifolia* Swingle) dan Limau Kesturi (*Citrus microcarpa* Bunge) telah didedahkan kepada ketegasan garam NaCl. Keputusan menunjukkan bahawa Limau Kesturi adalah lebih sensitif berbanding dengan Limau Nipis. Oleh itu, Limau Kesturi telah digunakan sebagai bahan ujikaji

seterusnya untuk digabungkan dengan pokok penanti dalam ujikaji seterusnya dalam penentuan pokok penanti yang boleh mengaruhi toleransi sion terhadap ketegasan garam. Penilaian tahap toleransi pokok cantuman Limau Kesturi terhadap ketegasan garam yang didorong oleh Cleopatra mandarin dan Shaker telah menunjukkan bahawa ketegasan garam merendahkan kandungan N, P, K dan RWC manakala telah meningkatkan kandungan Na, Cl, prolin, MDA dan H_2O_2 anak cantuman Limau Kesturi pada kedua-dua pokok penanti. Bagaimanapun, keputusan ini juga mencadangkan bahawa Shaker mempunyai tahap toleransi yang lebih tinggi terhadap tegasan garam berbanding dengan Cleopatra mandarin. Oleh itu spesis ini merupakan pokok penanti yang lebih sesuai. Berdasarkan kepada perubahan terhadap kandungan mineral dan biokimia dalam limau Kesturi yang dicantum pada Dez Orange [(*Citrus sinensis* (L.) Osbeck)] tetraploid dan diploid dan ditanam dalam suasana yang masin, kami mendapati bahawa Dez orange tetraploid telah meningkatkan toleransi scion (Limau Kesturi) terhadap ketegasan garam berbanding dengan Dez orange diploid. Penggunaan Dez Orange tetraploid sebagai interstok untuk Limau Kesturi menunjukkan bahawa kultivar tetraploid adalah lebih tahan terhadap kemasinan dan pokok ini berupaya mengekalkan paras mineral, prolin, RWC, MDA dan H_2O_2.

Secara keseluruhannya, bukti yang direkodkan daripada kajian ini membuktikan bahawa antara pokok penanti limau yang telah diuji, pokok penanti Shaker, dan pokok yang diôinterstokôkan dengan bahan tetraploid mempunyai tahap toleransi terhadap ketegasan garam yang lebih tinggi. Dengan itu, teknik dan bahan tanaman ini boleh diperkenalkan sebagai sumber baru untuk mengurangkan kesan kemasinan dalam industri limau.

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I certify that a Thesis Examination Committee has met on 4 March 2014 to conduct the final examination of Alireza Shafieizargar on his thesis entitled ñImprovement of salinity tolerance of citrus scion using tolerant rootstocks and interstocksò in accordance with the Universities and University Colleges Act 1971 and the Constitution of the Universiti Putra Malaysia [P.U. (A) 106] 15 March 1998. The Committee recommends that the student be awarded the Doctor of Philosophy.

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LIST OF ABBREVIATION

ABA	Abscisic acid
DM	Dray matter
DW	Dry weight
EC	Electrical conductivity
FW	Fresh weight
H_2O_2	Hydrogen peroxide
IAA	Indole acetic acid
K/Na	Potassium to sodium ratio
MDA	Malondialdehyde
mM	Millimolar
nmol	Nanomole
ROS	Reactive oxygen species
RWC	Relative water content
TW	Turgid weight
µmol	micromole

CHAPTER 1

INTRODUCTION

1.1 Background

All the environmental stresses such as extreme temperatures, mineral deficiency, salinity and low water availability induce potential injuries on plant species (Langridge *et al.*, 2006). Two types of environmental stresses are biotic (infection and/or competition by other organisms) and abiotic (light, high and low temperature, drought, salinity, radiation, etc.) that change the normal physiological function of plants (Khayatnezhad *et al.*, 2011). Salinity is one of the major important abiotic stresses, limiting crop production in arid and semi-arid regions, where soil salt content is naturally high and precipitation can be insufficient for leaching (Asghari, 2008). The USDA Salinity Laboratory defines a saline soil as having an electrical conductivity of the saturation extract (ECe) of 4 dS m^{-1} (1dS m^{-1} is approximately equal to 10 mM NaCl) or more. ECe is the electrical conductivity of the 'saturated paste extract', that is, of the solution extracted from a soil sample after being mixed with sufficient water to produce a saturated paste (Yadav *et al.*, 2011). High concentrations of soluble salts such as chlorides of sodium, calcium and magnesium contribute to the high electrical conductivity of saline soils. NaCl contributes to most of the soluble salts in saline soil (Chinnusamy *et al.*, 2006). Various ions such as Na^{+}, K^{+}, Mg^{+2}, Ca^{+2}, Cl^{-}, SO_4^{-2}, HCO_3^{-}, CO_3^{-2} and NO_3^{-} are involved in soil salinization but most commonly, the stress is caused by high Na and Cl concentrations in the soil solution. Na ion particularly causes the dispersion of the soil and Cl ion causes high toxicity and nutrient imbalances in plants (Hasegawa *et al.*, 2000). However, the severity of salt damage has been found to be dependent on the meteorological conditions, soil type, species and cultivar, growth stages of the plant, time interval between irrigations, amount of water distributed and time of exposure to saline water (Parida and Das, 2005; Munns and Tester, 2008).

One strategy to overcome problem of salinity is by selecting salt tolerant genotypes. For this, researchers require an understanding of relative tolerance of crops and their sensitivity, morphological and physiological traits that contribute to salinity tolerance ; the ameliorative effects of nutrition and other treatments on growth, mineral uptake, photosynthesis and active constituents of salt-stressed plants; alleviate the mechanisms of salt resistance in different plants (Omami, 2005; Said-Al Ahl and Omer, 2011). For many fruit tree plants such as grapevine and citrus, chloride ion is more toxic than sodium ion, because Na is maintained in the tissue of roots while chloride ion accumulated in aerial organs of plant, negatively impacting on photosynthesis (Asghari, 2008). The osmotic part of salinity is produced by excess ions such as sodium and chloride in the medium that decrease the osmotic potential of soil and hence water absorption by root of plant. Excessive uptake ions reduces the osmotic potential of the plant (Parida and Das, 2005). To escape with the damage of ion toxicity, the plants generally compartmentalized harmful ions in their vacuole and/or in less salt sensitive tissues. Parallel to this, adjustment of the cytoplasmic compartment is accomplished through production of compatible osmolytes such as proline (Ghotb Abadi *et al.*, 2010).

Citrus belongs to the genus *Citrus* L. and *Rutaceae* family, originating in tropical and subtropical Southeast Asia. These fruits are economically important in a large scale production for both fresh fruit and processed products. Although Citrus (*Citrus spp*.) is classified as salt-sensitive, there is great variation in the ability of citrus trees to tolerate salinity depending on rootstock, thus selection among the rootstocks should lead to increasing salt tolerance. Among a very limited study, a few reports showed that there is a lack of positive effects of natural rootstocks and interstocks on citrus grown under saline conditions. A more extensive study is therefore necessary especially when it involves citrus species or cultivars that are unique for a particular country or region. Information generated through such studies on the effects of salinity on physiological and biochemical aspects of citrus could lead to identification of salt tolerant cultivars and rootstocks. Polyploid interstocks may increase salinity tolerance of sensitive citrus cultivars. Because the tree breeding is a time-consuming process, interstocking technique could be an efficient and effective alternative to improve citrus productivity. Thus, the primary objective of the present study was to assess the significance of tolerant rootstocks and tetraploid interootstock in ameliorating the adverse effects of salt stress on citrus scions. The results obtained could be beneficial in improving citrus production practices, as well as in giving new directions in citrus research in the future.

1.2 Objectives

The objective of this study was:

i. To determine differences in salinity tolerance among citrus rootstocks at seed germination stage.

ii. To characterize the growth and physiological responses of citrus rootstocks and cultivars to different levels of NaCl salinity.

iii. To evaluate of the role of citrus rootstocks in alleviating salinity effects on citrus scions.

iv. To explore the growth and physiological responses of diploid and tetraploid of Dez orange to different levels of NaCl salinity.

v. To determine whether the use of salt tolerant rootstock and interstock can alleviate the problem of salinity of salt intolerant scion.

REFERENCES

Abari, A. K., Nasr, M. H., Hojjati, M., and Bayat, D. (2011). Salt Effects on Seed Germination and Seedling Emergence of Two Acacia Species. *African Journal Plant Science* 5 (1), 52-56.

Abbaspour, N. (2008). A Comparative Study of Cl-transport Across the Roots of Two Grapevine Rootstocks, K 51-40 and Paulsen, Differing in Salt Tolerance. *PhD Thesis.*: The University of Adelaide.

Abebe, T., Guenzi, A. C., Martin, B., and Cushman, J. C. (2003). Tolerance of Mannitol AccumulatingTtransgenic Wheat to Water Stress and Salinity. *Plant Physiology* 131 (4), 1748-1755.

Ábrahám, E., Hourton-Cabassa, C., Erdei, L., and Szabados, L. (2010). *Plant Stress Tolerance*. Springer, pp. 317-331.

Al Yassin, A. (2005a). Adverse Effects of Salinity on Citrus. *International Journal of Agricultural Biology* 4, 668-680.

Al Yassin, A. (2005b). Influence of Salinity on Citrus: a Review Paper. *Journal of Central European Agriculture* 5 (4), 263-272.

Alireza, S., Awang, Y., Juraimi, A., and Othman, R. (2011). Growth and Physiological Responses of 'Persian' Lime and 'Mayer' Lemon to Salinity Stress. *II International Symposium on Underutilized Plant Species: Crops for the Future-Beyond Food Security 979* 755-761.

Aljuburi, H. (1996). Effect of Sline Water on Growth Parameters of Five Citrus Root-Stocks. *Annals of Arid Zone* 35, 43-48.

Almansa, M. S., Hernandez, J. A., Jimenez, A., Botella, M., and Sevilla, F. (2002). Effect of Salt Stress on the Superoxide Dismutase Activity in Leaves of Citrus Limonum in Different Rootstock-Scion Combinations. *Biologia Plantarum* 45 (4), 545-549.

Alongi, D. M. (2008). Mangrove forests: resilience, protection from tsunamis, and responses to global climate change. *Estuarine, Coastal and Shelf Science* 76 (1), 1-13.

Amtmann, A., Armengaud, P., and Volkov, V. (2004). Potassium Nutrition and Salt Stress. *MembraneTtransport in Plants* 15, 293-339.

Anjum, M. A. (2008). Effect of NaCl Concentrations in Irrigation Water on Growth and Polyamine Metabolism in Two Citrus Rootstocks with Different Levels of Salinity Tolerance. *Acta Physiologiae Plantarum* 30 (1), 43-52.

Anjum, M. A., Abid, M., and Naveed, F. (2001). Evaluation of Citrus Rootstocks for Salinity Tolerance at Seedling Stage. *International Journal of Agriculture & Biology* 3, 1-4.

Arbona, V., Hossain, Z., López-Climent, M. F., Pérez-Clemente, R. M., and Gómez-Cadenas, A. (2008). Antioxidant Enzymatic Activity is Linked to Waterlogging Stress Tolerance in Citrus. *Physiologia Plantarum* 132 (4), 452-466.

Arzani, A. (2008). Improving Salinity Tolerance in Crop Plants a Biotechnological View. *In Vitro Cellular & Developmental Biology-Plant* 44 (5), 373-383.

Asghari, H. (2008). Vesicular- Rbuscular (VA) Mycorrhizae Improve Salinity Tolerance in Pre-inoculation Subterranean Clover (*Trifolium subterraneum*) Seedlings. *International Journal of Plant Production* 2 (3), 243-256.

Ashraf, M. (2001). Relationships Between Growth and Gas Exchange Characteristics in Some Salt-Tolerant Amphidiploid Brassica Species in Relation to Their Diploid Parents. *Environmental and Experimental Botany* 45 (2), 155-163.

Ashraf, M. (2004). Some Important Physiological Selection Criteria for Salt Tolerance in Plants. *Flora-Morphology, Distribution, Functional Ecology of Plants* 199 (5), 361-376.

Ashraf, M., and Ali, Q. (2008). Relative Membrane Permeability and Activities of some Antioxidant Enzymes as the Key Determinants of Salt Tolerance in Canola (*Brassica napus* L.). *Environmental and Experimental Botany* 63 (1), 266-273.

Ashraf, M., and Bashir, A. (2003). Salt Stress Induced Changes in Some Organic Metabolites and Ionic Relations in Nodules and Other Plant Parts of Two Crop Legumes Differing in Salt Tolerance. *Flora-Morphology, Distribution, Functional Ecology of Plants* 198 (6), 486-498.

Ashraf, M., and Foolad, M. (2007). Roles of Glycine Betaine and Proline in Improving Plant Abiotic Stress Resistance. *Environmental and Experimental Botany* 59 (2), 206-216.

Ashraf, M., and Harris, P. (2004). Potential Biochemical Indicators of Salinity Tolerance in Plants. *Plant Science* 166 (1), 3-16.

Ashraf, M., and Orooj, A. (2006). Salt Stress Effects on Growth, Ion Accumulation and Seed oil Concentration in an Arid Zone Traditional Medicinal Plant Ajwain (*Trachyspermum ammi* [L.] Sprague). *Journal of Arid Environments* 64 (2), 209-220.

Awang, Y., and Atherton, J. (1994). Salinity and Shading Effects on Leaf Water Relations and Ionic Composition of Strawberry Plants Grown on Rockwool. *Journal of Horticultural Science* 69.

Awang, Y., Shaharom, A. S., Mohamad, R. B., and Selamat, A. (2009). Chemical and Physical Characteristics of Cocopeat-Based Media Mixtures and their Effects on the Growth and Development of *Celosia cristata*. *American Journal of Agricultural and Biological Sciences* 4 (1), 63-71.

Aziz, I., and Khan, M. A. (2001). Effect of Seawater on the Growth, Ion Content and Water Potential of Rhizophora Mucronata Lam. *Journal of Plant Research* 114 (3), 369-373.

Balal, R. M. R., Ashraf, M. Y., Khan, M. M., Jaskani, M. J., and Ashfaq, M. (2011). Influence of Salt Stress on Growth and Biochemical Parameters of Citrus Cootstocks. *Pakistan Journal of Botany* 43 (4), 2135-2141.

Banuls, J., Legaz, F., and Primo-Millo, E. (1991). Salinity-Calcium Interactions on Growth and Ionic Concentration of Citrus Plants. *Plant and Soil* 133 (1), 39-46.

Banuls, J., and Primo-Millo, E. (1992). Effects of Chloride and Sodium on Gas Exchange Parameters and Water Relations of Citrus Plants. *Physiologia Plantarum* 86 (1), 115-123.

Bañuls, J., and Primo-Millo, E. (1995). Effects of Salinity on Some Citrus Scion-Rootstock Combinations. *Annals of Botany* 76 (1), 97-102.

Barrett, H. (1992). An Autotetraploid of the Key Lime, *Citrus Aurantifolia*. *Fruit Varieties Journal* 46 (3), 166-170.

Bates, L., Waldren, R., and Teare, I. (1973). Rapid Determination of Free Proline for Water-Stress Studies. *Plant and Soil* 39 (1), 205-207.

Bayat, F., Shiran, B., and Belyaev, D. (2011). Overexpression of *HvNHX2*, a Vacuolar Na/H Antiporter Gene from Barley, Improves Salt Tolerance in *Arabidopsis thaliana*. *Australian Journal of Crop Science* 5 (4), 428-432.

Behboudian, M., Törökfalvy, E., and Walker, R. (1986). Effects of Salinity on Ionic Content, Water Relations and Gas Exchange Parameters in some Citrus Scion Rootstock Combinations. *Scientia Horticulturae* 28 (1), 105-116.

Bernstein, L. (1975). Effects of Salinity and Sodicity on Plant Growth. *Annual Review of Phytopathology* 13 (1), 295-312.

Blumwald, E., Grover, A., and Good, A. (2004). Breeding for Abiotic Stress Resistance: Challenges and Opportunities. *New directions for a diverse planet. Proceedings of the 4th International Crop Science Congress, Brisbane, Australia*.

Bolarin, M., Fernandez, F., Cruz, V., and Cuartero, J. (1991). Salinity Tolerance in Four Wild Tomato Species Using Vegetative Yield-Salinity Response Curves. *Journal of the American Society for Horticultural Science* 116 (2), 286-290.

Boman, B. J., Zekri, M., and Stover, E. (2005). Managing Salinity in Citrus. *Hort Technology* 15 (1), 108-113.

Botella, M. A., Rosado, A., Bressan, R. A., and Hasegawa, P. M. (2005). Plant Adaptive Responses to Salinity Stress. *Plant Abiotic Stress*, 38-70.

Brugnoli, E., and Björkman, O. (1992). Growth of Cotton Under Continuous Salinity Stress: Influence on Allocation Pattern, Stomatal and Non-Stomatal Components of Photosynthesis and Dissipation of Excess Light Energy. *Planta* 187 (3), 335-347.

Bybordi, A., and Tabatabaei, J. (2009). Effect of Salinity Stress on Germination and Seedling Properties in Canola Cultivars (Brassica napus L.). *Not. Bot. Hort. Agrobot. Cluj* 37 (1), 71-76.

Cameron, J., M, and Soost, R. (1970). Characters of New Populations of Citrus Polyploids, and the Relation between Tetraploidy in the Pollen Parent and Hybrid Tetraploid Progeny. *1st Int. Citrus Symp., Riverside 1968.* 199-205.

Cerda, A., Nieves, M., and Guillen, M. (1990). Salt Tolerance of Lemon Trees as Affected by Rootstock. *Irrigation Science* 11 (4), 245-249.

Cerri, C. E. P., Sparovek, G., Bernoux, M., Easterling, W. E., Melillo, J. M., and Cerri, C. C. (2007). Tropical agriculture and global warming: impacts and mitigation options. *Scientia Agricola* 64 (1), 83-99.

Chartzoulakis, K. (2005). Salinity and Olive Growth, Salt Tolerance, Photosynthesis and Yield. *Agricultural Water Management* 78 (1), 108-121.

Chaves, M., Flexas, J., and Pinheiro, C. (2009). Photosynthesis Under Drought and Salt Stress: Regulation Mechanisms from Whole Pant to Cell. *Annals of Botany* 103 (4), 551-560.

Chinnusamy, V., Zhu, J., and Zhu, J.-K. (2006). *Genetic engineering*. Springer, pp. 141-177.

Chookhampaeng, S. (2011). The Effect of Salt Stress on Growth, Chlorophyll Content Proline Content and Antioxidative Enzymes of Pepper (*Capsicum annuum* L.) Seedling. *European Journal of Scientific Research* 49 (1), 103-109.

Chutipaijit, S., Cha-um, S., and Sompornpailin, K. (2011). High Contents of Proline and Anthocyanin Increase Protective Response to Salinity in *Oryza sativa* L. spp. *indica*. *Australian Journal of Crop Science* 5, 1191-1198.

Claussen, W. (2005). Proline as a Measure of Stress in Tomato Plants. *Plant Science* 168 (1), 241-248.

Cokkizgin, A. (2012). Salinity Stress in Common Bean (*Phaseolus vulgaris* L.) Seed Germination. *Notulae Botanicae Horti Agrobotanici Cluj-Napoca* 40 (1), 177-182.

Colla, G., Rouphael, Y., Leonardi, C., and Bie, Z. (2010). Role of Grafting in Vegetable Crops Grown under Saline Conditions. *Scientia Horticulturae* 127 (2), 147-155.

Cooper, W. (1961). Toxicity and Accumulation of Salts in Citrus Trees on Various Rootstocks in Texas. *Proc. Fla. State Hort. Soc* 95-104.

Dasberg, S., Bielorai, H., Haimowitz, A., and Erner, Y. (1991). The Effect of Saline Irrigation Water on "Shamouti" Orange Trees. *Irrigation Science* 12 (4), 205-211.

Davies, F. S., and Albrigo, L. G. (1999). *Citrus*. Acribia, SA.

Delauney, A. J., and Verma, D. P. S. (2002). Proline Biosynthesis and Osmoregulation in Plants. *The Plant Journal* 4 (2), 215-223.

Delfine, S., Alvino, A., Villani, M. C., and Loreto, F. (1999). Restrictions to Carbon Dioxide Conductance and Photosynthesis in Spinach Leaves Recovering from Salt Stress. *Plant Physiology* 119 (3), 1101-1106.

Desingh, R., and Kanagaraj, G. (2007). Influence of Salinity Stress on Photosynthesis and Antioxidative Systems in Two Cotton vVrieties. *Gen. Appl. Plant Physiol* 33 (3-4), 221-234.

Divate, M., and Pandey, R. (1979). Salt Tolerance in Grapes. IV. Effect of Salinity on Internal Water Deficit. *Indian Journal of Plant Physiology* 22 (1), 81-83.

Duran Zuazo, V., Martinez Raya, A., and Aguilar Ruiz, J. (2003). Salt Tolerance of Mango Rootstocks (Magnifera indica L. cv. Osteen). *Spanish Journal of Agricultural Research* 1 (1), 68-78.

El-Monem, A., and Sharaf, M. (2008). Tolerance of Five Genotypes of Lentil to NaCl-Salinity Stress. *New York Science Journal* 1, 70-80.

Etehadnia, M. (2009). Salt Stress Tolerance in Potato Genotypes. *PhD Thesis.*: University of Saskatchewan.

FAOSTAT, F. (2009). Statistical Databases. Food and Agriculture Organization of the United Nations: Rome, Italy.

Fernández-Ballester, G., García-Sánchez, F., Cerdá, A., and Martínez, V. (2003). Tolerance of Citrus Rootstock Seedlings to Saline Stress Based on Their Ability to Regulate Ion Uptake and Transport. *Tree Physiology* 23 (4), 265-271.

Ferreira-Silva, S. L., Silveira, J. A. G., Voigt, E. L., Soares, L. S. P., and Viégas, R. A. (2008). Changes in Physiological Indicators Associated with Salt Tolerance in Two Contrasting Cashew Rootstocks. *Brazilian Journal of Plant Physiology* 20 (1), 51-59.

Ferreira, A., and Lima-Costa, M. (2006). Metabolic Responses to Salt Stress in Cell Suspension Cultures of Sensitive and Resistant Citrus. *Journal of Horticultural Science and Biotechnology* 81 (6), 983.

Fisarakis, I., Chartzoulakis, K., and Stavrakas, D. (2001). Response of Sultana Vines (*V. vinifera* L.) on Six Rootstocks to NaCl Salinity Exposure and Recovery. *Agricultural Water Management* 51 (1), 13-27.

Flowers, T. (2004). Improving Crop Salt Tolerance. *Journal of Experimental Botany* 55 (396), 307-319.

Fricke, W., and Peters, W. S. (2002). The Biophysics of Leaf Growth in Salt-Stressed Barley A Study at the Cell Level. *Plant Physiology* 129 (1), 374-388.

Gama, P., Inanaga, S., Tanaka, K., and Nakazawa, R. (2007). Physiological Response of Common Bean (Phaseolus vulgaris L.) Seedlings to Salinity Stress. *African Journal of Biotechnology* 6 (2).

Ganatsas, P., and Tsakaldimi, M. (2007). Effect of Light Conditions and Salinity on Germination Behaviour and Early Growth of Umbrella Pine (Pinus pinea L.) Seed. *Journal of Horticultural Science and Biotechnology* 82 (4), 605-610.

García-Sánchez, F., Jifon, J. L., Carvajal, M., and Syvertsen, J. P. (2002). Gas Exchange, Chlorophyll, Nutrient Contents in Relation to Na^+ and Cl^- Accumulation in Sunburst Mandarin Grafted in Different Rootstocks. *Plant Science* 162 (5), 705-712.

García-Sánchez, F., Perez-Perez, J., Botia, P., and Martínez, V. (2006). The Response of Young Mandarin Trees Grown Under Saline Conditions Depends on the Rootstock. *European Journal of Agronomy* 24 (2), 129-139.

García-Sánchez, F., and Syvertsen, J. (2006). Salinity Tolerance of Cleopatra Mandarin and Carrizo Citrange Citrus Rootstock Seedlings is Affected by CO_2 Enrichment During Growth. *Journal of the American Society for Horticultural Science* 131 (1), 24-31.

García-Sánchez, F., and Syvertsen, J. P. (2009). Substrate Type and Salinity Affect Growth Allocation, Tissue Ion Concentrations, and Physiological Responses of Carrizo citrange Seedlings. *HortScience* 44 (5), 1432-1437.

Ghaleb, W. S., Sawwan, J. S., Akash, M. W., and Al-Abdallat, A. M. (2010). In Vitro Response of Two Citrus Rootstocks to Salt Stress. *International Journal of Fruit Science* 10 (1), 40-53.

Ghorbani Javid, M., Sorooshzadeh, A., Moradi, F., Sanavy, S., and Allahdadi, I. (2011). The role of Phytohormones in Alleviating Salt Stress in Crop Plants. *Australian Journal of Crop Science* 5 (6), 726.

Ghotb Abadi, F. S., Mostafavi, M., Eboutalebi, A., Samavat , S., and Ebadi, A. (2010). Biomass Accumulation and Proline Content of Six Citrus Rootstocks as Influenced by Long-Term Salinity. *Research Journal of Environmental Sciences* (4), 158-165.

Ghoulam, C., Foursy, A., and Fares, K. (2002). Effects of Salt Stress on Growth, Inorganic Ions and Proline Accumulation in Relation to Osmotic Adjustment in Five Sugar Beet Cultivars. *Environmental and Experimental Botany* 47 (1), 39-50.

Gil-Izquierdo, A., Riquelme, M. T., Porras, I., and Ferreres, F. (2004). Effect of the Rootstock and Interstock Grafted in Lemon Tree (*Citrus limon* (L.) Burm.) on the Flavonoid Content of Lemon Juice. *Journal of Agricultural and Food Chemistry* 52 (2), 324-331.

Gimeno, V., Syvertsen, J., Nieves, M., Simón, I., Martínez, V., and Garcia-Sanchez, E. (2009a). Orange Varieties as Interstocks Increase the Salt Tolerance of Lemon Trees. *The Journal of Horticultural Science & Biotechnology* 84 (6), 625.

Gimeno, V., Syvertsen, J., Nieves, M., Simón, I., Martínez, V., and García-Sánchez, F. (2009b). Additional Nitrogen Fertilization Affects Salt Tolerance of Lemon Trees on Different Rootstocks. *Scientia Horticulturae* 121 (3), 298-305.

Girardi, E. A., and Mourão Filho, F. d. A. A. (2006). Production of Interstocked'Pera'Sweet Orange Nursey Trees on'Volkamer'Lemon and'Swingle'Citrumelo Rootstocks. *Scientia Agricola* 63 (1), 5-10.

González, L., and González-Vilar, M. (2003). *Handbook of Plant Ecophysiology Techniques*. Springer, pp. 207-212.

Grattan, S., and Grieve, C. (1998). Salinity-Mineral Nutrient Relations in Horticultural Crops. *Scientia Horticulturae* 78 (1-4), 127-157.

Greenway, H., and Munns, R. (1980). Mechanisms of Salt Tolerance in Nonhalophytes. *Annual Review of Plant Physiology* 31 (1), 149-190.

Grieve, C. (2010). Salinity-Induced Enhancement of Horticultural Crop Quality. CRC Press, Boca Raton, Fla. pp. 1175-1196.

Guerrier, G. (1996). Fluxes of Na^+, K^+ and Cl, and Osmotic Adjustment in *Lycopersicon pimpinellifolium* and *L. esculentum* During Short and Long Term Exposures to NaCl. *Physiologia Plantarum* 97 (3), 583-591.

Gueta-Dahan, Y., Yaniv, Z., Zilinskas, B. A., and Ben-Hayyim, G. (1997). Salt and Oxidative Stress Similar and Specific Responses and Their Relation to Salt Tolerance in Citrus. *Planta* 203 (4), 460-469.

Gulzar, S., Khan, M. A., and Ungar, I. A. (2003). Salt Tolerance of a Coastal Salt Marsh Grass. *Communications in Soil Science and Plant Analysis* 34 (17-18), 2595-2605.

Gurmani, A., Bano, A., Khan, S., Din, J., and Zhang, J. (2011). Alleviation of Salt Stress by Seed Treatment with Abscisic Acid (ABA), 6-Benzylaminopurine (BA) and Chlormequat Chloride (CCC) Optimizes Ion and Organic Matter Accumulation and Increases Yield of Rice (*Oryza sativa* L.). *Australin Journal of Crop Science* 5, 1278-1285.

Hasegawa, P. M., Bressan, R. A., Zhu, J. K., and Bohnert, H. J. (2000). Plant Cellular and Molecular Responses to High Salinity. *Annual Review of Plant Biology* 51 (1), 463-499.

Hassan, S. A., A R, S., R A, H., and Abdul Rahman, Z. (2010). Salinity Effects on Germination of Forage Sorghumes. *Journal of Agronomy* 9 (4), 169-174.

Hellmann, H., Funck, D., Rentsch, D., and Frommer, W. B. (2000). Hypersensitivity of an Arabidopsis Sugar Signaling Mutant Toward Exogenous Proline Application. *Plant Physiology* 122 (2), 357-368.

Hester, M. W., Mendelssohn, I. A., and McKee, K. L. (2001). Species and Population Variation to Salinity Stress in *Panicum hemitomon*, *Spartina patens*, and *Spartina alterniflora*: Morphological and Physiological Constraints. *Environmental and Experimental Botany* 46 (3), 277-297.

Hetherington, A. M., and Woodward, F. I. (2003). The Role of Stomata in Sensing and Driving Environmental Change. *Nature* 424 (6951), 901-908.

Hiaba, A. A., and Mohamed, A. Y. (2009). Comparative Studies on Diploid and Tetraploid Levels of *Nicotiana alata*. *Seeds* 22 (25), 6.

Hokmabadi, H., Arzani, K., and Grierson, P. (2005). Growth, Chemical Composition, and Carbon Isotope Discrimination of Pistachio (Pistacia vera L.) Rootstock Seedlings in Response to Salinity. *Crop and Pasture Science* 56 (2), 135-144.

Jacoby, B., and Pessarakli, M. (1999). Mechanisms Involved in Salt Tolerance of Plants. *Handbook of Plant and Crop Stress*, 97-123.

Jones, R., Loch, D., and LeFeuvre, R. (1995). Differences in Mineral Concentration Among Diploid and Tetraploid Cultivars of Rhodesgrass (*Chloris gayana*). *Animal Production Science* 35 (8), 1123-1129.

Juan, M., Rivero, R. M., Romero, L., and Ruiz, J. M. (2005). Evaluation of Some Nutritional and Biochemical Indicators in Selecting Salt-Resistant Tomato Cultivars. *Environmental and Experimental Botany* 54 (3), 193-201.

Kafkafi, U., Siddiqi, M. Y., Ritchie, R. J., Glass, A., and Ruth, T. (1992). Reduction of Nitrate ($13NO_3$) Influx and Nitrogen (13N) Translocation by Tomato and

Melon Varieties After Short Exposure to Calcium and Potassium Chloride Salts. *Journal of Plant Nutrition* 15 (6-7), 959-975.

Karimi, S., Rahemi, M., Maftoun, M., and Tavallali, V. (2009). Effects of Long-Term Salinity on Growth and Performance of Two Pistachio (*Pistacia* L.) Rootstocks. *Australian Journal of Basic and Applied Sciences* 3 (3), 1630-1639.

Karuppanapandian, T., Moon, J.-C., Kim, C., Manoharan, K., and Kim, W. (2011). Reactive Oxygen Species in Plants Their Generation, Signal transduction, and Scavenging Mechanisms. *Australin Journal of Crop Science* 5, 709-725.

Kaymakanova, M. (2009). Effect of Salinity on Ggermination and Sseed Physiology in Bean (Phaseolus vulgaris L.). *Biotechnol. & Biotechnol. Eq* 23, 326-329.

Khayatnezhad, M., and Gholamin, R. (2011). Effects of Water and Salt Stresses on Ggermination and Seedling Growth in Two Gurum Wheat (*Triticum durum* Desf.) Genotypes. *Scientific Research and Essays* 6 (21), 4597-4603.

Khayatnezhad, M., Gholamin, R., Jamaati-e-Somarin, S., and Zabihi-e-Mahmoodabad, R. (2011). Scrutiny of Hexaploid and Tetraploid (*Triticum durum*) Wheat's Genotypes to Some Physiological Responses in Drought Stress. *Middle-East Journal of Scientific Research* 7 (1), 12-16.

Kholová, J., Sairam, R., Meena, R., and Srivastava, G. (2009). Response of Maize Genotypes to Salinity Stress in Relation to Osmolytes and Metal-Ions Contents, Oxidative Stress and Antioxidant Enzymes Activity. *Biologia Plantarum* 53 (2), 249-256.

Kim, S. Y., Lim, J., Park, M. R., Kim, Y. J., Park, T. I., Seo, Y. W., Choi, K. G., and Yun, S. J. (2005). Enhanced Antioxidant Enzymes are Associated with Reduced Hydrogen Peroxide in Barley Roots Under Saline Stress. *Journal of Biochemistry and Molecular Biology* 38 (2), 218.

Kozlowski, T. (1997). Responses of Woody Plants to Flooding and Salinity. *Tree Physiology Monograph* 1 (1).

Kurban, H., Saneoka, H., Nehira, K., Adilla, R., Premachandra, G. S., and Fujita, K. (1999). Effect of Salinity on Growth, Photosynthesis and Mineral Composition in Leguminous Plant *Alhagi pseudoalhagi* (Bieb.). *Soil Science and Plant Nutrition* 45 (4), 851-862.

Ladanyia, M. (2010). *Citrus Ffruit: Biology, Technology and Evaluation*. Access Online via Elsevier.

Langridge, P., Paltridge, N., and Fincher, G. (2006). Functional Genomics of Abiotic Stress Tolerance in Cereals. *Briefings in functional genomics & proteomics* 4 (4), 343-354.

Lea-Cox, J. D., and Syvertsen, J. P. (1993). Salinity Reduces Water Use and Nitrate-N-Nse Efficiency of Citrus. *Annals of Botany* 72 (1), 47-54.

Lei, Y., Yin, C., and Li, C. (2006). Differences in Some Morphological,Physiological, and Biochemical Responses to Drought Stress in Two Contrasting Populations of Populus Przewalskii. *Physiologia Plantarum* 127 (2), 182-191.

Levitt, J. (1980). *Responses of Plants to Environmental Stresses. Volume II. Water, Radiation, Salt, and Other Stresses*. Academic Press.

Levy, Y., and Syvertsen, J. (2004). Irrigation Water Quality and Salinity Effects in Citrus Trees. *Horticultural Reviews* 30, 37-82.

Li, W.-D., Biswas, D. K., Xu, H., Xu, C.-Q., Wang, X.-Z., Liu, J.-K., and Jiang, G.-M. (2009). Photosynthetic Responses to Chromosome Doubling in Relation to Leaf Anatomy in *Lonicera japonica* Subjected to Water Stress. *Functional Plant Biology* 36 (9), 783-792.

Li, W.-L., Berlyn, G. P., and Ashton, P. M. S. (1996). Polyploids and Their Structural and Physiological Characteristics Relative to Water Deficit in *Betula papyrifera* (Betulaceae). *American Journal of Botany*, 15-20.

Lima-Costa, M., Ferreira, S., Duarte, A., and Ferreira, A. (2008). Alleviation of Salt Stress Using Exogenous Proline on a Citrus Cell Line. *VI International Symposium on Mineral Nutrition of Fruit Crops 868* 109-112.

Lin, C. C., and Kao, C. H. (2000). Effect of NaCl Stress on H2O2 Metabolism in Rice Leaves. *Plant Growth Regulation* 30 (2), 151-155.

Lioyd, J., Kriedemann, P., and Aspinall, D. (1990). Contrasts Between Citrus Species in Response to Salinisation: An Analysis of Photosynthesis and Water Relations for Different Rootstock Scion Combinations. *Physiologia Plantarum* 78 (2), 236-246.

Longstreth, D. J., and Nobel, P. S. (1979). Salinity Effects on Leaf Anatomy Consequences for Photosynthesis 1. *Plant Physiology* 63 (4), 700.

Lopez-Climent, M. F., Arbona, V., Perez-Clemente, R. M., and Gómez-Cadenas, A. (2008). Relationship Between Salt Tolerance and Photosynthetic Machinery Performance in Citrus. *Environmental and Experimental Botany* 62 (2), 176-184.

Lu, C., Qiu, N., Lu, Q., Wang, B., and Kuang, T. (2002). Does Salt Stress Lead to Increased Susceptibility of Photosystem II to Photoinhibition and Changes in Photosynthetic Pigment Composition in Halophyte *Suaeda salsa* Grown Outdoors? *Plant Science* 163 (5), 1063-1068.

Maas, E. (1993). Salinity and Citriculture. *Tree Physiology* 12 (2), 195-216.

Marschner, H. (1995). Mineral Nutrition of Higher Plants. *Orlando (FL)* 7.

Martínez-Ballesta, M. C., Alcaraz-López, C., Muries, B., Mota-Cadenas, C., and Carvajal, M. (2010). Physiological Aspects of Rootstock–Scion Interactions. *Scientia Horticulturae* 127 (2), 112-118.

Massimiliano, T. (1994). Ionic Relations of Aeroponically-Grown Olive Genotypes, During Salt Stress. *Plant and Soil* 161 (2), 251-256.

Matsumura, T., Kanechi, M., Inagaki, N., and Maekawa, S. (1998). The Effects of Salt Stress on Ions Uptake, Accumulation of Compatible Solutes, and Leaf Osmotic Potential in Safflower, Chrysanthemum Paludosum and Sea Aster. *Journal Japanese Society for Horticultural Science* 67, 426-431.

McNeil, S. D., Nuccio, M. L., and Hanson, A. D. (1999). Betaines and Related Osmoprotectants. Targets for Metabolic Eengineering of Stress Resistance. *Plant Physiology* 120 (4), 945-949.

Melgar, J., Syvertsen, J., Martínez, V., and García-Sánchez, F. (2008). Leaf Gas Exchange, Water Relations, Nutrient Content and Growth in Citrus and Olive Seedlings Under Salinity. *Biologia Plantarum* 52 (2), 385-390.

Meng, H.-B., Jiang, S.-S., Hua, S.-J., Lin, X.-Y., Li, Y.-L., Guo, W.-L., and Jiang, L.-X. (2011). Comparison Between a Tetraploid Turnip and Its Diploid Progenitor (*Brassica rapa* L.): The Adaptation to Salinity Stress. *Agricultural Sciences in China* 10 (3), 363-375.

Mickelbart, M. V., and Arpaia, M. L. (2002). Rootstock Influences Changes in Ion Concentrations, Growth, and Photosynthesis of Hass' Avocado Trees in Response to Salinity. *Journal of the American Society for Horticultural Science* 127 (4), 649-655.

Mobayen, R., and Milthorpe, F. (1980a). Citrus Seed Germination as Influenced by Water Potential and Salinity. *Proceedings of the International Society of Citriculture 1978.* 247-249.

Mobayen, R., and Milthorpe, F. (1980b). Response of Seedlings of Three Citrus-Rootstock Cultivars to Salinity. *Crop and Pasture Science* 31 (1), 117-124.

Moya, J. L., Gómez-Cadenas, A., Primo-Millo, E., and Talon, M. (2003). Chloride Absorption in Salt-Sensitive Carrizo Citrange and Salt-Tolerant Cleopatra Mandarin Citrus Rootstocks is Linked to Water Use. *Journal of Experimental Botany* 54 (383), 825-833.

Mukhopadhyay, S. (2004). *Citrus: Production, Postharvest, Disease and Pest Management*. Science Publishers, Inc.

Munns, R. (1993). Physiological Processes Limiting Plant Growth in Saline Soils: Some Dogmas and Hypotheses. *Plant, Cell & Environment* 16 (1), 15-24.

Munns, R. (2002). Comparative Physiology of Salt and Water Stress. *Plant, Cell & Environment* 25 (2), 239-250.

Munns, R., James, R. A., and Läuchli, A. (2006). Approaches to Increasing the Salt Tolerance of Wheat and Other Cereals. *Journal of Experimental Botany* 57 (5), 1025-1043.

Munns, R., Schachtman, D. P., and Condon, A. G. (1995). The Significance of a Two-Phase Growth Response to Salinity in Wheat and Barley. *Australian Journal of Plant Physiology* 22, 561–569.

Munns, R., and Termaat, A. (1986). Whole-Plant Responses to Salinity. *Functional Plant Biology* 13 (1), 143-160.

Munns, R., and Tester, M. (2008). Mechanisms of Salinity Tolerance. *Annual Review of Plant Biology* 59, 651-681.

Murkute, A., Sharma, S., and Singh, S. (2006). Studies on Salt Stress Tolerance of Citrus Rootstock Genotypes with Arbuscular Mycorrhizal Fungi. *Horticultural Science* 33, 70-76.

Murkute, A. A., Sharma, S., and Singh, S. (2005). Citrus in Terms of Soil and Water Salinity: a Review. *Journal of Scientific and Industrial Research* 64 (6), 393.

Najqfian, S., Rahemi, M., and Tavallali, V. (2008). Effect of Salinity on Tolerance of Two Bitter Almond Rootstocks. *American-Eurasian Journal of Agricultural and Environmental Sciences* 3 (2), 264-268.

Navarro, J., Gomez-Gomez, A., Perez-Perez, J., and Botia, P. (2010). Effect of Saline Conditions on the Maturation Process of Clementine Clemenules Fruits on Two Different Rootstocks. *Spanish Journal of Agricultural Research* 8, 21-29.

Nazarbeygi, E., Yazdi, H. L., Naseri, R., and Soleimani, R. (2011). The Effects of Different Levels of Salinity on Proline and A-, B- Chlorophylls in Canola. *American-Eurasian Journal of Agriculture and Environmental Science* 10, 70-74.

Netondo, G. W., Onyango, J. C., and Beck, E. (2004). Sorghum and Salinity: I. Response of Growth, Water Relations, and Ion Accumulation to NaCI Salinity. *Crop Science* 44 (3), 797-805.

Neumann, P. (1997). Salinity Resistance and Plant Growth Revisited. *Plant, Cell & Environment* 20 (9), 1193-1198.

Nieves, M., Cerda, A., and Botella, M. (1991). Salt Tolerance of Two Lemon Scions Measured by Leaf Chloride and Sodium Accumulation. *Journal of Plant Nutrition* 14 (6), 623-636.

Okcu, G., Kaya, M. D., and Atak, M. (2005). Effects of Salt and Drought Stresses on Germination and Seedling Growth of Pea (*Pisum sativum* L.). *Turkish Journal of Agriculture and Forestry* 29 (4), 237-242.

Olave-Concha, N., Ruiz-Lara, S., Munoz, X., Bravo, L. A., and Corcuera, L. J. (2004). Accumulation of Dehydrin Transcripts and Proteins in Response to Abiotic Stresses in *Deschampsia antarctica*. *Antarctic Science* 16 (2), 175-184.

Ollitrault, P., Dambier, D., Luro, F., and Froelicher, Y. (2008). Ploidy Manipulation for Breeding Seedless Triploid Citrus. *Plant Breeding Reviews, Volume 30*, 323-352.

Omami, E. (2005). Salt Tolerance of Amaranth as Affected by Seed Priming. *PhD Thesis.*: University of Pretoria

Pankova, Y. I., and Konyushkova, M. (2013). Effect of global warming on soil salinity of the arid regions. *Russian Agricultural Sciences* 39 (5-6), 464-467.

Paranychianakis, N. V., Chartzoulakis, K. S., and Angelakis, A. N. (2004). Influence of Rootstock, Irrigation Level and Recycled Water on Water Relations and Leaf Gas Exchange of Soultanina Grapevines. *Environmental and Experimental Botany* 52 (2), 185-198.

Parida, A. K., Das, A., and Mittra, B. (2004). Effects of Salt on Growth, Ion Accumulation, Photosynthesis and Leaf Anatomy of the Mangrove, *Bruguiera parviflora*. *Trees* 18 (2), 167-174.

Parida, A. K., and Das, A. B. (2005). Salt Tolerance and Salinity Effects on Plants: a Review. *Ecotoxicology and Environmental Safety* 60 (3), 324-349.

Parry, M. L., Rosenzweig, C., Iglesias, A., Livermore, M., and Fischer, G. (2004). Effects of climate change on global food production under SRES emissions and socio-economic scenarios. *Global Environmental Change* 14 (1), 53-67.

Pérez-Pérez, J., Syvertsen, J., Botía, P., and García-Sánchez, F. (2007). Leaf Water Relations and Net Gas Exchange Responses of Salinized Carrizo Citrange Seedlings During Drought Stress and Recovery. *Annals of Botany* 100 (2), 335-345.

Pérez-Tornero, O., Tallón, C. I., Porras, I., and Navarro, J. M. (2009). Physiological and Growth Changes in Micropropagated *Citrus macrophylla* Explants Due to Salinity. *Journal of Plant Physiology* 166 (17), 1923-1933.

Peroni, L. A., Ferreira, R. R., Figueira, A., Machado, M. A., and Stach-Machado, D. R. (2007). Expression Profile of Oxidative and Antioxidative Stress Enzymes Based on ESTs Approach of Citrus. *Genetics and Molecular Biology* 30 (3), 872-880.

Prior, L., Grieve, A., Bevington, K., and Slavich, P. (2007). Long-Term Effects of Saline Irrigation Water on 'Valencia' Orange Trees: Relationships Between Growth and Yield, and Salt Levels in Soil and Leaves. *Crop and Pasture Science* 58 (4), 349-358.

Pritchard, S. G., and Amthor, J. S. (2005). *Crops and Environmental Change: an Introduction to Effects of Global Warming, Increasing Atmospheric CO_2 and O_3 Concentrations, and Soil Salinization on Crop Physiology and Yield*. CRC PressI Llc.

Pustovoitova, T., Eremin, G., Rassvetaeva, E., Zhdanova, N., and Zholkevich, V. (1996). Drought Resistance, Recovery Capacity, and Phytohormone Content in Polyploid Plum Leaves. *Russian Journal of Plant Physiology* 43 (2), 232-235.

Qasim, M., Ashraf, M., Jamil, M. A., Ashraf, M., and RHA, E. S. (2003). Water Relations and Leaf Gas Exchange Properties in Some Elite Canola (*Brassica napus*) Lines Under Salt Stress. *Annals of Applied Biology* 142 (3), 307-316.

Radin, J. W., Lu, Z., Percy, R. G., and Zeiger, E. (1994). Genetic Variability for Stomatal Conductance in Pima Cotton and Its Relation to Improvements of Heat Adaptation. *Proceedings of the National Academy of Sciences* 91 (15), 7217-7221.

Rahman, M., Soomro, U., Zahoor-ul-Haq, M., and Gul, S. (2008). Effects of NaCl Salinity on Wheat (*Triticum aestivum* L.) Cultivars. *World Journal of Agricultural Science* 4, 398-403.

Richards, L. A. (1954). Diagnosis and Improvement of Saline and Alkali Soils. *Soil Science* 78 (2), 154.

Rodríguez-Navarro, A., and Rubio, F. (2006). High-Affinity Potassium and Sodium Transport Systems in Plants. *Journal of Experimental Botany* 57 (5), 1149-1160.

Romero-Aranda, R., Soria, T., and Cuartero, J. (2001). Tomato Plant-Water Uptake and Plant-Water Relationships Under Saline Growth Conditions. *Plant Science* 160 (2), 265-272.

Roose, M., Schwarzacher, T., and Heslop-Harrison, J. (1998). Brief Communication. The Chromosomes of Citrus and Poncirus Species and Hybrids: Identification of Characteristic Chromosomes and Physical Mapping of R-DNA Loci Using in Situ Hybridization and Fluorochrome Banding. *Journal of Heredity* 89 (1), 83-86.

Rozpara, E., and Grzyb, Z. (2002). Frutana a New Interstock for Sweet Cherry Trees. *I International Symposium on Rootstocks for Deciduous Fruit Tree Species 658* 247-250.

Rufato, A., Tomaz, Z., Gonçalves, C., Silveira, S., Rufato, L., and Gomes, F. (2007). The Effect of Intergrafting on Fruit Quality and Productivity of Peach Tree'Jubileu'. *VIII International Symposium on Temperate Zone Fruits in the Tropics and Subtropics 872* 349-352.

Ruiz, D., Martínez, V., and Cerdá, A. (1997). Citrus Response to Salinity: Growth and Nutrient Uptake. *Tree Physiology* 17 (3), 141-150.

Said-Al Ahl, H., and Omer, E. (2011). Medicinal and Aromatic Plants Production Under Salt Stress. A Review. 57 (1), 72-87.

Sairam, R., Srivastava, G., Agarwal, S., and Meena, R. (2005). Differences in Antioxidant Activity in Response to Salinity Stress in Tolerant and Susceptible Wheat Genotypes. *Biologia Plantarum* 49 (1), 85-91.

Sairam, R., and Tyagi, A. (2004). Physiology and Molecular Biology of Salinity Stress Tolerance in Plants. *Current Science Bangalore* 86 (3), 407-421.

Sakr, M., and Arafa, A. (2009). Effect of Some Antioxidants on Canola Plants Grown Under Soil Salt Stress Condition. *Pakistan Journal of Biological Sciences* 12 (7), 582.

Saleh, B., Allario, T., Dambier, D., Ollitrault, P., and Morillon, R. (2008). Tetraploid Citrus Rootstocks are MoreTolerant to Salt Stress Than Diploid. *Comptes Rendus Biologies* 331 (9), 703-710.

Sardella, B. A., Matey, V., Cooper, J., Gonzalez, R. J., and Brauner, C. J. (2004). Physiological, Biochemical and Morphological Indicators of Osmoregulatory Stress in California'Mozambique Tilapia *(Oreochromis mossambicus* and *O. urolepis hornorum)* Exposed to Hypersaline Water. *Journal of Experimental Biology* 207 (8), 1399-1413.

Schmutz, U., and Lüdders, P. (1999). Effect of NaCl Salinity on Growth, Leaf Gas Exchange, and Mineral Composition of Grafted Mango Rootstocks (var.'13-1'and 'Turpentine'). *Gartenbauwiss* 64 (2), 60-64.

Seaman, J. (2011). Mechanisms of Salt Tolerance in Halophytes: Can Crop Plants Resistance to Salinity Be Improved. APS.

Seleznyova, A. N., Tustin, D. S., and Thorp, T. G. (2008). Apple Dwarfing Rootstocks and Interstocks Affect the Type of Growth Units Produced During the Annual Growth Cycle: Precocious Transition to Flowering Affects the Composition and Vigour of Annual Shoots. *Annals of Botany* 101 (5), 679-687.

Shafi, M., Zhang, G., Bakht, J., Khan, M., Islam, U., and Khan, M. (2010). Effect of Cadmium and Salinity Stresses on Root Morphology of Wheat. *Pakistan Journal of Botany* 42 (4), 2747-2754.

Shafieizargar, A., Awang, Y., Juraimi, A. S., and Othman, R. (2012). Yield and Fruit Quality of 'Queen'Orange [*Citrus sinensis* (L) Osb.] Grafted on Different Rootstocks in Iran. *Australian Journal of Crop Science* 6 (5), 777.

Shannon , M. C., Grieve , C. M., and Francois , L. E. (1994). Whole-Plant Response to Salinity. *Plant-environment interactions. Marcel Dekker Inc., New York, NY*, 199-244.

Sheokand, S., Kumari, A., and Sawhney, V. (2008). Effect of Nitric Oxide and Putrescine on Antioxidative Responses Under NaCl Stress in Chickpea Plants. *Physiology and Molecular Biology of Plants* 14 (4), 355-362.

Shokrollah, H., Lee Abdullah, T., Sijam, K., and Akmar Abdullah, S. N. (2011). Potential Use of Selected Citrus Rootstocks and Interstocks Against HLB Disease in Malaysia. *Crop Protection* 30 (5), 521-525.

Singh, A., Naqvi, S. A. M. H., and Singh, S. (2002). *Citrus Germplasm: Cultivars and Rootstocks*. Kalyani Publishers.

Singh, A., Saini, M. L., and Behl, R. K. (2004). Seed Germination and Seedling Growth of Citrus (Citrus Species) Rootstocks Under Different Salinity Regimes. *The Indian Journal of Agricultural Sciences* 74 (5), 246-248.

Smart, R. E., and Bingham, G. E. (1974). Rapid Estimates of Relative Water Content. *Plant Physiology* 53 (2), 258-260.

Sotiropoulos, T. (2007). Effect of NaCl and CaCl2 on Growth and Contents of Minerals, Chlorophyll, Proline and Sugars in the Apple Rootstock M 4 Cultured in Vitro. *Biologia Plantarum* 51 (1), 177-180.

Storey, R., and Walker, R. (1998). Citrus and Salinity. *Scientia Horticulturae* 78 (1), 39-81.

Syvertsen, J., and Yelenosky, G. (1988). Salinity Can Enhance Freeze Tolerance of Citrus Rootstock Seedlings by Modifying Growth, Water Relations, and Mineral Nutrition. *Journal of the American Society for Horticultural Science* 113.

Syvertsen, J. P., Melgar, J. C., and García-Sánchez, F. (2010). Salinity Tolerance and Leaf Water Use Efficiency in Citrus. *Journal of the American Society for Horticultural Science* 135 (1), 33-39.

Szabados, L., and Savouré, A. (2010). Proline: a Multifunctional Amino Acid. *Trends in plant science* 15 (2), 89-97.

Tabatabaie, S. J., and Nazari, J. (2007). Influence of Nutrient Concentrations and NaCl Salinity on the Growth, Photosynthesis, and Essential Oil Content of Peppermint and Lemon Verbena. *Turkish Journal of Agriculture and Forestry* 31 (4), 245-253.

Tanou, G., Job, C., Rajjou, L., Arc, E., Belghazi, M., Diamantidis, G., Molassiotis, A., and Job, D. (2009). Proteomics Reveals the Overlapping Roles of Hydrogen Peroxide and Nitric Oxide in the Acclimation of Citrus Plants to Salinity. *The Plant Journal* 60 (5), 795-804.

Tayebimeigooni, A., Awang, Y., Mahmood, M., Selamat, A., and Wahab, Z. (2012). Leaf Water Status, Proline Content, Lipid Peroxidation and Accumulation of

Hydrogen Peroxide in Salinized Chinese Kale (*Brassica alboglabra*). *Journal of Food, Agriculture & Environment* 10 (2), 371-374.

Tester, M., and Davenport, R. (2003). Na^+ Tolerance and Na^+ Transport in Higher Plants. *Annals of Botany* 91 (5), 503-527.

Tojnko, S., Cmelik, Z., and Zadravec, P. (2002). Influence of Interstock on Growth and Cropping of'Red Elstar'Apple. *I International Symposium on Rootstocks for Deciduous Fruit Tree Species 658* 303-306.

Torabi, M. (2010). Physiological and Biochemical Responses of Iranian Alfalfa (*Medicago sativa* L.) Ecotypes to Salt Stress. *PhD Thesis*.: University of Putra Malaysia.

Torabi, M., Halim, R., Sinniah, U., and Choukan, R. (2011). Influence of Salinity on the Germination of Iranian Alfalfa Ecotypes. *African Journal of Agricultural Research* 6 (19), 4624-4630.

Tozlu, I., Guy, C. L., and Moore, G. A. (1999). QTL Analysis of Morphological Traits in an Intergeneric BC1 Progeny of Citrus and Poncirus Under Saline and Non-Saline Environments. *Genome* 42 (5), 1020-1029.

Tozlu, I., Moore, G. A., and Guy, C. L. (2000). Effects of Increasing NaCl Concentration on Stem Elongation, Dry Mass Production, and Macro-and Micro-Nutrient Accumulation in *Poncirus trifoliata*. *Functional Plant Biology* 27 (1), 35-42.

Troncoso, A., Matte, C., Cantos, M., and Lavee, S. (1999). Evaluation Oalt Tolerance of in Vitro-Grown Grapevine Rootstock Varieties. *Vitis* 38 (2), 55-60.

Trovato, M., Mattioli, R., and Costantino, P. (2008). Multiple Roles of Proline in Plant Stress Tolerance and Development. *Rendiconti Lincei* 19 (4), 325-346.

Tyerman, S., and Skerrett, I. (1998). Root ion Channels and Salinity. *Scientia Horticulturae* 78 (1-4), 175-235.

Utset, A., and Borroto, M. (2001). A modeling-GIS approach for assessing irrigation effects on soil salinisation under global warming conditions. *Agricultural Water Management* 50 (1), 53-63.

Velikova, V., and Loreto, F. (2005). On the Relationship Between Isoprene Emission and Thermotolerance in *Phragmites australis* Leaves Exposed to High Temperatures and During the Recovery From a Heat Stress. *Plant, Cell & Environment* 28 (3), 318-327.

Walker, R. (1986). Sodium Exclusion and Potassium-Sodium Selectivity in Salt-Treated Trifoliate Orange (*Poncirus trifoliata*) and Cleopatra Mandarin (*Citrus reticulata*) Plants. *Functional Plant Biology* 13 (2), 293-303.

Walker, R., Torokfalvy, E., and Downton, W. (1982). Photosynthetic Responses of the Citrus Varieties Rangpur Lime and Etrog Citron to Salt Treatment. *Functional Plant Biology* 9 (6), 783-790.

Wang, F., Zeng, B., Sun, Z., and Zhu, C. (2009). Relationship Between Proline and Hg^{2+}-Induced Oxidative Stress in a Tolerant Rice Mutant. *Archives of Environmental Contamination and Toxicology* 56 (4), 723-731.

Wang, Y., Mopper, S., and Hasenstein, K. H. (2001). Effects of Salinity on Endogenous ABA, IAA, JA, and SA in *Iris Hexagona*. *Journal of Chemical Ecology* 27 (2), 327-342.

Webster, A. (1995). Rootstock and Interstock Effects on Deciduous Fruit Tree Vigour, precocity, and Yield Productivity. *New Zealand Journal of Crop and Horticultural Science* 23 (4), 373-382.

Webster, A. D., and Wertheim, S. (2003). 5 Apple Rootstocks. *Apples: Botany, Production and Uses*, 91.

Weibel, A. M. (2008). Dwarfing Mechanisms of Prunus Species as Interstems and Rootstocks on Peach [*Prunus Persica* (L.) Batsch] Tree Vegetative Growth and Physiology. *PhD Thesis.*: Clemson University.

White, P. J., and Broadley, M. R. (2001). Chloride in Soils and Its Uptake and Movement Within the Plant: A Review. *Annals of Botany* 88 (6), 967-988.

Wu, Q.-S., Xia, R.-X., and Zou, Y.-N. (2006). Reactive Oxygen Metabolism in Mycorrhizal and Non-Mycorrhizal Citrus (*Poncirus trifoliata*) Seedlings Subjected to Water Stress. *Journal of Plant Physiology* 163 (11), 1101-1110.

Wu, Q.-S., Zou, Y.-N., and He, X.-H. (2010). Contributions of Arbuscular Mycorrhizal Fungi to Growth, Photosynthesis, Root Morphology and Ionic Balance of Citrus Seedlings Under Salt Stress. *Acta Physiologiae Plantarum* 32 (2), 297-304.

Wu, Q. S., and Zou, Y. N. (2009). Adaptive Responses of Birch-Leaved Pear (*Pyrus betulaefolia*) Seedlings to Salinity Stress. *Notulae Botanicae Horti Agrobotanici Cluj-Napoca* 37 (1), 133-138.

Xue, X., Liu, A., and Hua, X. (2009). Proline Accumulation and Transcriptional Regulation of Proline Biothesynthesis and Degradation in *Brassica napus*. *BMB Reports* 42 (1), 28-34.

Yadav, S., Irfan, M., Ahmad, A., and Hayat, S. (2011). Causes of Salinity and Plant Manifestations to Salt Stress: a Review. *Journal of Environmental Biology/Academy of Environmental Biology, India* 32 (5), 667.

Yang, L.-H., Huang, H., and Wang, J.-J. (2010). Antioxidant Responses of Citrus Red Mite, *Panonychus citri* (McGregor) (Acari: Tetranychidae), Exposed to Tthermal Stress. *Journal of Insect Physiology* 56 (12), 1871-1876.

Yang, X., and Lu, C. (2005). Photosynthesis Is Improved by Exogenous Glycinebetaine in Salt-Stressed Maize Plants. *Physiologia Plantarum* 124 (3), 343-352.

Yohannes, D. B. (2006). Studies on Salt Tolerance in *Vitis spp*. *PhD Thesis.*: Agricultrual Sciences University of Dharwad.

Zapata, J. C., Cerdá, A., and Nieves, M. (2004). Interstock-Induced Mechanism of Increased Growth and Salt Resistance of Orange (*Citrus sinensis*) Trees. *Tree Physiology* 24 (10), 1109-1117.

Zapata, J. C., Nieves, M., and Cerdá, A. (2003). Improvement in Growth and Salt Resistance of Lemon (*Citrus limon*) Trees by an Interstock-Induced Mechanism. *Tree Physiology* 23 (13), 879-888.

Zarrouk, O., Gogorcena, Y., Moreno, M. A., and Pinochet, J. (2006). Graft Compatibility Between Peach Cultivars and Prunus Rootstocks. *HortScience* 41 (6), 1389-1394.

Zekri, M. (1991). Effects of NaCl on Growth and Physiology of Sour Orange and Cleopatra Mandarin Seedlings. *Scientia Horticulturae* 47 (3), 305-315.

Zekri, M. (1993). Seedling Emergence, Growth, and Mineral Concentration of Three Citrus Rootstocks Under Salt Stress. *Journal of Plant Nutrition* 16 (8), 1555-1568.

Zekri, M. (2001). Salinity Effect on Seedling Emergence, Nitrogen and Chloride Concentrations, and Growth of Citrus Rootstocks. *Proceedings of the Florida State Horticultural Society* 114, 79-82.

Zekri, M., and Parsons, L. R. (1990). Response of Split-Root Sour Orange Seedlings to NaCl and Polyethylene Glycol Stresses. *Journal of Experimental Botany* 41 (1), 35-40.

Zekri, M., and Parsons, L. R. (1992). Salinity Tolerance of Citrus Rootstocks: Effects of Salt on Root and Leaf Mineral Concentrations. *Plant and Soil* 147 (2), 171-181.

Zhang, X.-Y., Hu, C.-G., and Yao, J.-L. (2010). Tetraploidization of Diploid *Dioscorea* Results in Activation of the Antioxidant Defense System and Increased Heat Tolerance. *Journal of Plant Physiology* 167 (2), 88-94.

Zhen, A., Bie, Z., Huang, Y., Liu, Z., and Lei, B. (2011). Effects of Salt-Tolerant Rootstock Grafting on Ultrastructure, Photosynthetic Capacity, and H_2O_2 Scavenging System in Chloroplasts of Cucumber Seedlings under NaCl Stress. *Acta Physiologiae Plantarum* 33 (6), 2311-2319.

Zhu, J.-K. (2001). Plant Salt Tolerance. *Trends in Plant Science* 6 (2), 66-71.