The European Journal of Plant Science and Biotechnology ©2011 Global Science Books

The Use of Halophytes for Mediterranean Landscaping

Carla Cassaniti* • **Daniela Romano**

Department of Agriculture and Food Science, University of Catania, Via Valdisavoia 5, 95123, Catania, Italy

Corresponding author: * ccassani@unict.it

ABSTRACT

A study was carried out to identify some halophytes that naturally grow in the Mediterranean area, which could be utilized for ornamental purposes. The current investigation, based also on previous literature, showed about 172 suitable species in 30 families and 86 botanical genera. The *Chenopodiaceae* was found to be the largest family with 34 species. Within the genera, the most represented were *Limonium* and *Atriplex* (17 and 14 species, respectively). The most common life form was the herbaceous perennial (49%), the hydrohalophyte the most widespread habitat (about 40%). The characteristic lack of showy flowers in most of these halophytes, suggests the opportunity of using them to provide green areas with aesthetic features. The tolerance to saline environments allows these plants to be used in landscape restoration. Prostrate species such as *Carpobrotus edulis*, *Mesembryanthemum crystallinum* and *M. nodiflorum* seem to be of particular value not only for the spectacular blooming but also for their utilization such as groundcover. Future studies should be carried out in order to improve halophyte use with appropriate protocols for cultivation.

Keywords: plant selection, revegetation, salinity, sustainable landscape, xeriscape

INTRODUCTION

The use of native plants for green areas has been recently analyzed, in accordance with agronomical, political, social, cultural and ecological needs (Hitchmough 2004). As reported in the Brundtland Report (1987), the concept of sustainability or *the needs of the present without compromising the ability of future generations*, is of increasing interest. Therefore terms like "sustainable landscape", "environmental friendly landscape", "xeriscape", "xerogarden" and "wild garden" are becoming common (Franco *et al*. 2006). In this frame native plants have a more important role for their adaptability to both biotic and abiotic stress than their aesthetic features (Iles 2003; Savè 2009). Although interest in them has recently risen for restoring disturbed landscapes, controlling erosion, improving the aesthetic quality of various environments (urban, recreational areas, interiorscapes, commercial sites) (Martinez-Sànchez *et al*. 2003; Savè 2009), they have been largely ignored in landscaping (Romano 2004). The growth of tourism in many developing countries and the expansion of cities in coastal areas justify further the use of species irrigated with marginal water, thus saving fresh water for human consumption.

Amongst native plants halophytes play an important role for desert and coastal areas (Aronson 1985). The demand for landscaping plantings with low water requirement (Clark and Matheny 1998) and low cost management is increasing, and this has led to halophytes being used for revegetation or preserving soils with little plant cover. The use of native halophytes could also be promulgated for new green typologies (where salt stress is more accentuated) like roof gardens or living walls. There is potentially a large number of halophytes in the Mediterranean basin, which is considered one of the world's major centres of plant biodiversity (Mèdail and Quèzel 1997). This theme received great attention because 2010 was the International Year of Biodiversity.

The aim of the current investigation was to identify some halophytes, growing naturally in the Mediterranean area, which could be utilized for ornamental purpose.

MATERIALS AND METHODS

A plant list was created starting from the halophyte data base reported by Aronson (1989) which counts more than 1560 species in 550 genera and 117 families. All the native species of the Mediterranean environment that showed morphological or functional traits which might be of use for landscaping were included. For each species, the botanical family, life form, plant type, distribution and economic use provided originally by Aronson were considered. The scientific name and botanical family was checked with GRIN Taxonomy for Plant (USDA http://www.ars-grin.gov/cgi-bin/npgs/html/taxecon.pl) and the International Plant Names Index (http://www.ipni.org/). For life form, plants were classified as annuals, chamaephytes (small shrub under 0.5 m average height), nano-chamaephytes (dwarf shrub under 0.25 m average height), geophytes, herbaceous perennials, perennial grasses, sea grasses, shrubs and trees (with an average height of 2 and 8 m).

Table 1 List of economic use codes utilized[a].

Code	Category	Economic use
0100	Food and drink	Vegetable and fruits
0111	Food and drink	Uncooked vegetables
0124	Food and drink	Pickles
0131	Food and drink	Flour/meal
0310	Food and drink	Oilseed
0410	Food and drink	Salt and salt substitutes
1700	Domestic products	Thatching
2100	Timber	Fuel
2110	Timber	Fuel wood
2310	Timber	Poles
3100	Forage	Grazing
3200	Forage	Browse
3300	Forage	Fodder
3320	Forage	Silage
4520	Land use	Sand stabilization
4850	Land use	Salt-tolerant ornamental
7500	Medical	Respiratory system
8131	Chemical	Gum (including mucilages)

[a]From SEPASAL database (Royal Botanical Garden, Kew, London)

Received: 17 September, 2010. Accepted: 21 January, 2011.

Research Note

Referring to plant type, the primary habitat in which a taxon is normally found in nature, plants were classed as chasmophytes (cliff-dwelling species), hydrohalophytes (species from temperate zone salt marshes), phreatophytes (deep-rooted plants that obtain water from a permanent ground supply or from the water table), psammophiles (sand loving plants commonly found in littoral strand or inland sand-fields), weedy (species with high degree of adaptability), xerophytes (sand-loving plants) and xerohalophytes (inland salt desert species).

The distribution indicates the geographic distribution of each taxon, when "INTRO" is reported, it means that the taxon has been introduced and become naturalized.

Concerning the economic use, the numerical code adapted comes from a version of SEPASAL (*Survey of Economic Plants for Arid and Semi-Arid Lands*) database Economic Use code developed by G. E. Wickens and co-workers at the Royal Botanic Gardens, Kew, UK (**Table 1**).

RESULTS AND DISCUSSION

The importance of individuating halophytes adapted to saline environments is increasing for the development of the Mediterranean area (Choukr-Allah 1996). These species are commercially interesting since their potential salinity tolerance could be an important feature in reducing production costs. Moreover, their use in revegetation could be useful for landscape recovery and biodiversity maintenance (Morales *et al*. 2001).

In our study we identified 172 species, belonging to 30 families and 86 botanical genera (**Table 2**). Every species reported in the list showed traits that might be of use in Mediterranean landscapes where salinity and scarcity of water resources are substantial problems, because they show resistance to salt and drought stress, high water use efficiency (Morales *et al*. 2000; Franco *et al*. 2002; Clary *et al*. 2004), with wide adaptability within the genera and species (Sànchez-Blanco *et al*. 2002; Torrecillas *et al*. 2003). As expected the most representative family was the *Chenopodiaceae* (with 34 species), followed by the *Poaceae* (18 species) and *Plumbaginaceae* (17 species).

The *Chenopodiaceae* is the family with the largest number of halophytes; about 44% of the genera within the family have halophytic species (Flowers *et al*. 1986) which can accumulate large quantities of inorganic ions in their aerial tissues in response to increases in external salt concentration (Shekhawat 2006). In **Table 2**, the genus *Atriplex* (family *Chenopodiaceae*) is well represented with 14 species, and most of them are used for saline soil desalinization and for increasing crop yield on soils with marginal salinity (Albaho and Green 2000).

However, the best represented genus among those listed in **Table 2** is *Limonium* in the family *Plumbaginaceae* (17 species). It is known that in these species salts can be excreted directly by leaf salt glands, such excretion representing an efficient way of avoiding the toxic accumulation of salts in the leaves (Batanouny *et al*. 1992). In addition, Morales *et al*. (2001) showed that wild genotypes, such as *Limonium pectinatum*, are more tolerant to high salt concentration (200 mM NaCl) than cultivated genotypes like 'Beltlaard', due to a greater capacity to compartmentalise salts in the vacuole and regulation of toxic ions by excretion through salt glands.

The most common life form listed in **Table 2** is the herbaceous perennial, with 49% of the species. About 40% of the identified plants (69 species) were hydrohalophytes, likely a consequence of the most widespread habitat, the temperate zone salt marshes, which are typical of the Mediterranean. Furthermore, the great biodiversity and environmental characteristics that characterize the Mediterranean environment, allow a high number of halophytes grow, ensuring possible ornamental use. This is confirmed by the results obtained from the economic use: 40 species from the 172 investigated are in fact utilized for ornamental purpose (land use category). Only 16 species are used for forage, 11 species for vegetables and fruit, 4 species for timber, and few species for sand stabilization, medical and chemical purposes. The economic use has not been identified for about 100 species, highlighting the chance of their future use for ornamental landscaping. The plant characteristics that most of them lack showy flowers, suggest that they may best be used for their foliage. Given the increase of urban and peri-urban environments, the utilization of these halophytes, perhaps with few aesthetic features, is based on biological and physical concepts and horticultural principles of plant production, ecosystem and plant management in landscape settings and sociological aspects of plant/people interactions (Savè 2009). Halophytes are mainly suitable for restoration of disturbed landscapes, control of erosion and reduction of energy and water consumption. Therefore the prostrate species used as groundcover, like *Carpobrotus edulis*, *Mesembryanthemum crystallinum* and *M. nodiflorum*, seem to be of particular interest. These species could be taken into consideration because they have a very attractive blooming, even for a short period of time. It is also remarkable that the majority of species in which ornamental characters have been reported, belong to the genus *Limonium*. Intensive research programs to identify ornamental halophytes suited to arid environment are being developed in different parts of the world (Lieth 1999), and some species including *Limonium* spp. are already grown commercially (Zia *et al*. 2008).

CONCLUSIONS

Our study highlighted the increasing importance of utilizing halophytes in landscaping and identified native species that are better suited for a sustainable environment. Future studies should be carried out in order to improve their use with appropriate protocol of cultivation.

ACKNOWLEDGEMENTS

The authors thank Dr. Anne Wetson for revision of the written English in the manuscript.

REFERENCES

Adams CD (1972) *Flowering Plants of Jamaica*, University of West Indies, Jamaica, 848 pp

Albaho MS, Green JL (2000) *Suaeda salsa*, a desalinating companion plant for greenhouse tomato. *HortScience* **35**, 620-623

Aronson JA (1981-88) *Unpublished data*

Aronson JA (1982) *Halophytes of Central America and the Caribbean Region* (Vol BGUN-ARI) Ben Gurion University of the Negev, Beer-Sheva, Israel

Aronson JA (1989) *HALOPH: A data base of salt tolerant plants of the World*. Office of Arid Lands Studies, University of Arizona, Tucson, Arizona

Aronson JA, Pasternak D, Danon A (1988) Introduction and first evaluation of 120 halophytes under seawater irrigation. In: Whitehead EE, Hutchinson CF, Timmermann BN, Varady RG (Eds) *Arid Lands: Today and Tomorrow*, Proceedings of an international research and development conference, October 20-25 1985, Tucson Arizona, Westview Press, Boulder, Colorado, pp 737-746

Barbour MG, De Jong TM (1977) Response of West Coast beach taxa to salt spray, sea water inundation, and soil salinity. *Bulletin Torrey Botanical Club* **104**, 29-34

Batanouny KH, Hassan AA, Fahmy GM (1992) Ecophysiological studies on halophytes in arid and semi-arid zones. II. The salt secreting *Limonium delicatum* (Gir.) Ktze. *Flora* **186**, 105-116

Baum B (1978) *The Genus Tamarix*, The Israel Academy of Sciences and Humanities, Jerusalem, 209 pp

Bender MM (1971) Variations in the $^{13}C/^{12}C$ rations of plants in relation to the pathway of photosynthetic carbon dioxide fixation. *Phytochemistry* **10**, 1239-1244

Boston KG (1983) The development of salt pans on tidal marshes, with particular reference to south-eastern Australia. *Journal of Biogeography* **10**, 1-10

Bramwell D, Bramwell Z (1974) *Wild Flowers of the Canary Islands*, Stanley Thornes Ltd., London, 261 pp

Breckle SW (1983) Temperate deserts and semi-deserts of Afghanistan and Iran. In: Goodall DW, West N (Eds) *Ecosystems of the World* (Vol 5), Amsterdam, Elsevier, pp 271-316

Brundtland Report (1987) *The Report of the Brundtland Commission*, *Our Common Future*, Oxford University Press, 43 pp

Chaudri II, Shah BH, Naqvi N, Mallick IA (1964) Investigations on the role of *Suaeda fruticola* Forssk. in the reclamation of saline and alkaline soils in

Table 2 Botanical family, species, life form, plant type, origin, economic use and references of the investigated halophytes[a].

Botanical family[b]	Species[b]	Life form[c]	Plant type[d]	Origin[e]	Economic code[f]	References
Aizoaceae	*Carpobrotus edulis* (L.) N. E. Br.	HP	Xero	sAfrica, Intro: Cosm.	4850	Prescott and Venning 1984; Aronson *et al*. 1988
Aizoaceae	*Disphyma crassifolium* (L.) L. Bolus	CH	Psamm	sAfrica, Intro: Australia, Europe	4850	Prescott and Venning 1984; Aronson *et al*. 1988
Aizoaceae	*Drosanthemum candens* Schwantes	HP	Xero	sAfrica, Intro: Australia, Europe	4850	Tutin *et al*. 1964; Shomer-Ilan 1985; Aronson *et al*. 1988
Aizoaceae	*Mesembryanthemum crystallinum* L.	A	Xero	sAfrica, Intro: Med.	4850	Winter and Troughton 1978; Aronson *et al*. 1988
Aizoaceae	*Mesembryanthemum nodiflorum* L.	A	Xeroh	Cosm.	-	Winter 1974
Aizoaceae	*Tetragonia tetragonoides* (Pall.) Kuntze	HP	Psamm	Cosm.	4850	Aronson *et al*. 1988
Apiaceae	*Ammi visnaga* (L.) Lam.	A	Weedy	wMed., Europe, Asia, NAmerica	-	Mason 1957; Tutin *et al*. 1964
Apiaceae	*Crithmum maritimum* L.	HP	Chas	Med., Europe	4850	Tutin *et al*. 1964; Okusanya 1979; Aronson *et al*. 1988
Apiaceae	*Eryngium maritimum* L.	A	Psamm	Med.	4850	Tutin *et al*. 1964; Martin 1969; Zohari 1972
Apiaceae	*Ligusticum scoticum* L.	HP	Chas	nEurope	-	Tutin *et al*. 1964; Okusanya 1979
Apiaceae	*Oenanthe fistulosa* L.	HP	Hyhal	Europe	0131, 0310	Corre 1977
Apiaceae	*Oenanthe lachenalii* C. Gmel	HP	Hyhal	seEurope	-	Martin 1969
Asparagaceae	*Drimia maritima* (L.) Stearn	G	Psamm	Med.	4850	Feinbrun 1986; Aronson *et al*. 1988
Asteraceae	*Inula crithmoides* L.	HP	Psamm	Med.	4850	Dubuis and Simmonneau 1960; Okusanya 1979; Shomer-Ilan 1985; Aronson *et al*. 1988
Asteraceae	*Leontodon saxatilis* Lam.	HP	Weedy	Europe, Intro: California	-	Mason 1957
Asteraceae	*Otanthus maritimus* (L.) Hoffmanns. & Link	HP	Psamm	Med.	4850	Feinbrun 1978; Shomer-Ilan 1985; Aronson *et al*. 1988
Asteraceae	*Tripolium pannonicum* (Jacq.) Dobrocz. subsp. *tripolium* (L.) Greuter	HP	Hyhal	Europe, Asia	-	Corre 1977; Corre 1985
Brassicaceae	*Cakile edentula* (Bigelow) Hook.	A	Psamm	Europe, California	-	Tutin *et al*. 1964
Brassicaceae	*Cakile maritima* Scop.	HP	Psamm	Cosm.	0111	Tutin *et al*. 1964
Brassicaceae	*Cochlearia anglica* L.	HP	Hyhal	Europe	-	Tutin *et al*. 1964
Brassicaceae	*Cochlearia danica* L.	HP	Weedy	Europe	-	Shishkin 1936; Tutin *et al*. 1964
Brassicaceae	*Cochlearia officinalis* L.	HP	Chas	Europe, Intro: NAmerica	-	Tutin *et al*. 1964
Brassicaceae	*Crambe maritima* L.	A	Psamm	Med.	-	Tutin *et al*. 1964; Aronson *et al*. 1988
Brassicaceae	*Lepidium cardamines* L.	A	Hyhal	wMed.	-	Tutin *et al*. 1964
Brassicaceae	*Lepidium cartilagineum* (J. C. Mayer) Thell. subsp. *cartilagineum*	A	Hyhal	Europe	-	Tutin *et al*. 1964
Brassicaceae	*Lepidium ruderale* L.	A	Weedy	Europe, NAmerica	-	Martin 1969
Brassicaceae	*Lobularia maritima* (L.) Desv.	A	Psamm	Europe, wAsia	-	Tutin *et al*. 1964
Caryophyllaceae	*Arenaria graveolens* Schreb.	A	Psamm	Med.	-	Dubuis and Simmonneau 1960
Caryophyllaceae	*Cerastium glomeratum* Thuill	A	Psamm	Med.	-	Dubuis and Simmonneau 1960
Caryophyllaceae	*Honckenya peploides* (L.) Ehrh.	HP	Psamm	Europe, Intro: NAmerica	-	Tutin *et al*. 1964; Barbour and De Jong 1977
Caryophyllaceae	*Spergularia diandra* (Guss.) Heldr.	HP	Weedy	Med., Irano-Turanian and Saharo-Arabian regions	-	Quèzel 1965; Zohary 1966
Caryophyllaceae	*Spergularia marina* (L.) Griseb.	A	Weedy	Cosm.	-	Dubuis and Simmonneau 1960; Mepham and Mepham 1985; Shomer-Ilan 1985
Caryophyllaceae	*Spergularia rubra* (L.) J. Presl & C. Presl	A	Weedy	Med., Europe, Intro: Australia	-	Zohary 1966; Malcolm 1985; Mepham and Mepham 1985
Chenopodiaceae	*Arthrocnemum parviflorum* Lowe	CHN	Hyhal	nAfrica, Med.	-	-
Chenopodiaceae	*Atriplex argentea* Nutt.	A	Hyhal	wNAmerica, Intro: Europe	3200	Munz and Keck 1968; Henrickson 1977
Chenopodiaceae	*Atriplex calotheca* (Rafn) Fr.	A	Psamm	Europe	-	Tutin *et al*. 1964
Chenopodiaceae	*Atriplex cana* C. A. Mey.	CH	Xeroh	Europe, Asia	2110, 3300	Shishkin 1936; Tutin *et al*. 1964; Somers *et al*. 1979; Pasternak *et al*. 1980
Chenopodiaceae	*Atriplex glabriuscula* Edmondston	CHN	Psamm	Europe	-	Tutin *et al.* 1964; Osmond *et al*. 1980
Chenopodiaceae	*Atriplex heterosperma* Bunge	A	Weedy	Eurasia	-	Shishkin 1936; Tutin *et al*. 1964; Osmond *et al*. 1980
Chenopodiaceae	*Atriplex hortensis* L.	A	Xero	Cosm.	0111	Shishkin 1936; Tutin *et al*. 1964; Osmond *et al*. 1980
Chenopodiaceae	*Atriplex littoralis* L.	A	Psamm	Cosm.	0111	Shishkin 1936; Osmond *et al*. 1980
Chenopodiaceae	*Atriplex nitens Schkuhr*	CHN	Xero	Asia, Intro: Europe, nAmerica	-	Osmond *et al*. 1980

Table 2 (Cont.)

Botanical family[b]	Species[b]	Life form[c]	Plant type[d]	Origin[e]	Economic code[f]	References
Chenopodiaceae	*Atriplex portulacoides* L.	HP	Hyhal	Euro-Siberian and Med. regions	4850	Shomer-Ilan 1985; Aronson *et al*. 1988
Chenopodiaceae	*Atriplex prostrata* Boucher ex DC	A	Hyhal	Europe, tempAmerica, Australia	-	Osmond *et al*. 1980; Wilson 1984
Chenopodiaceae	*Atriplex prostrata* Phil var. *longipes* (Drejer) Meijden	CHN	Psamm	Eurasia	-	Tutin *et al*. 1964
Chenopodiaceae	*Atriplex rosea* L.	A	Xero	nAmerica, Med., Europe, Asia	0124, 0410	Shishkin 1936; Osmond *et al*. 1980
Chenopodiaceae	*Atriplex tatarica* L.	A	Weedy	Europe	-	Tutin *et al*. 1964
Chenopodiaceae	*Atriplex verrucifera* M. Bieb.	CH	Hyhal	Eurasia	3200	Shishkin 1936; Tutin *et al*. 1964
Chenopodiaceae	*Bassia hirsuta* Hartmann	A	Psamm	Europe, Med.	-	Tutin *et al*. 1964; Corre 1985
Chenopodiaceae	*Bassia hyssopifolia* (Pall.) Kuntze	A	Weedy	Europe, Asia, Intro: Australia	-	Tutin *et al*. 1964; Munz and Keck 1968; Wilson 1984
Chenopodiaceae	*Bassia scoparia* (L.) A. J. Scott	A	Xero	Europe, Asia, Intro: Cosm.	4850	Shishkin 1936; Munz and Keck 1968
Chenopodiaceae	*Bassia sedoides* Asch.	A	Xero	Europe	-	Tutin *et al*. 1964
Chenopodiaceae	*Chenopodium botryodes* Sm.	A	Weedy	Europe, Intro: Cosm.	-	Tutin *et al*. 1964; Corre 1985
Chenopodiaceae	*Halocnemum strobilaceum* (Pall.) M. Bieb.	CH	Xeroh	Med., Irano-Turanian and Saharo-Arabian regions, eAfrica, India	4850	Shishkin 1936; Zohary 1972; Breckle 1983; Mepham and Mepham 1985
Chenopodiaceae	*Halogeton sativus* (L.) Moq.	A	Xeroh	swMed.	0410	Tutin *et al*. 1964
Chenopodiaceae	*Halopeplis amplexicaulis* Ung.-Sternb. ex Ces. , Pass. & Gibelli	HP	Xero	wMed., NAfrica	-	Dubuis and Simmonneau 1960; Tutin *et al*. 1964
Chenopodiaceae	*Halopeplis pygmaea* (Pall.) Bunge ex Ung.-Sternb.	A	Psamm	Europe	-	Tutin *et al*. 1964
Chenopodiaceae	*Maireana brevifolia* (R. Br.) Paul G. Wilson	SH	Weedy	Australia, Intro: Med.	3100	Wilson 1984; Mepham and Mepham 1985
Chenopodiaceae	*Salicornia dolichostachya* Moss.	A	Hyhal	nwEurope	-	Tutin *et al*. 1964
Chenopodiaceae	*Salicornia europea* L.	A	Hyhal	subCosm.	0111, 0124, 0310	O'Leary *et al.* 1986
Chenopodiaceae	*Salicornia procumbens* Sm.	A	Hyhal	Europe	-	Tutin *et al*. 1964
Chenopodiaceae	*Salicornia ramosissima* Woods	CH	Hyhal	nwEurope, wMed.	-	Tutin *et al*. 1964
Chenopodiaceae	*Sarcocornia fruticosa* (L.) A. J. Scott	CH	Hyhal	Med.	-	Zohari 1972; Aronson *et al.* 1988
Chenopodiaceae	*Sarcocornia pacifica* (Standl.) A. J. Scott	A	Xero	Cosm.	0310, 3100	Ragonese 1951; Chaudhri *et al*. 1964; Saxena and Gupta 1972
Chenopodiaceae	*Suaeda splendens* Gren. & Godr.	SH	Xero	Med.	3100	Shomer-Ilan 1985; Aronson *et al*. 1988
Chenopodiaceae	*Suaeda vera (*Forssk.) J.F. Gmel	CHN	Hyhal	Med.	4850	Aronson *et al*. 1988
Convolvulaceae	*Calystegia sepium* (L.) R. Br.	HP	Hyhal	Europe, Intro: NAmerica	-	Mason 1957; Mepham and Mepham 1985
Convolvulaceae	*Calystegia soldanella* (L.) Roem. & Schult.	HP	Psamm	Europe, Intro: Cosm.	-	Munz and Keck 1968; Barbour and De Jong 1977
Convolvulaceae	*Convolvulus cneorum* L.	CH	Psamm	swEurope	4850	Aronson 1981-88
Convolvulaceae	*Cressa cretica* L.	HP	Hyhal	Med. and Irano-Turanian regions, eAfrica	-	Saxena and Gupta 1972; Aronson 1982; Mepham and Mepham 1985
Convolvulaceae	*Ipomoea imperati* (Vahl) Griseb.	HP	Psamm	Med., Pantrop	4850	Feinbrun 1978; Shomer-Ilan 1985; Aronson *et al.* 1988
Convolvulaceae	*Ipomoea sagittata* Poir.	HP	Hyhal	Med., TropAmerica	-	Feinbrun 1978; Aronson 1981-88
Cyperaceae	*Bolboschoenus affinis* Drobow	HP	Hyhal	Eurasia	3300	Shishkin 1936
Cyperaceae	*Bolboschoenus compactus* Drobow	HP	Hyhal	Eurasia	0111	Shishkin 1936
Cyperaceae	*Bolboschoenus maritimus* (L.) Palla	HP	Hyhal	Europe	3100	Shishkin 1936; Corre 1985; Feinbrun 1986
Cyperaceae	*Carex divisa* Huds.	HP	Hyhal	Eurasia	3100	Shishkin 1936; Corre 1985; Feinbrun 1986
Cyperaceae	*Carex extensa* Gooden.	HP	Hyhal	Med., Europe, Intro: Middle East	3100	Martin 1969; Corre 1985
Cyperaceae	*Carex marcida* Raeusch	HP	Hyhal	nEurope	-	-
Cyperaceae	*Carex songorica* Kar. & Kir.	HP	Hyhal	Europe	-	-
Cyperaceae	*Cyperus laevigatus* L.	HP	Hyhal	Med., Irano-Turanian and Saharo-Arabian regions, SAmerica	-	Ragonese and Covas 1947; Feinbrun 1986
Cyperaceae	*Cyperus odoratus* L.	HP	Hyhal	Cosm.	-	Bender 1971
Cyperaceae	*Cyperus papyrus* L.	HP	Hyhal	Cosm.	-	Mepham and Mepham 1985; Feinbrun 1986
Cyperaceae	*Eleocharis palustris* (L.) Roem. & Schult.	HP	Hyhal	Cosm.	-	Munz and Keck 1968; Feinbrun 1986
Plumbaginaceae	*Limonium girardianum Fourr.*	HP	Hyhal	Med.	4850	Corre 1985
Plumbaginaceae	*Limonium meyeri Kuntze*	HP	Hyhal	eMed.	4850	Aronson 1981-88; Aronson *et al*. 1988

Table 2 (Cont.)

Botanical family[b]	Species[b]	Life form[c]	Plant type[d]	Origin[e]	Economic code[f]	References
Cyperaceae	*Eleocharis parvula* (Roem. & Schult.) Link ex Bluff *et al*.	A	Hyhal	Cosm.	-	Mason 1957
Cyperaceae	*Schoenoplectus americanus* (Pers.) Volkart ex Schinz & R. Keller	HP	Hyhal	Cosm.	-	Ragonese and Covas 1947; Mason 1957
Cyperaceae	*Schoenoplectus tabernaemontani* (C. C. Gmel.) Palla	HP	Hyhal	Eurasia	-	Shishkin 1936; Martin 1969
Cyperaceae	*Scirpoides holoschoenus* (L.) Soják	HP	Psamm	Europe, Australia	-	Martin 1969; Danin 1981
Fabaceae	*Alhagi maurorum* Medik.	CH	Weedy	Med.	-	Zohari 1972; Dafni 1975; Aronson 1981-88
Fabaceae	*Lathyrus palustris* L.	HP	Hyhal	Namerica, Europe	-	Mason 1957; Munz and Keck 1968
Fabaceae	*Lotus creticus* L.	HP	Psamm	Med.	4850	Zohari 1972; Aronson *et al*. 1988
Fabaceae	*Lotus cytisoides* L.	HP	Chas	Med.	4850	Zohari 1972; Aronson *et al*. 1988
Fabaceae	*Lotus halophilus* Boiss. & Spruner	HP	Psamm	Med. and Saharo-Arabian regions	-	-
Fabaceae	*Lotus preslii* Ten.	HP	Psamm	Med.	3100	Corre 1985
Fabaceae	*Medicago littoralis* Rohde ex Loisel	A	Psamm	Med.	-	Zohari 1972; Corre 1985
Fabaceae	*Medicago marina* L.	HP	Psamm	Med.	-	Zohari 1972; Corre 1985
Fabaceae	*Trifolium resupinatum* L.	HP	Psamm	Australia, Med.	-	Heerkloss and Bartolomaeus 1980
Fabaceae	*Trifolium squamosum* L.	HP	Psamm	Med.	3100	Corre 1985
Fabaceae	*Trifolium tomentosum* L.	HP	Psamm	Med.	-	Danin 1981
Frankeniaceae	*Frankenia boissieri* Reut. ex Boiss.	HP	Hyhal	wMed.	-	Tutin *et al.* 1964
Frankeniaceae	*Frankenia hirsuta* L.	HP	Psamm	Med., Middle East, Europe, Asia	-	Tutin *et al.* 1964; Quèzel 1965
Frankeniaceae	*Frankenia pulverulenta* L.	A	Psamm	Cosm.	4850	Quezèl 1965; Aronson *et al.* 1988; Shomer-Ilan 1985
Hydrocharitaceae	*Halophila stipulacea* Asch.	AQ	Weedy	Saharo-Arabian region, Europe	-	Tutin *et al.* 1964
Juncaceae	*Juncus balticus* Willd.	HP	Hyhal	Cosm.	-	Verettoni 1961
Juncaceae	*Juncus bufonius* L.	A	Hyhal	Cosm.	-	Munz and Keck 1968
Juncaceae	*Juncus capitatus* Weigel	A	Hyhal	Euro-Siberian and Med. regions, TropAfrica, California	-	Feinbrun 1986
Juncaginaceae	*Asparagus maritimus* Mill.	HP	Psamm	Med.	-	Corre 1985
Juncaginaceae	*Asparagus officinalis* L.	HP	Psamm	Europe	0111	Tutin *et al.* 1964; Feinbrun 1986
Juncaginaceae	*Asparagus stipularis* Forssk.	HP	Xero	sMed. and Saharo-Arabian regions	-	Tutin *et al.* 1964; Mepham and Mepham 1985
Juncaginaceae	*Triglochin bulbosa* L.	G	Hyhal	Med., Australia, Africa	-	Aronson 1981-88; Feinbrun 1986
Malvaceae	*Althaea officinalis* L.	CH	Xero	Med.	7510, 8131	Corre 1985
Malvaceae	*Malva arborea* (L.) Webb & Berthel.	SH	Psamm	Med., Intro: NAmerica	-	Munz and Keck 1968; Okusanya 1979
Mimosaceae	*Prosopis farcta* (Banks & Sol.) J. F. Macbr.	CH	Weedy	Med.	-	Dafni 1975; Aronson 1981-88
Orobanchaceae	*Bartsia verna* Rchb.f.	HP	Hyhal	Europe	-	-
Phyllanthaceae	*Andrachne telephioides* L.	HP	Weedy	Med. and Irano-Turanian regions, eAfrica	-	Daoud 1985
Plantaginaceae	*Plantago cornuti* Gouan	HP	Psamm	Med.	-	Danin 1981
Plantaginaceae	*Plantago coronopus* L.	A	Xero	Med., Irano-Turanian and Saharo-Arabian regions, Australia, California	-	Corre 1985; Mepham and Mepham 1985
Plantaginaceae	*Plantago crassifolia* Forssk.	HP	Hyhal	Med.	-	Feinbrun 1986; Aronson *et al.* 1988
Plantaginaceae	*Plantago major* L.	HP	Psamm	Euro-Siberian and Med. regions	4850	Tutin *et al.* 1964; Zohary 1972
Plantaginaceae	*Plantago tenuiflora* Waldst. & Kit.	HP	Hyhal	Europe	-	Tutin *et al.* 1964
Plumbaginaceae	*Limonium articulatum* Kuntze	HP	Psamm	Med.	-	Tutin *et al.* 1964; Rozema 1975
Plumbaginaceae	*Limonium binervosum* (Sm.) C.E.Salmon	HP	Hyhal	Europe, Intro: Australia	-	Tutin *et al.* 1964; Mepham and Mepham 1985
Plumbaginaceae	*Limonium humile* Mill.	HP	Hyhal	eEurope	-	Tutin *et al.* 1964
Plumbaginaceae	*Limonium ovalifolium* Kuntze	HP	Psamm	Europe	-	Bramwell and Bramwell 1974
Plumbaginaceae	*Armeria maritima* (Mill.) Willd.	HP	Psamm	Europe	4850	Rozema 1975; Cooper 1982; Dijkema 1984
Plumbaginaceae	*Limonium auriculae-ursifolium* (Pourr.) Druce	HP	Psamm	Med.	4850	Corre 1985
Plumbaginaceae	*Limonium bellidifolium* (Gouan) Dumort.	HP	Hyhal	Europe	4850	Tutin *et al.* 1964
Plumbaginaceae	*Limonium cordatum* Mill.	HP	Hyhal	nwMed.	4850	Corre 1985
Plumbaginaceae	*Limonium duriusculum* Fourr.	HP	Chas	wMed.	4850	Dubuis and Simmonneau 1960; Tutin *et al.* 1964; Corre 1985
Plumbaginaceae	*Limonium ferulaceum* Kuntze	HP	Hyhal	wMed.	4850	Corre 1985

Table 2 (Cont.)

Botanical family[b]	Species[b]	Life form[c]	Plant type[d]	Origin[e]	Economic code[f]	References
Plumbaginaceae	*Limonium oleifolium* Mill.	HP	Hyhal	Med.	4850	Corre 1985
Plumbaginaceae	*Limonium perezii* (Stapf) F. T. Hubb.	HP	Chas	wMed., Canary Is.	4850	Aronson *et al.* 1988
Plumbaginaceae	*Limonium ramosissimum* (Poir.) Maire	HP	Hyhal	wMed.	4850	Corre 1985
Plumbaginaceae	*Limonium sinuatum* (L.) Mill.	HP	Hyhal	Med.	4850	Aronson *et al.* 1988
Plumbaginaceae	*Limonium tomentellum* Kuntze	HP	Hyhal	eEurope	4850	Tutin *et al.* 1964
Plumbaginaceae	*Limonium vulgare* Mill.	HP	Hyhal	Med.	4850	Tutin *et al.* 1964; Aronson *et al.* 1988
Poaceae	*Agrostis stolonifera* L.	HP	Psamm	Europe	-	Rozema 1975; Heerkloss and Bartolomaeus 1980
Poaceae	*Arundo donax* L.	PG	Weedy	Cosm.	0100	Shomer-Ilan 1985; Aronson *et al.* 1988
Poaceae	*Crypsis vaginiflora* (Forssk.) Opiz	A	Hyhal	Europe, Intro: NAmerica	-	Mason 1957; Dijkema 1984
Poaceae	*Cynodon dactylon* (L.) Pers	PG	Weedy	Cosm.	4850	Mepham and Mepham 1985; Fischer and Skerman 1986; Aronson *et al.* 1988
Poaceae	*Elytrigia ×littorea* (Schumach.) Hyl.	PG	Psamm	Med.	3100, 4520	Corre 1977; Dewey 1983; Dijkema 1984
Poaceae	*Hordeum murinum* L. subsp. *glaucum* (Steud.) Tzvelev	A	Weedy	Cosm.	-	Feinbrun 1986
Poaceae	*Lepturus filiformis* (Roth) Trin.	PG	Psamm	Med.	-	Corre 1977
Poaceae	*Lepturus incurvatus* Trin.	A	Psamm	Med.	-	Quezèl 1965; Corre 1977
Poaceae	*Parapholis incurva* (L.) C. E. Hubb.	A	Hyhal	Europe, Intro: California	-	Mason 1957; Munz and Keck 1968
Poaceae	*Pennisetum ciliare* (L.) Link	PG	Weedy	Cosm.	3100	Saxena and Gupta 1972; Int. Board for Plant Gen. Res. 1984; Fischer and Skerman 1986
Poaceae	*Phragmites australis* (Cav.) Trin. ex Steud.	PG	Hyhal	Cosm.	1700, 2310, 2330	Dubuis and Simmonneau 1960; Mepham and Mepham 1985
Poaceae	*Polypogon monspeliensis* (L.) Desf.	PG	Psamm	Med., nAfrica	-	Quezèl 1965
Poaceae	*Puccinellia distans* (Jacq.) Parl.	HP	Hyhal	Europe, Asia, Intro: California	-	Mason 1957
Poaceae	*Puccinellia festuciformis* Parl.	HP	Hyhal	Europe	-	Corre 1985
Poaceae	*Spartina ×townsendii* H. Groves & J. Groves	PG	Hyhal	Europe	3100, 3320	Boston 1983
Poaceae	*Thinopyrum elongatum* (Host) D. R. Dewey	PG	Psamm	Med.	3100	Corre 1977; Dewey 1983; Dijkema 1984
Poaceae	*Thinopyrum pungens* (Pers.) Barkworth	PG	Psamm	Med., Intro: Cosm.	-	Martin 1969; Dewey 1983
Poaceae	*Vulpia unilateralis* (L.) Stace	PG	Psamm	Eurasia	-	Tutin *et al.* 1964
Polygonaceae	*Polygonum aviculare* L.	A	Xero	Med.	-	Dubuis and Simmonneau 1960
Portulacaceae	*Talinum paniculatum* (Jacq.) Gaertn.	HP	Weedy	Cosm.	-	Ragonese 1951
Potamogetonaceae	*Zannichellia palustris* L.	AQ	Hyhal	Cosm.	-	Mason 1957; Munz and Keck 1968
Primulaceae	*Anagallis arvensis* L.	A	Xeroh	Cosm.	3100	Dubuis and Simmonneau 1960; Aronson *et al*. 1988
Primulaceae	*Glaux maritima* L.	HP	Hyhal	Europe, Asia, eAfrica, wNAmerica	-	Mason 1957; Munz and Keck 1968
Ruppiaceae	*Ruppia cirrhosa* (Petagna) Grande	AQ	Hyhal	Cosm.	-	Adams 1972
Ruppiaceae	*Ruppia maritima* L.	AQ	Hyhal	Cosm.	-	Mason 1957; Mepham and Mepham 1985
Tamaricaceae	*Tamarix africana* Poir	T2	Xero	Med.	4850	Dubuis and Simmonneau 1960; Baum 1978
Tamaricaceae	*Tamarix canariensis* Willd.	T2	Phrea	wMed., nwAfrica	2100	Baum 1978
Tamaricaceae	*Tamarix dalmatica* B.R.Baum	T4	Xero	wMed., Yugoslav	2100	Baum 1978
Tamaricaceae	*Tamarix gallica* L.	T4	Phrea	Med., Intro: Europe	4850	Dubuis and Simmonneau 1960; Baum 1978
Tamaricaceae	*Tamarix hampeana* Boiss. & Heldr.	T4	Phrea	eMed.	4850	Baum 1978
Tamaricaceae	*Tamarix nilotica* (Ehrenb.) Bunge	T2	Xero	seMed.	4850	Baum 1978
Typhaceae	*Typha angustifolia* L.	HP	Hyhal	Cosm.	-	Mason 1957
Typhaceae	*Typha latifolia* L.	HP	Hyhal	Cosm.	-	Mason 1957; Mepham and Mepham 1985
Verbenaceae	*Phyla nodiflora* (L.) Greene	HP	Hyhal	Cosm.	4850	Shomer-Ilan 1985; Aronson *et al.* 1988
Zosteraceae	*Zostera nana* Roth	SG	Hyhal	Europe	-	Den Hartog 1970

[a]Fields for each species derived from the list reported by Aronson.
[b]For scientific name references are made to GRIN Taxonomy for Plant of USDA and International Plant Names Index.
[c] A: annual, CH: chamaephyte, CHN: nano-chamaephyte, G: geophytes, HP: herbaceous perennial, PG: perennial grass, SG: sea grass, SH: shrubs, T2-T8: trees between 2 and 8 meter height, respectively.
[d]Chas: chasmophytes, Hyhal: hydrohalophytes, Phrea: phreatophytes, Psamm: psammophiles, Xero: xerophytes, Xeroh: xerohalophytes.
[e] Med: Mediterranean, Cosm: Cosmopolita. Lowercase prefixes refer to portions of geographic region; n: North, s: South, e: East, w: West.
[f]For economic code see **Table 1**.

west Pakistan plains. *Plant and Soil* **21**, 1-7

Choukr-Allah R (1996) The potential of halophytes in the development and rehabilitation of arid and semi-arid zones. In: Choukr-Allah R, Malcom CV, Hamdy A (Eds) *Halophytes and Biosaline Agriculture*, Marcel Dekker Inc., New York, pp 3-17

Clark R, Matheny NP (1998) A model of urban forest sustainability: Application to cities in the united states. *Journal of Arboriculture* **24**, 112-120

Clary J, Savè R, Biel C, De Herralde F (2004) Water relations in competitive interactions of mediterranean grasses and shrubs. *Annals of Applied Biology* **144**, 149-155

Cooper A (1982) The effects of salinity and waterlogging on the growth and cation uptake and salt marsh plants. *New Phytologist* **90**, 263-275

Corre JJ (1977) Etude phyto-écologique des milieux littoraux sales en Languedoc et en Camargue II. *Vie et Milieu* **28**, 1-49

Corre JJ (1985) *Personal communication*, Institut de Botanique, Universitè de Montpellier, France

Dafni A (1975) Comparative biology of *Prosopis farcta* in four different habitats in Israel. Ph.D. dissertation, Hebrew University, Jerusalem, 110 pp

Danin A (1981) The impact of geomorphologic and climatic conditions on the vegetation of salt marshes along the Mediterranean Coast of Israel and Sinai. *Anales Jardín Botánico de Madrid* **37**, 269-275

Daoud HS (1985) *Flora of Kuwait. Dicotyledoneae* (Vol 1) Revised by: Al-Rawi A, London, KPI, 224 pp

Den Hartog C (1970) *The Sea-grasses of the World*, Amsterdam, North-Holland, 275 pp

Dewey DR (1983) Historical and current taxonomic perspectives of *Agropyron*, *Elymus*, and related genera. *Crop Science* **23**, 637-642

Dijkema KS (1984) *Salt Marshes of Europe*, Nature and Environment Series No. 30, Council of Europe, Strasbourg, 175 pp

Dubuis A, Simmonneau P (1960) *Contribution à l'ètude de la vegetation halophile des basins fermes du Plateau D'Oran*, Services des Etudes Scientifiques, Clarbois, Algeria

Feinbrun N (1978) *Flora Palaestina* III. Israel Academy of Sciences, Jerusalem, 167 pp

Feinbrun N (1986) *Flora Palaestina* IV, Israel Academy of Sciences, Jerusalem, 403 pp

Fischer MJ, Skerman PJ (1986) Salt tolerant forage plants for summer rainfall areas. *Reclamation and Revegetation Research* **5**, 263-284

Flowers TJ, Hajibagheri MA, Clipson NJW (1986) Halophytes. *The Quarterly Review of Biology* **61**, 313-337

Franco JA, Cros V, Bañón S, González A, Abrisqueta JM (2002) Effect of nursery irrigation on postplanting root dynamics of *Lotus creticus* in semiarid field conditions. *Hortscience* **37**, 525-528

Franco JA, Martìnez-Sànchez JJ, Fernandez JA, Bañón S (2006) Selection and nursery production of ornamental plants for landscaping and xerogardening in semi-arid environment. *Journal of Horticultural Science and Biotechnology* **81**, 3-17

Heerkloss B, Bartolomaeus W (1980) Experimental studies on germination behaviour of cultivated plants at different salinities of the germination media. *Archiv fuer Acker - und Pflanzenbau Bodenkdunde* **24**, 241-245

Henrickson J (1977) Saline habitats and halophytic vegetation of the Chihuahuan Desert region. In: Wauer RH and Riskind DH (Eds) *Transactions of the Symposium on the Biological Resources of the Chihuahuan Desert Region*, United States and Mexico Washington, DC U.S. Department of the Interior, National Park Service Transactions and Proceedings series, Number 3, pp 289-314

Hitchmough J (2004) Philosophical and practical challenges to the design and management of planting in urban greenspace in the 21st century. *Acta Horticulturae* **643**, 97-103

Iles JK (2003) The science and practice of stress reduction in managed landscapes. *Acta Horticulturae* **618**, 117-124

International Board for Plant Genetic Resources and Royal Botanic Gardens, Kew (1994) *Forage and browse plants for arid and semi-arid Africa*, Rome, FAO

International Plant Names Index (2008) http://www.ipni.org

Lieth H (1999) Development of crops and other useful plants from halophytes. In: Lieth H, Moschenko M, Lohmann M, Koyro HW, Hamdy A (Eds) *Halophytes Uses in Different Climates. I. Ecological and Ecophisiological Studies*, Backhuys Publishers, Leiden, pp 1-17

Martin WK (1969) *The Concise British Flora in Colour*, Ebury Press, London, 254 pp

Martìnez-Sànchez JJ, Ferrandis P, Trabaud L, Galindo R, Franco JA, Herranz JM (2003) Comparative root system structure on post-fire *Pinus halepensis* Mill. and *Cistus monspeliensis* L. sampling. *Plant Ecology* **168**, 309-320

Mason HC (1957) *A Flora of the Marshes of California*, University of California, Berkeley, 878 pp

Médail F, Quézel P (1997) Hot-spots analysis for conservation of plant biodiversity in the Mediterranean basin. *Annals of The Missouri Botanical Garden* **84**, 112-117

Mepham RH, Mepham JS (1985) The flora of tidal forests – a rationalization of the use of the term "mangrove". *South African Journal of Botany* **51**, 75-99

Morales MA, Torrecillas A, Rodríguez P, Alarcón JJ, Sánchez-Blanco MJ (2001) Effects of salinity on growth and leaf water relations of two genotypes of *Limonium* sp. *Acta Horticulturae* **559**, 419-423

Munz P, Keck DD (1968) *A Flora of California and Supplement*, University of California, Berkeley, 1681 pp and 224 pp

O'Leary JW, Glenn EP, Watson MC (1986) Agricultural production of halophytes irrigated with seawater. *Plant and Soil* **89**, 311-322

Okusanya OT (1979) An experimental investigation into the ecology of some maritime cliff species. III. Effect of seawater on growth. *Journal of Ecology* **67**, 579-590

Osmond CB, Bjorkman O, Anderson D (1980) *Physiological Processes in Plant Ecology: Toward a Synthesis with Atriplex*, Berlin, Springer-Verlag, New York, 468 pp

Pasternak D, Ben-Dov Y, Forti M (1980) Is seawater irrigation possible? *Hassadeh* **59**, 2369-2373 (in Hebrew)

Prescott A, Venning J (1984) Aizoaceae. In: George AS (Ed) *Flora of Australia* (Vol 4) Australian Government Publishing Service, Canberra, 354 pp

Quézel P (1965) *La végétation du Sahara*, Stuttgart, Fischer, 99 pp

Ragonese AE (1951) La vegetación de la República Argentina. II. Estudio fitosociológico de las Salinas Grandes. *Revue de Investigaciones Agrícolas (Buenos Aires)* **5**, 1-233

Ragonese AE, Covas G (1947) La flora halofile del sur de la proincia de Santa Fe. *Darwiniana* **7**, 401-495

Romano D (2004) Strategie per migliorare la compatibilità del verde ornamentale con l'ambiente Mediterraneo. In: Pirani A (Ed) *Il Verde in città. La progettazione del verde negli spazi urbani*, Edagricole, Bologna, pp 363-404

Rozema J (1975) The influence of salinity, inundation and temperature on the germination of some halophytes and non-halophytes. *Oecologia Plantarum* **10**, 341-353

Sánchez-Blanco MJ, Rodríguez MJ, Morales MA, Ortuño MF, Torrecillas A (2002) Comparative growth and water relations of *Cistus albidus* and *Cistus monspeliensis* plants during water deficit conditions and recovery. *Plant Science* **162**, 107-113

Savè R (2009) What is stress and how to deal with it in ornamental plants? *Acta Horticulturae* **81**, 241-254

Saxena SK, Gupta RK (1972) Vegetation of Pachpadra Salt Basin in Western Rajasthan. *Journal of Bombay Natural History* **70**, 104-127

Scott AJ (1977) Reinstatement and revision of Salicorniaceae J. Agardh (Caryophyllales). *Botanical Journal of the Linnean Society* **75**, 357-374

Shekhawat VPS, Kumar A, Neumann KH (2006) Effect of sodium chloride salinity on growth and ion accumulation in some halophytes. *Communications in Soil Science and Plant Analysis* **37**, 1933-1946

Shishkin BK (1936) *Flora of the U.S.S.R* (Vol 6), Centrospermae. Izdatel'stvo Akademii Nauk, Moscow and Leningrad, SSSR

Shomer-Ilan A (1985) *Unpublished data*, TelAviv University, Israel

Somers GF, Fontes M, Grant DM (1979) Halophytes from coastal marshes: A potential source of crop plants for arid lands. In: Goodin JR, Northington DK (Eds) *Arid Land Plant Resources*, International Center for arid and semiarid land studies, Texas Tech University, Lubbock, pp 402-418

Torrecillas A, Rodríguez MJ, Sánchez-Blanco MJ (2003) Comparison of growth, leaf water relations and gas exchange of *Cistus albidus* and *Cistus monspeliensis* plants irrigated with water of different NaCl salinity levels. *Scientia Horticulturae* **97**, 353-368

Tutin TG, Heywood VH, Burges NA, Valentine DH, Walter SM, Webb DA (1964) *Flora Europaea* (Vol 1) Cambridge University, Cambridge, UK

USDA - *National Genetic Resources Program. Germplasm Resources Information Network* (GRIN), National Germplasm Resources Laboratory, Beltsville, Maryland. Available online: http://www.ars-grin.gov/

Verettoni HN (1961) *Las Asociaciones Halofilas del partido de Bahia Blanca*, Bahia Blanca, Argentina

Wilson PG (1984) Chenopodiaceae. In: George AS (Ed) *Flora of Australia* (Vol 4), Australian Government Printing Service, Canberra, 354 pp

Winter K (1974) The effect of NaCl salinity on growth and photosynthesis in the halophytes *Mesembryanthemum nodiflorum* L. and *Suaeda maritima* (L.) Fum. *Oecologia* **48**, 100-106

Winter K, Troughton JH (1978) Photosynthetic pathways in plants of coastal and inland habitats of Israel and the Sinai. *Flora* **167**, 1-34

Zia S, Egan TP, Khan AK (2008) Growth and selective ion transport of *Limonium stocksii* Plumbaginacea under saline conditions. *Pakistani Journal of Botany* **40**, 697-709

Zohary M (1972) *Geobotanical Foundations of the Middle East*, Stuttgart, Fisher, 738 pp