

# ICARDA-IPGRI ARBORETUM

## *An Arboretum at ICARDA to promote greater uses and scientific knowledge of lesser known agro-biodiversity of the CWANA Region*

### **Introduction**

The Central & West Asia and North African region (CWANA) is a primary centre of diversity for some of the world's major crops, but at the same time is home to a lesser known wealth of agro-biodiversity, poorly addressed by research in spite of recognized values given to them in traditional agricultural systems. Such a diversity, variously neglected & underutilized, play an important role in food security, ecosystem conservation and enhancement of income in rural areas. Recognition of such a role is being increasingly acknowledged at national and international level along with calls for greater attention by the scientific community to provide better information on their biology, genetic diversity, crop potentials, agronomic practices and uses.

### **An Arboretum at ICARDA**

As an answer to this call for greater support, ICARDA and IPGRI established an Arboretum in ICARDA's headquarters at Aleppo, Syria, aiming at enhancing better uses of these species. The Arboretum hosts a number of selected most promising underutilized/neglected species which will be used to allow scientific studies and raise awareness on their uses as source of additional income to farmers, source of diversified food, their role in reclaiming land in areas affected by desertification or under various abiotic stresses such as drought, salinity, cold etc, their impact in the preservation of both natural and man-made ecosystems, their values as landscape improver in urban and rural areas. Included in the selection are species (such as pistachio) which are not underutilized from the economical point of view but are largely neglected by research, which has not provided yet a good understanding of the diversity among cultivated and wild species and a proper valorization of Pistacia species for the preservation of natural habitat in the region. The Arboretum is envisaged to play three major roles viz:

- **Training facility** the species host at the facility (trees and shrubs) will provide material for scientists involved on plant genetic diversity studies. Ad hoc selection of inter and infra specific diversity across a number of key species will be addressed in order to allow these studies. Primary and secondary gene pools of targeted crops will be represented as far as possible.
- **Demonstration facility** users of agro-biodiversity (from simple farmers to people involved in the market and transformation sector) will be exposed to practical examples of genetic diversity and its possible uses.
- **Public awareness** the Arboretum will contribute to raise awareness among policy makers on the wealth of agro-biodiversity in CWANA as with regard to underutilized or neglected species and encourage thus greater attention on this group of species. Other uses, such as landscaping, and role of the species in maintaining cultural and artistic values of communities will be also addressed.

### **Which species to select for the Arboretum?**

The selection of the species will be consistent with the above mentioned objectives while taking into account particularly the role that these species play in Syria, ICARDA's host country. The following Table 1 lists a first set of species selected for the Arboretum which will form the initial nucleus of the Arboretum, further expansion is foreseen aiming at better representing inter- and intraspecific diversity of selected species or additional new ones, as part of a development of the Arboretum in view of needs perceived by the scientific community and by users in general in the future.

### **Organization of the site**

The site is located on the hill side of the ICARDA Campus, in Aleppo, Syria. The site's extension consent the establishment of the species selected in the above table, leaving provisions for future expansions according to scientific interest that will emerge at later stages. Initial irrigation has been supplied to allow a quick establishment of the species. Once established, these species will be attended with low water input through traditional water harvesting practices, in order to raise awareness on their capacity to withstand long period of drought. Other low input agronomic practices will be employed in order to demonstrate the comparative advantage of these frugal species to grow in marginal and difficult areas. The cultivation will be organized in a way to allow an easy visit to the area by researchers and by the general public. Visual aid accompanying the species will illustrate their major botanical characteristics while highlighting agronomic and economic traits of relevant value. The Arboretum will represent a sort of agro-botanical park, having though no conservation activities. An *ad hoc* nursery will be established within the ICARDA's existing facilities. A herbarium collection of the species maintained at the Arboretum will be also established as an additional educational support to the Arboretum.

**Table 1.** List of species selected for the ICARDA/IPGRI Arboretum at the initial stage

<b>Name</b>	<b>Priority</b>	<b>Latin Name</b>	<b>Family</b>	<b>Uses</b>	<b>Main Use</b>	<b>Number of Trees</b>	<b>Comments</b>
Olive	b, c, e	<i>Olea europea</i> var. <i>europea</i>	Oleaceae	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20	oil production	50 trees for the major Syrian varieties used for table and industrial uses	key species; oil quality produced will be assessed as a way to add value to Syrian existing varieties
Wild olive	a	<i>O. europea</i> var. <i>sylvestris</i>	Oleaceae	4, 9, 11, 12, 16, 17, 19, 20	research on the gene pool of the cultigen	10 trees selected from different ecological zones	
Pistachio	a,b,c,e	<i>Pistacia vera</i>	Anacardiaceae	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 12, 13, 16, 17, 20, 21	nut production	50 trees of the four major Syrian varieties and 20 trees for each of the other 18 lesser known local varieties	activities to assess agro-economical traits of local varieties will be foreseen as a strategy to add value to lesser known material
wild Pistacia	a,b,c,d,e	<i>Pistacia atlantica</i>	Anacardiaceae	4, 5, 6, 7, 8, 9, 11, 12, 13, 15, 16, 17, 18, 19, 20, 21	research on gene pool of the cultigen	10 trees	valuable species in reforestation and rootstock for the cultigen
	a,b,c,e	<i>Pistacia lentiscus</i>	Anacardiaceae	4, 5, 6, 7, 8, 9, 11, 12, 13, 15, 16, 17, 18, 19, 20, 21	research on gene pool of the cultigen	10 trees	source of resistant rootstock for the cultigen
	a,b,c,e	<i>Pistacia palestina</i>	Anacardiaceae	4, 5, 6, 7, 8, 9, 11, 12, 13, 15, 16, 17, 18, 19, 20, 21	research on gene pool of the cultigen	10 trees	source of resistant rootstock for the cultigen
	a,b,c	<i>Pistacia khinjuk</i>	Anacardiaceae	4, 5, 6, 7, 8, 9, 11, 12, 13, 15, 16, 17, 18, 19, 20, 21	research on gene pool of the cultigen	10 trees	source of resistant rootstock for the cultigen

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Almond	a,b,e	<i>Amygdalus communis</i>	Rosaceae	1, 2, 3, 4, 5, 6, 8, 9, 10, 11, 12, 13, 15, 16, 17, 20	nut production	50 trees of the three major Syrian varieties and 20 trees for each of the other 18 lesser popular local varieties	activities to assess agro-economical traits of local varieties will be foreseen as a strategy to add value to lesser known material
Wild almond	a	<i>A. Arabica</i>	Rosaceae	4, 5, 6, 7, 8, 9, 11, 12, 13, 15, 16, 17, 18, 19, 20, 21	research on gene pool of the cultigen, use in degraded land	10 trees	valuable species in land reclamation and rootstock for the cultigen
	a	<i>A. orientalis</i>	Rosaceae	4, 5, 6, 7, 8, 9, 11, 12, 13, 15, 16, 17, 18, 19, 20, 21	research on gene pool of the cultigen, use in degraded land	10 trees	valuable species in land reclamation and rootstock for the cultigen
	a	<i>A. spartioides</i>	Rosaceae	4, 5, 6, 7, 8, 9, 11, 12, 13, 15, 16, 17, 18, 19, 20, 21	research on gene pool of the cultigen, use in degraded land	10 trees	key species in reforestation and as rootstock for the cultigen
	a	<i>A. korschinskii</i>	Rosaceae	4, 5, 6, 7, 8, 9, 11, 12, 13, 15, 16, 17, 18, 19, 20, 21	research on gene pool of the cultigen, use in degraded land	10 trees	key species in reforestation and as rootstock for the cultigen
Pine	d,e	<i>Pinus brutia</i>	Pinaceae	1, 4, 5, 8, 9, 10, 12, 13, 14, 16, 19, 20	rehabilitation of degraded land	20 trees	key species in reforestation
Aleppo pine	d,e	<i>Pinus halepensis</i>	Pinaceae	1, 4, 5, 8, 9, 10, 12, 13, 14, 16, 19, 20	rehabilitation of degraded land	20 trees	key species in reforestation
Carob	a,b,c,d,e	<i>Ceratonia siliqua</i>	Leguminosae	1, 4, 5, 8, 9, 10, 12, 13, 14, 16, 19, 20, 21	rehabilitation of degraded land	20 trees	key species in reforestation

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Laurel	b,d,e	<i>Laurus nobilis</i>	Lauraceae	1, 4, 5, 8, 9, 10, 12, 13, 14, 16, 19, 20, 21	rehabilitation of degraded land/multiple uses	20 trees	key species in reforestation
Junper	c,d,e	<i>Juniperus excelsa</i>	Cupressaceae	1, 4, 5, 8, 9, 10, 12, 13, 14, 16, 19, 20, 21	rehabilitation of degraded land/multiple uses	20 trees	key species in reforestation
Oak	b,d,e	<i>Quercus calliprinos</i>	Fagaceae	1, 4, 5, 8, 9, 10, 12, 13, 14, 16, 19, 20, 21	rehabilitation of degraded land/multiple uses	20 trees	Important species in reforestation
Oak	a	<i>Quercus ilex</i>	Fagaceae	1, 4, 5, 8, 9, 10, 12, 13, 14, 16, 19, 20, 21	rehabilitation of degraded land/multiple uses	20 trees	Important species in reforestation
Quince	a,b,e	<i>Cydonia oblonga</i>	Rosaceae	1, 2, 3, 4, 5, 9 10, 20, 21	food uses	10 trees for the main 5 Syrian local varieties	species particularly appreciated in Syria and almost lost in other Mediterranean countries
Argania		<i>Argania spinosa</i>	Sapotaceae	1, 2, 4, 5, 7, 8, 11, 12, 15, 16, 19, 20, 21,	valuable edible oil	10 trees	very interesting economic potentials
Oleander		<i>Nerium oleander</i>	Apocynaceae	4, 5, 9, 12, 13, 17, 20, 21	valuable ornamental value	10 trees for each of the top 5 main varieties	widely used in the region in landscaping
Crotalaria		<i>Crotalaria saharae</i>	Leguminosae	4, 6, 9, 12, 13, 14, 15, 16, 17, 20	dune fixation, drought resistance	50 shrubs	
Azarole	b,e	<i>Crataegus azarolus</i>	Rosaceae	1, 2, 3, 4, 5, 9 10, 20, 21	food uses	10 trees for each of the three main local varieties	species particularly appreciated in Syria and almost lost in other Mediterranean countries
Pomegranate	b,e	<i>Punica granatum</i>	Punicaceae	1, 2, 3, 4, 5, 8, 9 10, 20, 21	food uses	10 trees for the main 5 Syrian local varieties	species particularly appreciated in Syria and almost lost in other Mediterranean countries
Sorb	b,e	<i>Sorbus domestica</i>	Rosaceae	1, 2, 3, 4, 5, 9 10, 20, 21	food uses	10 trees for each of the three main local varieties	species particularly appreciated in Syria and almost lost in other Mediterranean countries

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Jujube	b,e	<i>Zizyphus lotus</i>	Rhamnaceae	1, 2, 3, 4, 5, 9 10, 20, 21	food uses	10 trees	species poorly addressed by research
	b,e	<i>Zizyphus spina christi</i>	Rhamnaceae	1, 2, 3, 4, 5, 9 10, 20, 21	food uses	10 trees	species poorly addressed by research
Acacia	a	<i>Acacia cyanophylla</i>	Leguminosae	4, 6, 9, 12, 13, 14, 15, 16, 17, 20	dune fixation, drought resistance	10 trees	introduced species but widely used in many areas
	a	<i>Acacia radiana</i>	Leguminosae	4, 6, 9, 12, 13, 14, 15, 16, 17, 20	dune fixation, drought resistance	10 trees	
Salt bush	a	<i>Atriplex halimus</i>	Chenopodiaceae	4, 6, 9, 12, 13, 14, 15, 16, 17, 20, 21	salt tolerance, dune fixation, drought resistance	50 shrubs	valuable species in highly degraded land under desertification process
	a	<i>Atriplex mummularia</i>	Chenopodiaceae	4, 6, 9, 12, 13, 14, 15, 16, 17, 20, 21	salt tolerance, dune fixation, drought resistance	50 shrubs	valuable in highly degraded land under desertification process
Rosemary	a,b,c	<i>Rosmarinus officinalis</i>	Lamiaceae	1, 2, 4, 5, 8, 9, 10, 12, 13, 16, 17, 20, 21	major aromatic species	50 shrubs of five main varieties	
Nitraria		<i>Nitraria retusa</i>	Nitrariaceae	4, 5, 6, 8, 9, 12, 13, 15, 16, 17, 20	salt and drought resistant species	50 shrubs	
Salsola	a	<i>Salsola longifolia</i>	Chenopodiaceae	4, 6, 9, 12, 13, 14, 15, 16, 17, 20, 21	salt tolerance, dune fixation, drought resistance	50 shrubs	valuable in highly degraded land under desertification process
	a	<i>Salsola tetrandra</i>	Chenopodiaceae	4, 6, 9, 12, 13, 14, 15, 16, 17, 20, 21	salt tolerance, dune fixation, drought resistance	50 shrubs	valuable in highly degraded land under desertification process
Tamarisk		<i>Tamarix aphylla</i>	Tamaricaceae	4, 6, 9, 12, 13, 14, 15, 16, 17, 20, 21	dune fixation drought resistance	10 trees	valuable in highly degraded land under desertification process

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Sanguisorba		<i>S. officinalis</i>	Rosaceae	4, 6, 9, 12, 13, 14, 15, 16, 17, 20, 21	dune fixation, fodder	50 shrubs	valuable in highly degraded land under desertification process
Caper	a,b,c,e	<i>Capparis spinosa</i>	Capparidaceae	1, 2, 3, 4, 6, 9, 12, 13, 14, 15, 16, 17, 21	soil erosion, fodder	50 shrubs	valuable in highly degraded land under desertification process
Thymelea		<i>Thymelea hirsuta</i>	Thymeleaceae	1, 3, 4, 5, 6, 8, 9, 12, 13, 14, 15, 16, 17, 21	production of paper & fiber, sand fixation	50 shrubs	valuable in highly degraded land under desertification process
Calligonum		<i>Calligonum comosum</i>	Polygonaceae	4, 6, 9, 12, 13, 14, 15, 16, 17, 20, 21	sand fixation	50 shrubs	valuable in highly degraded land under desertification process
Sumac	a	<i>Rhus coriaria</i>	Anacardiaceae	1, 5, 8, 9, 10, 12, 17, 21	dyeing industry	50 shrubs	particularly interesting for the production of natural colorants

## **Legend**

### **International meeting, surveys in which the importance of the species has been particularly highlighted**

- a) Recommended at the IPGRI's Conference on Priority Setting for Underutilized species in the CWANA region (Syria, 1998)
- b) Ranked at the top list in the IPGRI's regional survey on most promising Mediterranean underutilized species (Italy, 1993)
- c) Ranked at the top in the survey carried out by the CHIEAM's MEDUSA Network on underutilized species spontaneous in the Mediterranean region (Greece, 1997)
- d) Recommended by Foresters participating to the IPGRI's Meeting on Priority Setting on Forest Species in Syria (Syria, 1998)
- e) Recommended by the participants to a Workshop on species of cultural/artistic and landscape value for the Mediterranean (Italy, 1996)

### **List of most important uses/values for the selected species**

1. Good economic potentials
2. Food uses
3. Particularly valuable for nutritional contents
4. Ecosystem conservation role
5. Industrial uses
6. Source of fodder/forage
7. Used as rootstocks
8. Source of alternative products
9. Landscape/ornamental value
10. Historic/cultural value
11. Wild relative of the cultigen
12. Low requirements (frugal species)
13. Drought resistance
14. Dune fixation
15. Salt tolerance
16. Species of low environmental impact
17. Great adaptation to marginal land/poor soil
18. Particularly interesting for taxonomic, botanical traits
19. Particularly useful in reforestation
20. Poorly addressed by research
21. Medicinal /Aromatic uses