The Simbiotic Project

Environmental Restoration of SE Sicilian Salt Marshes

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MAVA Workshop
Catania, 18-19 April 2013
Operative Program Italia-Malta 2007-2013 for transboundary cooperation

- Axis I. Competitiveness, Innovation and Research, Sustainable Development
- Axis II. Environment, Energy and Risk Prevention

Specific Objective 2.1

Contributing to the protection of the environment through the safeguarding, exploitation and monitoring of natural resources
SIMBIOTIC
Enhancing Sicily-Malta geographical Transboundary Insular Connectivity

PROJECT PARTNERS

University of Malta, Institute of Earth Systems

Ministry for Gozo

Università di Catania, Dipartimento di Scienze biologiche, geologiche e ambientali

Comune di Pachino
SIMBIOTIC IS AN ENVIRONMENTAL RESTORATION PROJECT

- FACILITATE MIGRATORY ROUTES BETWEEN SE SICILY AND GOZO ISLAND
- IMPROVE THE MANAGEMENT OF PROTECTED AREAS
- INTEGRATE ENVIRONMENTAL PLANNING WITH LOCAL PARTICIPATION
WORK PACKAGES

WP 1 – Management and coordination

WP 2 – Area characterization and participatory planning for restoration

WP 3 – Characterization, collection and propagation of Mediterranean plant germplasm (*holm oak, carob, halophilous species*)

WP 4 – Improved protected area management and pilot habitat restoration

WP 5 – Dialogue for integrated planning and policy (*guidelines, workshop*)

WP 6 – Communication and publicity (*website, guided visits, publications, posters and local media*)

*Project started in April 2011*
SIMBIOTIC - SELECTED AREAS IN GOZO

Il - Ghammar

it Taksis

and

Gozo Experimental Farm in Xewkija

ta ‘Lambert
SICILY

The territory of Pachino (Siracusa province)

Pantano Ponterio
Natural Reserve "Pantani della Sicilia orientale" established in July 2011
Mapping of today situation

1. Pantano Marzamemi
2. Pantano Morghella
3. Pantano Ponterio
4. Pantano Ciaramiraro
5. Pantano Baronello
6. Pantano Auruca
7. Pantano Cuba
8. Pantano Longarini
9. Pantano Bruno
10. Gorgo Salato
✓ Typical coastal areas separated from the sea by recent or old dune ridges
✓ Salt marshes fed by small watersheds and rain falls and subject to wide fluctuations in water level and salinity
✓ More or less dried in summer
The marshes of Pachino are important wetlands for the conservation of plant and animal biodiversity.

The migratory birds found here resting places along the migration route between Europe and Africa.
Endangered vascular plants included in national and regional red lists

Aeluropus lagopoides  Allium lehmannii
Arthrocnemum glaucum  Atriplex tornabeni
Cressa cretica  Halopeplis amplexicaulis
Isolepis cernua  Juncus subulatus
Lamprothamnium papulosum
Limonium hybleum  Limonium pachynense
Pulicaria sicula  Ruppia maritima
Salicornia emerici  Salicornia patula
Schoenus nigricans  Spartina juncea
Suaeda spicata
Triglochin bulbosum ssp. barrelieri
Habitats of Directive 43/92 EEC

1150*: Coastal lagoons

1310: Salicornia and other annuals colonizing mud and sand

1410: Mediterranean salt meadows (*Juncetalia maritimi*)

1420: Mediterranean and thermo-atlantic halophilous scrubs (*Sarcocornietea fruticosi*)

1510*: Mediterranean salt steppes (*Limonietalia*)

1430: Halo-nitrophilous scrubs (*Pegano-Salgoletea*)

7230: Alkaline fens
TODAY.....

**Site of Community Importance (SCI)**
- ITA090003 Pantani della Sicilia sud orientale
- ITA090004 Pantano Morghella
- ITA090005 Pantano di Marzamemi

**Special Protection Areas (SPA)**
ITA090029 Pantani della Sicilia sud-orientale, Morghella, di Marzamemi, di Punta Pilieri

**Important Bird Area (IBA) and Important Plant Area (IPA)**
Despite of all those legal and policy constraints ...... today marshes are at risk because of agricultural activity in full field and greenhouse touristic and residential settlements
The conservation status of the marshes is often made precarious by:

- Micro landfills
- Drainage and reclamation
- Use of surface water or groundwater for irrigation
- Invasion of exotic species
A PILOT PROJECT FOR PANTANO PONTERIO

Basic studies
- Flora and vegetation
- Avifauna
- Hydrogeology
- Cartography
- Germplasm collection

In July 2012 the restoration project was delivered and then approved by responsible authorities.

Today works are starting after a public announcement.

A convention with the owner for free use of Pantano Ponterio
WASTE REMOVAL MAP
First of all: asbestos !!!
HABITAT RESTORATION MAP
Present vegetation

Restoration of Inulion and Juncion habitat

Restoration of Juncion habitat

Restoration of Inulion habitat

Restoration of Tamarix africana community

Legenda

Area di Progetto

Interventi di ripristino degli habitat

Existing vegetation

Restoration of Inulion habitat

Restoration of Inulion and Juncion habitat

Restoration of Juncion habitat

Restoration of Sarcocornion habitat

Restoration of Tamarix africana community
How did we operate for getting plants to be used in restoration?

• **Target species**

• **Seed collection**

  *Arthrocnemum macrostachyum* (Moric.) Moris
  *Bolboschoenus maritimus* (L.) Palla
  *Limbara crithmoides* (L.) Dumort. (= *Inula crithmoides* L.)
  *Limonium narbonense* Miller (= *L. serotinum* (Reich) Pign.)
  *Juncus acutus* L. subsp. *acutus*
  *Juncus maritimus* Lam.
  *Juncus subulatus* Forssk.
  *Sarcocornia fruticosa* (L.) A.J. Scott
  *Sarcocornia alpina* (Lag.) Rivas-Martinez (= *S. perennis* (Mill.) A. J. Scott.)

• **Plants of *Tamarix africana* Poiret**  →  1500 plants free by Azienda Regionale Foreste Demaniali (Spinagallo nursery) from cuttings collected in S Sicily
Germination tests and planting of target species

*Limbarda crithmoides* (Pantano Ponterio)
*Limonium narbonense* (Pantano Ponterio)
*Juncus maritimus* (Pantano Longarini)
*Juncus acutus* subsp. *acutus* (Pantano Auruca)
*Juncus subulatus* (Pantano Ciaramiraro)
*Sarcocornia alpinii* (Pantano Ponterio)
*Sarcocornia fruticosa* (Pantano Baronello)

Standard procedures according to MSB

T ➞ 10°C, 15°C, 20°C, 25°C

Light ➞ 12/12 or dark
### Limbarda crithmoides

**Pantano Ciaramiraro – Pachino (SR)**

30/09/2011

<table>
<thead>
<tr>
<th>N. SEEDS</th>
<th>4 X 25</th>
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</tr>
</thead>
<tbody>
<tr>
<td>TEMPERATURE (°C)</td>
<td>10</td>
<td>15</td>
<td>20</td>
<td>25</td>
</tr>
<tr>
<td>PHOTOPERIOD (H)</td>
<td>12/12</td>
<td>12/12</td>
<td>12/12</td>
<td>12/12</td>
</tr>
<tr>
<td>% GERMINATION</td>
<td>89</td>
<td>92</td>
<td>100</td>
<td>100</td>
</tr>
<tr>
<td>Germination start (days)</td>
<td>8</td>
<td>4</td>
<td>3</td>
<td>2</td>
</tr>
</tbody>
</table>

- **Germination (%)**
- **Temperature (°C)**
- **Germination start (days)**

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**Graph:**

- Germination (%) vs Temperature (°C)
- 10°C, 15°C, 20°C, 25°C
**Limonium narbonense**  
Pantano Ponterio – Pachino (SR)  
25/11/2011

<table>
<thead>
<tr>
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<td>25</td>
</tr>
<tr>
<td>PHOTOPERIOD (H)</td>
<td>B</td>
<td>B</td>
<td>B</td>
<td>B</td>
</tr>
<tr>
<td>% FINAL MEDIUM GERMINATION</td>
<td>97</td>
<td>98</td>
<td>100</td>
<td>100</td>
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<tr>
<td>Germination start (days)</td>
<td>4</td>
<td>2</td>
<td>1</td>
<td>1</td>
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</table>

![Graph showing germination percentages at different temperatures]
Juncus acutus
Pantano Auruca – Pachino (SR)
21/10/2011

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<td>PHOTOPERIOD (H)</td>
<td>12/12</td>
<td>12/12</td>
<td>12/12</td>
<td>12/12</td>
</tr>
<tr>
<td>% GERMINATION</td>
<td>31</td>
<td>87</td>
<td>100</td>
<td>100</td>
</tr>
<tr>
<td>Germination start (days)</td>
<td>9</td>
<td>4</td>
<td>2</td>
<td>1</td>
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</tbody>
</table>

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### Germination Chart

**Juncus acutus subsp. acutus**

![Germination Chart](chart.png)

<table>
<thead>
<tr>
<th>Temperature (°C)</th>
<th>Germination%</th>
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<tbody>
<tr>
<td>10°C</td>
<td>31</td>
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<tr>
<td>15°C</td>
<td>87</td>
</tr>
<tr>
<td>20°C</td>
<td>100</td>
</tr>
<tr>
<td>25°C</td>
<td>100</td>
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</tbody>
</table>
**Juncus maritimus**
Pantano Longarini – Pachino (SR)
21/10/2011

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<thead>
<tr>
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<td>10</td>
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<td>20</td>
<td>25</td>
</tr>
<tr>
<td>PHOTOPERIOD (H)</td>
<td>12/12</td>
<td>12/12</td>
<td>12/12</td>
<td>12/12</td>
</tr>
<tr>
<td>% GERMINATION</td>
<td>33</td>
<td>45</td>
<td>85</td>
<td>92</td>
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<tr>
<td>Germination start (days)</td>
<td>10</td>
<td>12</td>
<td>6</td>
<td>5</td>
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</table>

**Juncus subulatus**
Pantano Auruca – Pachino (SR)
21/10/2011

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<td>12/12</td>
<td>12/12</td>
<td>12/12</td>
<td>12/12</td>
</tr>
<tr>
<td>% GERMINATION</td>
<td>91</td>
<td>95</td>
<td>100</td>
<td>100</td>
</tr>
<tr>
<td>Germination start (days)</td>
<td>3</td>
<td>2</td>
<td>2</td>
<td>1</td>
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</tbody>
</table>
**Sarcocornia alpinii**
Pantano Baronello – Pachino (SR)
8/12/2011

<table>
<thead>
<tr>
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<td>TEMPERATURE</td>
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<td>25</td>
</tr>
<tr>
<td>PHOTOPERIOD</td>
<td>12/12</td>
<td>12/12</td>
<td>12/12</td>
<td>12/12</td>
</tr>
<tr>
<td>% GERMINATION</td>
<td>60</td>
<td>73</td>
<td>80</td>
<td>97</td>
</tr>
<tr>
<td>Germination start (days)</td>
<td>5</td>
<td>5</td>
<td>3</td>
<td>2</td>
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</tbody>
</table>

**Sarcocornia fruticosa**
Pantano Ponterio – Pachino (SR)
6/12/2011

<table>
<thead>
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<td>25</td>
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<tr>
<td>PHOTOPERIOD</td>
<td>12/12</td>
<td>12/12</td>
<td>12/12</td>
<td>12/12</td>
</tr>
<tr>
<td>% GERMINATION</td>
<td>54</td>
<td>87</td>
<td>98</td>
<td>97</td>
</tr>
<tr>
<td>Germination start (days)</td>
<td>4</td>
<td>4</td>
<td>1</td>
<td>2</td>
</tr>
</tbody>
</table>
**SEEDLINGS PRODUCTION**

Pressed peat containers  
Many seeds for each pot, placed with tweezers  
Good quality soil  
Pots in incubators under checked light and temperature conditions  
Irrigation with clean water, avoiding stagnation

<table>
<thead>
<tr>
<th>Species</th>
<th>Seed number per pot</th>
<th>Plants</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>Limbarda crithmoides</em></td>
<td>10-20</td>
<td>200</td>
</tr>
<tr>
<td><em>Limonium narbonense</em></td>
<td>10-20</td>
<td>400</td>
</tr>
<tr>
<td><em>Juncus maritimus</em></td>
<td>50-100</td>
<td>50</td>
</tr>
<tr>
<td><em>J. acutus</em></td>
<td>50-100</td>
<td>680</td>
</tr>
<tr>
<td><em>J. subulatus</em></td>
<td>50-100</td>
<td>300</td>
</tr>
<tr>
<td><em>Sarcocornia fruticosa</em></td>
<td>100</td>
<td>50</td>
</tr>
<tr>
<td><em>S. alpinii</em></td>
<td>100</td>
<td>50</td>
</tr>
</tbody>
</table>
... and now we are looking forward the start of restoration works by the Municipality of Pachino!

Thank you