Environmental impacts of energy crops and environmental problems related to abandonment of marginal croplands in a Mediterranean area
Marginal croplands

- Accessibility
- Soil condition
- Cultivated species
- Economic profitability
Marginal croplands

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*Marginal croplands*

- hiper marginal
- marginal
- super marginal
- good areas
Marginal croplands

- Mediterranean climate
- Rainfall 250 – 500 mm annual average
- Irregular and stationary rainfall
- 11 ºC to 18 ºC annual average
- Soft winter in low areas
Marginal croplands

- mediterranean climate
- rainfall 250 – 500 mm anual average
- irregular and stational rainfall
- 11 °C a 18 °C anual average
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Marginal croplands

- Good soils are scarce
- Bad soils are common

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Abandonment of marginal crop problems

- Disappearance of the local population
- Cultural loss of knowledge and traditions
- Destruction of traditional agricultural structures
- Increase in erosive processes on slopes
- Development of the scrub as fuel in case of fire
- Disappearance of the fauna and flora linked to crops
# Land evolution (ha) in Murcia

<table>
<thead>
<tr>
<th>Land Type</th>
<th>2002</th>
<th>2004</th>
<th>2006</th>
<th>2008</th>
<th>2010</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>TOTAL SURFACE</strong></td>
<td>1,131.398</td>
<td>1,131.398</td>
<td>1,131.398</td>
<td>1,131.398</td>
<td>1,131.398</td>
</tr>
<tr>
<td><strong>ARABLE LANDS</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Arable crops</td>
<td>112.978</td>
<td>115.167</td>
<td>109.700</td>
<td>99.733</td>
<td>96.439</td>
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<tr>
<td>Fallow and other</td>
<td>269.245</td>
<td>275.396</td>
<td>245.727</td>
<td>252.652</td>
<td>258.130</td>
</tr>
<tr>
<td>Tree crops</td>
<td>223.796</td>
<td>215.276</td>
<td>211.196</td>
<td>209.094</td>
<td>199.795</td>
</tr>
<tr>
<td><strong>NATURAL LANDS</strong></td>
<td>436.607</td>
<td>436.607</td>
<td>440.573</td>
<td>445.333</td>
<td>449.266</td>
</tr>
<tr>
<td>Forest</td>
<td>169.810</td>
<td>169.810</td>
<td>172.129</td>
<td>173.123</td>
<td>168.480</td>
</tr>
<tr>
<td>Scrubland</td>
<td>105.539</td>
<td>105.539</td>
<td>104.580</td>
<td>104.782</td>
<td>117.490</td>
</tr>
<tr>
<td>Esparto grass</td>
<td>86.215</td>
<td>86.215</td>
<td>86.475</td>
<td>89.645</td>
<td>89.008</td>
</tr>
<tr>
<td>Pastures</td>
<td>75.243</td>
<td>75.243</td>
<td>77.389</td>
<td>77.783</td>
<td>74.288</td>
</tr>
<tr>
<td><strong>OTHER LANDS</strong></td>
<td>88.912</td>
<td>89.092</td>
<td>124.202</td>
<td>124.586</td>
<td>127.768</td>
</tr>
</tbody>
</table>

Environmental impacts of energy crops and environmental problems related to abandonment of marginal croplands in a Mediterranean area.
Objective crops

Environmental impacts of energy crops and environmental problems related to abandonment of marginal croplands in a Mediterranean area.
Objective areas

- areas with dominance of almonds
- areas with dominance of cereals
- mosaic areas with vineyard

Environmental impacts of energy crops and environmental problems related to abandonment of marginal croplands in a Mediterranean area
The expansion of agriculture has produced intense impacts on the natural environment.

¿Agriculture paradox?

The abandonment of agricultural activity produces a decrease in local biodiversity.

Loss of the “Great Nature”: bears, wolves, birds of prey, large herds of hoofed animals, plants, …

Loss of the “Little Nature”: small carnivores, small and steppe birds, invertebrates, weeds, …
Biomass crops: baseline

- No ploughing natural areas from new cultures
- Not utilize very marginal lands, which should be returned to a natural dynamic (forestry, livestock)
- Adapted plants to local conditions
- No monocultures
- Diversify the landscape
- Ecological crops management
- Promoting wild and cinegetic fauna
## Environmental impacts of energy crops

- Disappearance of the old crop
- Change of land management
- Change in the landscape
- Change of associated fauna
- Change of spontaneous flora
- Some biomass-plants may behave as invasive
- New pests and diseases
- Ecosystem global change
Change of land management

- Use of perennial biomass-plants
- Decrease in plowing and improvement of soil structure
- Use of urban and livestock waste, not tolerable for food crops
- Decline in employment of phytochemicals
- Changes in the schedule and the logistics of the production
- They will not produce residual products of cereal crops for livestock
Many animal species rely on rain-fed crops, especially in marginal crops.
A new balance?

- New cultivated plants will bring new plagues of insects and other pest.

- There will be a major change in the invertebrate herbivores, as many of them depend on one or few plant species.

- The new biomass-plants already have natural predators today, that will be enhanced in the future.
A new balance?

- *Aethiessa floralis*
- *Netocia morio*
- *Cetonia carthami*

- These large beetles feed on the flowers and seeds of thistles.
- The loss of biomass is small but they can produce large loss of seeds.
A new balance?

*Megascolia bidens*

- The females parasitize the larger larvae of beetles; after chop them with the sting to paralyze them, introduce an egg inside, and there the larvae will develop.
A new balance?

- The biomass-plants can produce food that favor some species of birds
- Losses in seed production
**Steppe birds**

- Agro-steppes: land open with cereal cultivation not irrigated and extensive grazing.

- Greater importance in Spain, both the huge area it occupies and its relevance to economic, social and landscape

- Threatened or endangered bird species: *Otis tarda, Tetrax tetrax, Burhinus oedicnemus, Pterocles alchata, Pterocles orientalis, Circus cyaneus, Circus pygargus, ......*

- Most important threats:
  - processes of intensification
  - increase of chemical compounds (fertilizers, pesticides)
  - poisoning or diminishes the fauna of invertebrates
  - change in the traditional agricultural calendar
  - rain-fed irrigation implementation
  - reforestation of agricultural lands
  - BIOMASS CROPS?
Steppe birds

- Lek: grouping of males who compete for mating with females, gathering in specific places for exhibitions. Lek is always held on the same territory.

http://gl.wikipedia.org/wiki/Sison

http://gl.wikipedia.org/wiki/Tetrax_tetrax
Spontaneous flora

- Important flora associated to rainfed crops
- Rare or threatened plant species
- Use of herbicides, with some extremely sensitive species
- New weeds from new crops

*Nigella papillosa*
Positive impacts

- Contribute to the reduction of greenhouse gas emissions
- Reduce the energy dependency of the oil-producing countries
- Maintenance of agricultural activity, that can replace marginal crops or not profitable
- Implementation of environmentally friendly farming techniques
- Appearance of new habitats for the wildlife and hunting
- Consider the impact on susceptible animal species change of cultivation, as especially the steppe birds
- Maintenance of the rural population that participates in the custody of territory
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thanks

8th and 9th of September, 2011

Antonio Robledo Miras