



European
Commission

ENERGY CROPS

3.2.2 Recovering abandoned land - Production of energy crops

Objective: recover abandoned land through energy crops, which have a double function:

- 1) Help to improve soil quality, increase biodiversity and reduce soil loss due to erosion.
- 2) Harvested product can be used as a raw material for pellet productions or for use directly as fuel in **Energy Generation Equipment**.

Steps taken

1. Data of soil conditions and their potential to cultivate energy crops, present vegetation, historical land use practices and rainfall was collected and analysed.
2. Energy crops were selected depending on the conditions of the respective plot. The following criteria were considered: **irrigation requirements, growth conditions, yield and energy content, market value and fertilizers/pesticides requirements**.
3. 4 initial varieties were selected: **triticale, guinea grass, sorghum and cardoon**, but due to lack of rainfall, the guinea grass and cardoon showed insufficient growth. So, **sunflower and barley** were chosen to replace guinea grass and cardoon (respectively).
4. A **Crop Plan** detailing soil pre-treatment and ploughing, weed control, sowing, water and

fertilizers supplement, harvesting and monitoring was developed and followed.

5. Data related to **optimal water requirement, necessary treatment and the energy yield** of each species were collected and analysed.
6. Different mixtures (0/50; 50/50; 67/33; 75/25) of two biomass types (olive kernel and sorghum) were made into pellets and tested for use in a biomass boiler. These materials were selected since olive kernel is produced in large amounts (by-product), while sorghum is considered one the most successful energy crops cultivated at Coop Cambrils. The increased ratios of olive kernel seemed to improve the pellets' physical characteristics and produce favorable durability and length. Theoretically these pellets would be suitable for use in Energy Generation Equipment.



Preparación de la tierra para los cultivos energéticos
Preparing the land for planting of energy crops



Mezcla para hacer la prueba de gránulos
Mixture of second pellet tests



Introduciendo la mezcla de sorgo y alperujo seco en la máquina peletizador
Feeding of pellet press with the mixture of sorghum and olive kernel

El resumen de la productividad y el poder calorífico de cada una de las especies analizadas / A summary of the productivity and calorific value of each of the crop varieties analysed.

Cultivo de biomasa <i>Biomass crop</i>	area (ha)	Preparación terreno <i>Land preparation</i>	Fecha de siembra <i>sowing date</i>	Densidad semillas <i>Seeds density (kg/ha)</i>	Fecha cosecha <i>Harvesting date</i>	Producción <i>Production (tn/ha)</i>	Producción <i>Production (tn)</i>	Poder calorífico <i>Calorific Value (MJ/kg)</i>
Cardo <i>Cardoon</i>	1,5	Mar 2015	Nov 2015	6	Jul 2017	1,2	1,8	18
Cebada <i>Barley</i>	1,78	Sep 2016	Nov 2016	100	Jun 2017	0,9	1,6	18
Triticale 1 ^{er} siembra <i>1st sowing</i>	1,55	Oct 2015	Nov 2015	200	Jun 2016	1,37	2,1	17,7
Triticale 2 ^{er} siembra <i>2nd sowing</i>	1,25	Sep 2016	Nov 2016	220	Jun 2017	0,72	0,9	18,4
Sorgo 1 ^{er} siembra <i>Sorghum 1st sowing</i>	1,25	Mar 2015	May 2015	32	Oct 2015	5,6	7	18
Sorgo 2 ^{er} siembra <i>Sorghum 2nd sowing</i>	1,55	May 2017	May 2017	25,8	Ene / Jan 2018	3	4,7	18,7