



Lyon, 4 May 2010

Fourth Workshop of the 4FCROPS Project
Future Crops for Food, Feed, Fiber and Fuel
www.4fcrops.eu

Towards a successful insertion of the non-food crops in the EU27 agriculture

The fourth workshop of 4FCROPS project (organized by the project coordinator-CRES) carried out in Lyon (4/5/10) as a side event in the 18th European Biomass Conference (www.conference-biomass.com) and theme “Towards a successful insertion of the non-food crops in EU27 agriculture”.

A total number of eight presentations were made starting with a presentation from **Dr. Eveline Lecoq** (DG Research) that presenting the main drivers for policy and research on biomass in the EU. **Dr. Efi Alexopoulou** (CRES), as 4FCROPS coordinator presented briefly the structure as well as the progress of the project. **Dr. Ewa Ganko** (EC BREC) with her presentation focused on land availability for the cultivation of non-food crops now and in the future. **Dr. Uwe Fritsche** (OEKO) gave a presentation with the title “Sustainability biomass supply: Criteria and Potentials in Europe”.

The second part of workshop starting with the presentation from **Prof. Luciano Cosentino** (UNICT) dealing with the cropping possibilities of non-food crops in EU27 agriculture. The economic viability of the non-food crops was discussed by **Prof. Peter Soldatos** (AUA) taking under consideration the farmers’ point of view. A Spanish project dealing with the cultivation of several energy crops throughout Spain entitled “On-Cultivos: an integrated approach for energy crops deployment in Spain” presented by **Dr. Juan Carrasco** (CIEMAT). The workshop ended with a presentation from **Prof. Spyros Kyritsis** (AUA) that focused on the promising sustainable feedstocks for transport biofuels respecting food competition.

KEY WORKSHOP FACTS

Main drivers for policy and research on biomass in the EU

The main challenges that have to be faced in the future are: a) primary production and climate change, b) food security, c) sustainable competitive, d) social inclusively and e) oceans.

FP7 for Research and Development (2007-2013) expected to spend 53 billion Euros. The cooperation programme for research has 10 thematic areas and Theme 2 “Food, Agriculture, Fisheries, and Biotechnology is one of them. Theme 2 has three main activities (2.1, 2.2 and 2.3). The activity 2.3 (Life sciences, biotechnology and biochemistry for sustainable non-food products and processes) is the one that funded the 4FCROPS project. Other relevant to 4FCROPS projects are: Energypoplar, EU pearls, ICON, Sweetfuel, Aquaterre, Crops2Industry, JATROPT and Global-bio-pact. From the Theme 5 two projects are the more interesting for 4FCROPS; BEE project and CEUBIOM. From the Intelligent Energy Europe Programme (IEE) the most relevant are: BIOMASS FUTURES and EUBIONETT III.

The next call of Theme 2 will open (most probably will be middle of June 2010). An information day will take place in September 2010 in Brussels (13/9). The plan is the deadline for the proposal submission is to be in January 2011 (18/1). The



evaluation of this call is expected to take place in March/April 2011 and the negotiation period has been scheduled to take place in May/June 2011.

Land availability for non-food crops for now and in the future

The land availability of non-food crops for now and in the future was estimated in 4FCROPS. The baseline scenario for the current available land for the cultivation of the non-food crops was based on the fact that only the fallow land will be taken under consideration. It has been estimated that the total area that energy crops is being cultivated is around 3 million ha.

For the estimation of the available land in 2020 and 2030 it was taken under consideration: a) the fallow land and b) the land that will be realised from food and fodder crops. Three were the main parameters for the land assessment: a) the future productivity increase, b) the changes in population and c) food imports/exports balances.

In the baseline scenario the total current available land has been estimated that is 13.2 million ha and 80% is fallow land, while the rest 20% is being used for the energy crops production. The largest area of cultivation of energy crops is in Germany, while quite important area is being cultivated in France and UK.

The estimation for 2020 showed that the available land for the cultivation of non-food crops will be increased and will be 20.2 million ha, while in 2030 is expected to be 24.2 million ha.

In 2020 the country that expected to be the one that will have the largest available land for energy crops will be Spain (it was the first in 2010), and most of this land will be fallow land, while in 2030 Germany is expected to be the one with the largest available land and this land is expected to be fallow land, land will be realised from cereals, fodder and grazing, oil crops and root crops.

Sustainability biomass supply: Criteria and potentials in the future

The key sustainability criteria for biomass are:

- direct and indirect land use change (LUC), and its impacts on GHG emissions, and biodiversity,
- impacts on air, water and soil quality,
- (global) food security impacts and
- Social: employment, rural income. He pointed that there is need to establish coherent set for all biomass/bio energy applications across heat, electricity/CHP, transport and material sectors.

The existing sustainability standards globally are: ISO, RSB, GBEP and GEF and the ones for Europe and USA are: EU RED and CEN. EU RED will be implemented in MS in 2010. In EU RED no social requirements will be taken under consideration, none for soil/water (reporting only), ongoing work on clarification of high-bio diverse grassland (current consultation), and inclusion of iLUC (consultation upcoming).

The Biomass potential for EU was presented based mainly on the report that had been prepared by EEA (2006) entitled “How much bioenergy can Europe produce without harming the environment?”

The bio energy potentials in EU has been estimated that in 2010 was 7350 PJ, in 2020 is estimated to be 9730 PJ, while in 2030 will be 12650 PJ. In 2010 it has been estimated that is mainly based on residues and wastes.



Cropping possibilities for non-food crops in EU agriculture

The Cropping possibilities of the non-food crops were examined in 4FCROPS. The main parameters that took under consideration in order to prepare a list with the most promising non-food crops for the EU agriculture were: the ecology of the crops, the biology, the crop physiology and the crop production. A list of fifteen non-food crops was consolidated and the selected crops were: rapeseed, sunflower and Ethiopian mustard for biodiesel production, sugar beets and sweet sorghum for bioethanol production, hemp and flax for fiber production, giant reed, reed canary grass, switchgrass, miscanthus and cardoon as lignocellulosic crops and willow, poplar and salix for short rotation forestry.

For the development of the cropping systems the parameters that were taken under consideration were: environment, role of the crop in the rotation, the avoidance of mono-culture, is the crop is an annual or perennial one. Four scenarios were developed: growing the non food crops on marginal lands with high or low inputs and on agricultural land with low or high inputs. *Marginal land* is that land for one or more constraints (slope, stones, nature of soil, salt concentration, pH, depth, drought, etc.) is not fertile.

Then for each climatic area (Nemoral, continental, Atlantic north, Atlantic south, Lusitanian, Mediterranean north and Mediterranean south) the selected cropping systems were presented divided in two annual and perennial ones.

Economic viability of energy crops in the EU: The farmers' point of view

The economic viability can be achieved if the return of the investment realized is competitive with other job or investment opportunities which are open to the farmer at present time and in the near future. Regarding the economic viability of the energy crops it should be pointed out that the energy crops are in general uneconomic without state support.

In 4FCROPS of the economic viability of 15 non-food crops was examined economic and the results for two rapeseed and miscanthus presented in the workshop.

The cultivation of *rapeseed* for biodiesel production started in 2004 in Germany when the German government exempted biofuels from taxes in a bit to reduce CO₂ emissions and introduced a raft of subsidies that sparked a rapid expansion of the biodiesel industry, the biggest in the world. Boosted by high oil prices, biodiesel sales in Germany rose to 2.8 million tons in 2006, accounting for almost 5 percent of the country's total transport fuel sales. After many years of leadership in biodiesel production Germany lost the top position in 2010. Now, Germany is now behind the USA and Argentina, who is developing into a world exporter.

Miscanthus is cultivated in a total area of 6,000 ha in UK. The yields of the crop varied from 10 to 25 t/ha. The selling price is between 50 and 60 euro/tn. It is estimated that the establishment cost is around 2000 euro and DEFRA give 800 euro/ha as subsidy to the establishment cost. Taking under consideration that the yields of miscanthus is 14 t/ha and the selling price is 50 euro per tonne the profit of this cultivation cost is 667 euro/ha before grant, taking under consideration that the plantation will have a lifetime of 15 years. Miscanthus can be a viable cultivation in UK.

On-Cultivos: An integrated approach for energy crops deployment in Spain

On-cultivos is a Spanish project that has as final objective (www.oncultivos.es) to upgrade the sustainable energy production from dedicated crops to a pre-commercial stage in Spain. On-cultivos has to develop, define and create the



necessary conditions to promote the sustainable market of the biomass from energy crops. The Project started in 2005 and will be ended in 2012 and having a total budget of 62 million euros. The total area of energy crops cultivation will be 5000 ha.

In *On Cultivos* the Development and evaluation of energy crops chains will be carried. The selected lignocellulosic crops were: woody (poplar, robinia, olmo di Siberia and pawlinia) and herbaceous ones (cardoon, rapeseed, switchgrass, agropiros, triticale, giant reed, sorgo hibrodo). The selected crops for biodiesel were: rapeseed, sinapis alba, jatropha, camelina, crambe).

The main goal of the experimental programme on energy crops in Spain is the study of different agronomic aspects needed for the development and application of the candidate species at a commercial scale (considering cultivation, postharvest and logistics). In the framework of the On Cultivos project pellets were also made from several energy crops.

With the competition of the On Cultivos programme the main achievements for Spain will be:

- Energy crops will become a significant source or renewable energy in Spain
- Energy crops will become a real alternative to the sustainability problems of the present spanish agriculture.
- Adequate tools and knowledge will be available for farmers and industrials to produce sustainable energy from biomass crops.
- A number of universities and R&D organisms will be capable to give the required technological support for energy crops deployment in the short term, as well as to achieve further developments.

Promising sustainable feedstock for the production transportation biofuels respecting food competition

Nowadays, the bioethanol is being produced by corn (USA) and sugarcane (Brazil) and sugar beet and cereals (Europe). The today ethanol production comes mainly from food crops. So, the energy prices influence the food prices.

European Union regulations supports the use of feedstock not designated for food and respecting the new sustainability criteria, saving initially at least 35% of CO₂, and up to 2017 more than 50%, with the existing installations (<1/4/2013), and more than 60%, for the new installations. The bioenergy feedstock should not be produced: a) in land of high biodiversity, b) from places of high Carbon stock (Natural forests, Peat lands, Savannas, etc.), 3) without respecting soil, water and air and d) biofuels should prove to be socially responsible.

A promising energy crop for bioethanol production in Europe is sweet sorghum. Sweet Sorghum even though a new ethanol crop (the first commercial distillery was established in 2007) is proved that disposes a great potential to produce competitive ethanol, to reduce GHG, and a promising crop for food feed and fuel production in parallel or in rotation. South European and Mediterranean climatic and social conditions are very suitable for S.S. ethanol and feed productions.

Jatropha Curcas is a new feedstock for biodiesel production able to valorize poor soils under dry conditions. Its production could be sustainable under an appropriate policy. Some Universities (Hawaii, Hohenheim, California) and many Research Centers (in Guatemala and others) try to find the best cultivars for specific conditions. The social and climatic conditions in South Med-countries are suitable for good production, but research is still needed to assure production and efforts.

