



4FCROPS

**Future Crops for
Food, Feed, Fiber and Fuel**

Minutes of the third 4FCROPS workshop

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

Lyon, 4/5/10

The workshop took place in the area of 18th European Biomass Conference, Lyon 3-7/5/10 (www.conference-biomass.com) as side event

Prepared by CRES



Participants list

Participant Name	Organisation
1. HOFER Anton	University of Konstanz, Germany
2. SILIM Salim	Agriculture and Agri-Food Canada, Canada
3. ADAMOVICS Aleksandrs	Latvia University of Agriculture, Latvia
4. CADORNIGA Carlos	INIA, Spain
5. LECOQ Eveline	DG Research, European Commission
6. BOUKIS Nikolaos	KIT, Germany
7. STEKSPAAD Arke	AgroTech A/S, Denmark
8. LEMKE Thoralf	MWM GmbH, Germany
9. PASCOE Nick	International Energy Crops, UK
10. PARI Luigi	CRA, Italy
11. SANCHER LOPEZ Javier	UPM, Spain
12. FORMOWITZ Beate	Technologie-und Forderzentrum, Germany
13. EL KASMIOUI Quafik	University of Antwerp, Belgium
14. NJAKOY DJOMO Sylvestre	University of Antwerp, Belgium
15. CARRASCO Juan Esteban	CIEMAT, Spain
16. GONZALEZ W. Jose Manuel	Santa Lidia, Chile
17. GONZALEZ A. Jose Manuel	Santa Lidia, Chile
18. Ganko Ewa	EC BREC, Poland
19. KUJANPAA	VTT, Technical Research Centre of Finland
20. HELIN Tuomas	VTT, Technical Research Centre of Finland
21. KOPONEN Kati	VTT, Technical Research Centre of Finland
22. IVERSEN Norazana	Danish Ministry of Food Agriculture & Fisheries, Denmark
23. FERNANDO Ana Luisa	New University of Lisbon - UniNOVA
24. FRITSCH Uwe	Oeko Institute, Germany
25. Duarte Maria Paula	New University of Lisbon - UniNOVA
26. VENTURI Gianepetro	University of Bologna, DiSTA
27. ZEGADA-LIZARAZU Walter	UNIBO, Italy
28. KYRITSIS Spyros	Agricultural University of Athens, Greece
29. MONTI Andrea	University of Bologna - UNIBO
30. DI VIRGILIO Nicola	IBIMET
31. SANCHEZ Godoy	Foundation Premio Arce. ETSI. Arginomos
32. SOLDATOS Peter	Agricultural University of Athens, Greece
33. SCORDIA Danilo	University of Catania, Italy
34. JAMIESON Craig	Next Generation, UK
35. KIMMING Marie	Sweden University of Agricultural Sciences, Sweden
36. HUGONY Francesca	Experimental Institute for Fuels, Italy
37. MANNING Eibhilin	EUBIA, Belgium
38. BOGNANSKI Anne	FAO, Italy
39. DECKER Thomas	University of Applied Sciences Weihenstephan-Triesdorf, Germany
40. ALEXOPOULOU Efi	Center for Renewables Energy Sources, CRES, Greece
41. TEMPONERAS Dionysios	Greece



Lyon, 4 May 2010

Fourth Workshop of the 4FCROPS Project:

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

Side event of the 18th European Biomass Conference and Exhibition

Lyon Convention Centre - Cité Internationale

10:00 - 13:30 Tuesday 4 May 2010

Room Rhône 1, level 1

Chairmen: Dr. Juan Carrasco, Dr. Efi Alexopoulou

9:30 - 10:00	Registration	
10:00	Main drivers for policy and research on biomass in the EU	<i>Dr. Eveline Lecoq, DG Research</i>
10:20	4F CROPS project	<i>Dr. Efi Alexopoulou, CRES</i>
10:40	Land availability for non-food crops in the EU today and in the future	<i>Dr. Ewa Ganko, EC BREC</i>
11:00	Sustainability biomass supply: Criteria and Potentials in Europe	<i>Dr. Uwe Fritsche, Oeko</i>
11:20	Break	
11:30	Cropping possibility of non-food crops in EU agriculture	<i>Prof. Salvatore Luciano Cosentino, UNICT</i>
12:00	Economic viability of energy crops in the EU: The farmers' point of view	<i>Prof. Peter Soldatos, AUA</i>
12:20	“On-Cultivos: an integrated approach for energy crops deployment in Spain”	<i>Dr. Juan Carrasco, CIEMAT</i>
12:40	Promising sustainable feedstocks for transportation biofuels respecting food competition	<i>Prof. Spyros Kyristis, AUA</i>
13:10	Questions and conclusions	
13:30	End of the workshop	

Dr. Juan Carrasco, chairman of the workshop, welcomed the participants and made a short introduction about the scope of this workshop

Dr. Eveline Lecoq, DG Research

Main drivers for policy and research on biomass in the EU

Dr. Eveline Lecoq, scientific officer for 4FCROPS (DG Research) presented the 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.

Dr. Lecoq continued her presentation by presented the 7th Framework Programme and more specifically Theme 2 and its specific activities 2.1, 2.2 and 2.3. The activity 2.3 “Biotechnologies” is the one that 4FCROPS is belonging and the projects that are relevant to 4FCROPS 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 was presented starting with the time that the call 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.

Dr. Efi Alexopoulou, CRES

4FCROPS project

Dr. Efi Alexopoulou welcomed the invited speakers and participants and thanked *Dr. Juan Carrasco* for accepting the invitation to be the chairman of this workshop.

Dr. Alexopoulou presented in brief the project 4FCROPS (www.4fcrops.eu) that was the reason for the organisation of this thematic workshop.

4FCROPS started in June 2008 and will finish in November 2010. The project is a dissemination and support action one and its main aim is to survey and analyse all the parameters that will play an important role in a successful non-food cropping systems alongside the existing food crops systems.

The project is being accomplished its aims through eight work packages: 1) land use in EU27, 2) cropping possibilities, 3) cost analysis of non-food crops and socio economics impacts, 4) environmental analysis, 5) regulatory framework, 6) best practices scenarios, 7) dissemination and support actions and 8) management and coordination.

Key element to the success of the 4FCROPS is the thematic workshops that have been scheduled. Up to now two thematic workshops had been organised; the first in Bologna (September 2008) with theme “**Market needs**

of non-food crops in EU27”, the second in Madrid (24/3/09) with theme “Which are the key future non-food crops in EU27?”, the third with theme “Can the production of non-food crops be environmentally friendly and economic viable?” and today is the fourth one.

Another important element to the project success is the scientific committee of the project that consisted from the work packages leaders and invited stakeholders that have an advisory role in the scientific committee and participate in the thematic workshops.

4FCROPS had been invited to participate in the twinning opportunity between EU and Canada that started last year with a workshop (February 2008 in Montréal) and continued last year in Pisa in the second workshop (June 2009), while the third workshop will take place in Canada (October 2010).

Recently, 4FCROPS have been invited to participate in the twinning opportunity with Argentina and MERCOSUR project. The first meeting of this twinning opportunity took place in Buenos Aires (7&8/5/09) and the second will be take place in Athens in June or July 2010 and will be organised by CRES.

Dr. Ewa Ganko, EC BREC

Land availability for non-food crops in the EU today and in the future

Dr. Ganko is the work package leader for first work package entitled “Land Use in EU27” of 4FCROPS. The main target of this work package was to estimate the available land area for non-food crops (fibre and fuel) in 2020 and 2030.

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.

Dr. Uwe Fritsche, OeKO

Sustainability biomass supply: Criteria and Potentials in Europe

Dr. Fritsche starting his presentation with the key sustainability criteria for biomass which are: a) direct and indirect land use change (LUC), and its impacts on GHG emissions, and biodiversity, b) impacts on air, water and soil quality, c) (global) food security impacts and d) 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.

He continued his presentation with the existing sustainability standards globally (ISO, RSB, GBEP, GEF) and the ones for Europe (EU RED and CEN) and USA. EU RED is going to 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?”

He presented the biomass potential of the forest residues with a map in EU27 countries and parameters that should be taken under consideration are: a) no intensification on protected areas, b) roots and foliage remain in the forest, c) sustainable nutrient balance (soil type and base saturation), d) soil erosion (steepness and elevation) and e) soil compaction (peat land and soil water regime).

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.

Prof. Luciano Cosentino, UNICT

Cropping possibility of non-food crops in EU agriculture

Prof. Luciano Cosentino that is acting as the work package leader of WP2 entitled “Cropping possibilities” starting his presentation by presented the main parameters that took under consideration in order to prepare a list with the most promising non-food crops for the EU agriculture, which 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.

Prof. Peter Soldatos, AUA

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

Prof. Peter Soldatos started his presentation by answering how the economic viability of the crops can be achieved. 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.

Prof. Soldatos concentrated his presentation on two energy crops rapeseed and miscanthus.

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.

Prof Soldatos presented a comparison between two annual winter crops in Germany; rapeseed and wheat taking under consideration that the first crop has 3.5t/ha yields and the second 7 t/ha. The profit of rapeseed has been estimated to 141.54 euro/ha, while of wheat estimated to 98 euro/ha.

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.

Dr. Juan Carrasco, CIEMAT

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

Dr. Carrasco presented the Spanish project entitled “***On-cultivos: an integrated approach for energy crops deployment in Spain***” that is coordinated.

The final objective of On Cultivos (www.oncultivos.es) is to upgrade the sustainable energy production from dedicated crops to a pre-commercial stage in Spain. Thus, the project has the objective 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 the view of ***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 of 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 feedstocks for transportation biofuels respecting food competition

Prof. Kyritsis presented the most promising sustainable feedstocks for the production of transportation biofuels taking under consideration the competition between food and fuel. 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.

The final conclusion of this presentation was “The better Productivity and Sustainability of the new feedstocks and their ability to be produced either in infertile soil or for dual purpose Food and Fuel, moreover the fact that investments and markets are without frontier, an appropriate policy is needed by EU and countries to face many of their energy, economic and social problems”.

End of the workshop



in the Biomass Exhibition Area in which there they could find more information about both the 4FCROPS as well as about the On Cultivos project.

Dr. Carrasco closed the workshop by make a summary of the important points of the presentation that made this morning. He invited also the participants to visit the CIEMAT place

