

**THE PROJECT ECHIT.  
LARGE SCALE PRODUCTION OF BIO-ETHANOL FROM SWEET SORGHUM**

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## 1 OBJECTIVES

The project aims at demonstrating the feasibility of sweet sorghum cultivation for the renewable and sustainable production of transport fuels (bio-ethanol, and even bio-hydrogen and bio-methanol), energy (electricity and heat) and other products (such as animal feed, pulp for paper, charcoal, activated coal, etc.) in Europe and abroad. During the project a detailed technical, economic and financial study on a **Integrated Bioenergy Complex** based on sweet sorghum was performed, with the main goal to define the plant configuration and logistics, from the biomass receipt to the products supply: three possible sites were selected, two in Peoples Republic of China and one in Italy. Also, a preliminary environmental impact assessment and an evaluation of the socio-economic benefits (i.e. job creation) were carried out.

The main issue addressed by the project is to raise the technical knowledge about ethanol production from sweet sorghum; the alcohol production, in fact, is usually obtained (in Brazil and Europe) from sugarcane and beet and so there is a general lack of know-how on its production from sweet sorghum. The cultivation of this dedicated crop is common in China and Romania, thus providing the necessary skills to carry out the project. The other main issue of the project is that the processing of sweet sorghum can be done with existing commercial technologies, but the application of these technologies to this crop is very innovative and research activity is needed. Furthermore, the integrated processing of an energy crop into several products with high added value (e.g. chemicals) has never been implemented so far.

The Integrated sweet sorghum Complex can contribute to the achievements of actual policies for both European States and Developing Countries. The production of renewable energy at a competitive cost, the diversification of energy supply, the production of vegetal proteins (DDG) and new permanent job creation are goals suitable for the first group of countries; the fight against poverty and unemployment, a phenomenon typical of rural and remote areas, and the innovation and development of advanced technologies are very important for the second one.

## 2 RESULTS

The ECHI-T project examined a wide range of bioenergy schemes based on sweet sorghum in Italy and Peoples Republic of China. A survey of the three sites has been carried out, and areas suitable for sweet sorghum cultivation and the related industrial processing activities have been identified. Two different approaches have been chosen: the first one aimed at designing a large scale centralised scheme to be adopted in Basilicata (Italy) and Dongying (P.R. China), while the second one based on small scale clustered units suitable for rural areas and probably lower quality soils, evaluated for Huhhot (P.R. China).

The project demonstrated that the integrated bioenergy scheme is technically feasible on the basis of existing commercial technologies, even if minor adaptations are necessary. The economics of the projects are favourable, even if some support is needed to make the investment economically sounder, given also the favourable impact on the environment and the connected socio-economic benefits. Moreover, the scheme in Europe and abroad is eligible for several measures financially supporting RE projects, as Structural Funds or CO<sub>2</sub> trading, which could significantly improve the returns on investment and, also, the possibility of combining the production of bio-ethanol from sweet sorghum with bio-ethanol from other crops could extend the use along the year of the ethanol production plant, and therefore improve the economics.

In Romania, where Sweet Sorghum is well known, a commercial project is now set up with a plantation of 20,000 ha, conversion into alcohol, grain and pellets; some innovative demonstration projects are added to convert the biomass into other high value products.

The ECHI-T Brochure can be requested to ETA-Renewable Energies.