IENICA

Interactive European Network for Industrial Crops and their Applications

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This newsletter is printed on 20% hemp and 80% recycled post consumer waste. The hemp was grown in Essex, UK and the pulp produced as part of the BioRegional MiniMill project – developing small-scale pulp mill technology with support from environmental organisations, six UK paper manufacturers and the British Government. See www.bioregional.com

Hemp in Europe

Since prehistoric times, hemp (*Cannabis sativa*) has been grown for its fibre, oil and psychoactive substances. The crop was once widely cultivated, especially in Central Asia. From the 16th to the 18th century hemp was an important fibre crop in Europe and in North America. Hemp cultivation declined in the 19th and 20th centuries because of the increase in the large-scale production of cotton and other fibre crops, the advent of synthetic fibres, and the introduction of legislation related to the control of psychoactive substances.

The need for alternative crops in western agriculture due to the overproduction of some commodities and the shortage of fibre in the EU triggered renewed interest in hemp. For several years hemp cultivation was economically interesting as it attracted special European subsidies ("green set-aside") but these have now been cut back. There are, however, many interesting markets for the crop because of its multitude of applications, including vegetable oil, beer, bedding, paper, construction material, geo-textiles, clothing, industrial yarns, etc. Hemp is also an interesting raw material for multi-output systems based on biocascading.

Hemp is easy to grow as an arable crop, requires very little input and suppresses weeds very efficiently. In Europe fibre hemp may yield up to 25 tonnes above ground dry matter per ha (20t stem dry matter/ha or 12t cellulose/ha). Yields are especially high in Southern European countries, where sowing can be early and a long growing season can be achieved.

The area has fluctuated during the last decade. A rapid development of the cultivation and use of the crop will require a solution for several problems. Firstly, the association with illegal narcotics, addressed by breeding for extremely low contents of psychoactive compounds (below 0.2% THC on the basis of dry matter) and by permitting only crops that set seed. Also, the crop is difficult to harvest, as normal machinery cannot cope with the tough material, so considerable investment is needed for designing harvesting and processing systems. Finally, multi-purpose production and use systems may prove to be the most economically feasible options.

It is timely to produce an overview of latest developments. This newsletter provides such an overview on the basis of recent experiences in several countries in Europe.

P.C. Struik, Plant Research International, Wageningen University, The Netherlands

Hemp in the Netherlands and in the UK

Drug hemp is one of the most profitable crops in the Netherlands. It is mainly grown indoors and widely spread, albeit illegal. In 1997 the area of hemp reached 1220 ha, but dropped slightly in 2001 to 1045 ha. For 2002, however, estimates of hemp area are as high as 3000 ha. The hemp crop is concentrated in the northern parts of the country (Groningen and Drenthe) for use as industrial fibre and bedding. However, a new nucleus of hemp production for textiles appears in the eastern part of the country (Achterhoek).

Dutch research organisations have been active in several EU programmes on hemp research. A new cultivar with very high quality of fibre bred by Plant Research International in Wageningen has boosted further interest and research.

The company Hempflax was instrumental in establishing hemp cultivation and processing of industrial hemp in the north of the Netherlands. It recently developed a new mechanical process, which separates fibre hemp into four main products: bark fibre, hemp core, hemp seed and hemp compost. It has a capacity large enough to process 5,000 ha of fibre hemp.

Hemp in the UK has also undergone a renaissance as its many and varied applications have been recognised. In England and Wales a number of processing companies now exist. Hemcore in South Essex processes large quantities of hemp. It sells the chopped pith of the plant as horse bedding. A great deal of the English hemp fibre, however, is exported to Germany where it has a large number of uses, e.g. within the automotive industry. JB Plant Fibres, situated in North Wales, produces a diversity of geo-textiles based on hemp and flax. This company also develops insulation products based on hemp.

Hemp may also provide the raw material for a mainstream form of ecological building. Hemp is used in a range of eco-composites, including "chipboard" and insulation batts. "Hempcrete" can be produced when hemp hurds are mixed with lime and cast. After treatment with a fire retardant, chopped-up hemp hurd can also be used as a loose-fill insulation material in floors and roofs.

P.C. Struik, partly based on information provided by Nigel Oliver, ACTIN

Hemp in France

Hemp has become an important crop in France. In 2000 15,000 hectares of fibre hemp was grown. Two R&D programmes on hemp have been selected by the scientific interest group AGRICE (Agriculture for Chemicals and Energy), the first programme, in 1997, is focused on the construction industry. Plant-derived materials, in particular hemp, have begun to find applications e.g. 'Canobiote', an insulating material marketed by the Chanvrière de l'Aube. However, insufficient knowledge of the properties of hemp fibre limits its broader use in construction. The project goal is to determine the possibilities for using hemp fibre and to gather the data necessary for the utilisation of these fibres in conformity with good building practices.

The second programme, in 2000, focused on the production of composites for the automobile industry. Fibre from crops such as hemp and flax has useful characteristics, such as low density, non-abrasiveness and innocuousness, renewability and recyclability and absence of noxious waste when incinerated, not to mention their high technical performance. The goal of this second programme is to create a new itinerary for commercially producing hemp fibre, from supplying the raw material to preparing the semi-finished product (hemp coating), to transforming it into automobile body parts using the so-called R-RIM process.

Magali Rocher, ADEME. Most relevant contact: Bernard BOYEUX, La Chanvrière de l'Aube, Rue du Général de Gaulle, 10200 Bar-sur-Aube, France Tel: 33 3 25 92 91 95

Hemp in Hungary

Hemp cultivation and processing is a traditional agricultural activity in Hungary, where fair climate conditions are coupled with sophisticated processing technologies based on long-term professional experience. Due to a continuous decrease in demand, hemp cultivation and processing is at present only 10% of the level in 1990.

Hemp was cultivated on approximately 1000 ha in 2002. This production level satisfied the needs of the traditional hemp processing industry and hemp seed production. Two thirds of this was for fibre, one third for oilseed. Since no market expansion has occurred for decades no technological development had been carried out to promote the processing industry. However, hemp breeding research is fairly strong in Hungary and some of the top quality Hungarian clones are used worldwide.

The main barrier in terms of fibre crop production is the lack of harvesting and

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Hemp in Hungary

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processing machinery capacity. Currently the hemp processing companies are looking for new hemp fibre utilisation opportunities, such as the use of hemp as heat and noise insulation material, which would also require special processing machinery.

The main problem of the Hungarian hemp/fibre crop production is the lack of market information. No clearinghouse exists with up to date information on subsidies, buyer requirements and market prices. The export of the raw materials and final products is not organised. Until 1990 a high fraction of the hemp and flax products were sold to the Soviet Union. With the fall of the Soviet market most of the hemp producers have shifted to the cultivation of other industrial crops. Legislatively, there is a lack of state and bilateral subsidies for the construction of modern hemp processing factories. Also the existing subsidy on hemp cultivation is low (33 Euros/hectare) and there is no subsidy for processing.

While the extensive use of hemp fibre materials has decreased recently, there is an ever-increasing interest in environmentally friendly materials and the often superior properties and ecological factor of utilising hemp creates opportunities in the automotive industry, building material production etc. Although only an estimate, the area of hemp cultivated is likely to be several hundred thousand hectares in the near future.

Kati Réczey, IENICA-Hungary. Based on information from Mr. György Tóth (Hungarohemp Rtd) and Dr. Ildikó Iványi (Tessedik Sámuel University)

Picture 1. Hemp mower for straw and/or seed (panicle) harvesting

Hemp in Switzerland (non EU)

The government supports hemp production in Switzerland if the cultivated variety is listed in the national variety catalogue, which includes 13 varieties with an expected content of THC below 0.3%. Farmers producing more than 0.02 ha of industrial hemp can ask for a crop linked financial contribution of 1,015 Euros per year. Additionally, a general contribution of 1,080 Euros per year is paid as a direct payment related to area. Growing plants with a content of THC more than 0.3% is not forbidden if the products are not used as drugs. Farmers who grow these varieties can only ask for the general contribution. In 2001, the total area of registered hemp was 114ha (31ha of which was industrial hemp with a THC content greater than 0.3%). One small company uses almost 50% of the grain production (of the industrial hemp) to produce hemp oil for skin care. A small amount of essential oil is produced which is mainly used as flavouring for edibles or for aromatherapy.

Due to the absence of an industrial fibre decortication facility in Switzerland, no fibre production is possible. Nevertheless, some research for hemp processing and assessments for market potential has been carried out i.e. on fibre hemp insulation, agricultural cultivation and market analysis. This research revealed that a market for industrial hemp exists. Another reason for the small hemp production could be the legal requirements. Since "drug-hemp" is legal if it's not used for drug production, all hemp producers have to be aware of strict police controls. A considerable change of the legal requirements is expected for the year 2005 or later. Cultivating and selling of drug hemp should be strictly controlled; the export is prohibited. The law is currently in discussion and no final version is available.

Claudia Frick, Swiss Federal Research Station for Agroecology and Agriculture

Hemp in two pre-accession countries: Lithuania and Poland

Lithuania

Hemp is one of the oldest fibre crops in Lithuania and was once widely grown, on small plots close to the house. Some farmers produced hemp on larger areas on fertile soils. In 1941 the hemp area was 1,500 hectares. Fibre was used for making ropes, fishing nets and sacks, whereas the other stem parts were used as insulation material and for heating. Today, hemp is forbidden due to the content of psychoactive compounds, although it is expected that this will change in the near future, for low-THC varieties.

Sigitas Lazauskas, Lithuanian Institute of Agriculture

Poland

Once very popular (30,000 ha in the 1960s), the area of hemp cultivated has declined as a result of competition, first from cheaper plant fibres (jute and sisal) and later by synthetic fibres. Today, the area of hemp is only about 100 ha, mainly for the production of seed which is exported to EU countries. However, the interest in this crop is growing. The main constraint on hemp cultivation, besides competition from other fibres, is the lack of efficient and reliable harvesting and processing technologies. In Poland, where machines for small and medium size plantations are required, the harvesting is based on machines capable of harvesting about 1.0 ha/h (see Picture 1).

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When grown for the panicles (for essential oils) the straw can be harvested simultaneously at an early stage and processed for the textile industry or used for numerous non-textile applications e.g. composites. The stems harvested at full maturity (when seeds are also harvested) can be used for pulp production. In the next 2-5 years a pulp producing unit with a production capacity of 20,000 tonnes is planned in Western Poland. In connection with pulp production a technology of efficient and more economical straw decorticating has been developed. This new straw processing technology employs only one basic unit, is able to process 1000-1500 kg of straw per hour and produces fibre-containing impurities at a level which is comparable with the standard technology.

Picture 2. New decorticator for straw processing

The efforts to revive hemp cultivation in Poland also include breeding to obtain cultivars with high yields of fibre. Recently, attempts were made to obtain hybrids from crossings between high fibre containing Polish cultivars and an old Italian strain *Cannabis gigantea*, which was thought be extinct for a long time. It is expected that all the developments described above will boost the area of hemp cultivation next year to 2000-2500 ha.

Przemyslaw Baraniecki & Jerzy Mankowski. Institute of Natural Fibres, Poznan

Biofibre Conference, Gothenburg, November 5th 2002

The growing interest in the industrial use of biofibres has led to the creation of a Nordic network: Biofibre.net, financed by the Nordic Industrial Fund. The aim of the network is to enhance the industrial utilisation of biofibres for the manufacture of products with as little environmental impact as possible. A Nordic Biofibre Conference was held on the 5th November in Gothenburg. The programme included the IENICA network, presented by Melvyn Askew, together with overviews on biofibres for paper and packaging, for new materials including wood plastics, enzyme technology, design development and processing methods for hemp fibres.

The growing interest in the use of biofibres industrially is not reflected in an equal growing industrial output. The main reason is the lack of knowledge and suppliers of fibres, wood-plastic pellets and mats with desired properties, of machinery and of designers with the required knowledge of the new materials. This new network together with existing networks such as IENICA will help fill in the vacuum between research and production. Within the next year it is planned to hold workshops on specific topics and a second conference with a broader scope. If you wish to become a member of the network, or for more information, please see: www.biofibre.net

Forthcoming Industrial Crops Events

12-13 February 2003
International IBAW Symposium:
Advanced Bioplastics
Nuremberg, Germany
Tel: +49 30 28482352
Email: symposium@ibaw.org
Website: www.ibaw-symposium.com

15-16 May 2003
IENICA Regional Seminar:
Non-Food Crops in Southern Europe and the Mediterranean:
From Agriculture to Industry
Bologna, Italy
Email: avecchi@agrsci.unibo.it

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