IENICA

Interactive European Network for Industrial Crops and their Applications

Newsletter number 15 February 2002

The Stinging Nettle: Its Reintroduction for Fibre Production

The nettle (*Urtica dioica* L., stinging nettle) is a perennial plant that contains unlignified, sclerenchymatic fibres in the bark. Collecting nettles as a source of fibre goes back a long way in history. During World War I and WW II nettles were used for producing textiles in addition to flax and hemp. In Hamburg, Germany, efforts were undertaken to select nettles with fibre contents up to ~ 15 % of the dry stem mass.

In 1999, an EU-project (FAIR-CT98-9615) was started to observe the possibilities for this plant to be cultivated as a raw material for the production of fibres and cellulose using modern methods of plant production and fibre processing. Project partners were textile companies from Austria, Germany and Italy, the Institute of Applied Research at FH-Reutlingen, Manfred Ghesla GmbH and the Institute of Agrobiotechnology in Tulln/AUSTRIA (IFA-Tulln).

Main goals were aspects of plant production (establishing of the crop, nutrition requirements, maintenance works, harvesting methods) and fibre processing (techniques of fibre extraction, methods of spinning the fibre, weaving fabrics and manufacture textiles).

In spring of 1999, four clones with high fibre content were planted at two locations in Austria. The plant material was supplied by the Thüringer Landesanstalt für Landwirtschaft, Germany, and originated from the breeding work of G. Bredemann, Hamburg, who worked in this field from the 1920s to 1950s. The propagation had been done vegetatively with cuttings. After six weeks of preculture in the greenhouse cuttings were transplanted to the field.

Planting of nettles in spring 1999.

Fibre nettles were cultivated in rows, being spaced apart 75 cm and 50 cm within rows. Two hectares were planted with 27,000 plants per hectare, using a machine normally used for cabbage seedlings.

As the nettle is a nitrophyllic plant, the effect of increased amounts of nitrogen on quantity and quality of fibre yield was investigated under different levels of nitrogen using organic fertilizers.

The first harvest was in 2000 because in the first year the growth performance was poor. In summer 2000, different cutting times and techniques of harvesting were tested. After accurate investigations of fibre quality at the Institute for Applied Research of FH-Reutlingen, Germany, the harvest time in 2001 was in the middle of August when a large amount of leaves had already fallen, but new sprouts had not yet been formed.

Harvest time in August 2001.

In literature, nettles are often described as being highly competitive with weeds. It is also mentioned that they need sufficient moisture and good soil conditions to produce high yields. It was observed that on the best plots the nettle plants developed well with a large amount of tall stems. In this region the plants reached up to 180 cm height and yields of almost 5 kg total fresh mass per m^2 were observed. As the proportion of dry stem mass is about 20 % this will be the equivalent to 1 kg dry stem mass per m^2. Unfortunately, due to a very variable soil, the average yield was only 0,34 kg dry stem mass per m^2, thus 3,4 tonnes per hectare.

On the worst trial areas, where soil conditions were not optimized, a lot of weeds like thistles, wild teasels and dandelion (*Taraxacum officinale)* suppressed the development of the nettles. As a result, the yields in these areas were only about 0,1 kg dry stem mass per m^2. Concerning yields, a high variability was also found between the clones as a result of different height, number of stems/plant and diameter of stems.

Nettles are described as resistant to diseases and pests. In the 2nd year, one clone was infected by mildew. Aphids and larvae of some butterflies appeared, but not at significant levels.

After harvest, the dry stems were decorticated by a flax company in Austria and the fibres sent to Germany where our partners are still busy spinning experimental yarns.

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BASAN

Basan (Baltic Sea agro-industrial network) is an EU financed network with 11 participants representing the countries (apart from Russia) around the Baltic Sea. Four of these 11 participants are regional research organisations. The others are regional innovation centres. The Secretariat is based at the Bioraf Denmark Foundation situated on Bornholm, a small island in the middle of the Baltic Sea. Bornholm has 50,000 inhabitants and is faced with the same challenges and problems as the other regions.

Basan's main objective is to encourage the establishment of new commercial activities based on local raw materials in the rural areas around the Baltic sea.

The Baltic Sea area

The Baltic Sea Area (BSA) includes 9 countries and 7 relatively large islands. The entire BSA with a total of 60 million inhabitants has a history of close co-operation over many centuries.

Although the regions differ in many ways, they still share many challenges and problems:

- Agriculture plays a dominant role
- Some of the Baltic Sea countries are members of the EU, and thus subject to the EU Common Agricultural Policy, and the others will most likely join in a foreseeable future.
- The majority of the sub-regions are considered "rand zones" (less favoured regions).

- They are faced with depopulation problems (social desertification) and /or high unemployment rates
- They are relatively near important markets (big cities)

The sub-regions in the BSA, where traditional agriculture is a dominating income source, will not be able to effectively counteract the depopulation and the high unemployment rates unless new activities are found, preferably industrial activities based on local raw materials, i.e. agricultural products.

Experience has shown that it is very difficult to attract high tech companies and larger agro-industries to these areas. Currently a major part of the agricultural products from the regions is not processed locally, but sent to large central processing plants in urban areas. This means that the added value is created elsewhere and not returned to the local regions.

However, with today's fast developing modern technology it is possible to establish economically viable and very efficient small-scale production units. Such units should have a size that makes it feasible to place them in the areas where the raw material is produced. This is today possible due to modern computer technology, sophisticated regulation and control equipment and modern material technology.

There will be many advantages to establishing small-scale production units in the rural areas. The logistics are simplified, the transportation costs for the often bulky raw materials are reduced, and, perhaps most important, it will be possible to introduce whole chain control systems. For a number of identical units it will be possible to share costs like extension service costs, costs for quality control (centralised control functions), sharing of marketing activities etc. New activities will also be created in affiliated fields such as the transport sector, the maintenance sector, energy suppliers, service suppliers, marketing functions etc.

We believe that authenticity may become an important marketing parameter in the future. Already now an increasing number of consumers wish to know where the products they buy come from and how they are made. Such a demand could be met by the establishment of a network of production units with centralised marketing and quality control. The famous "appellation controlle" system that has been applied for French wine for many years may be copied for use in the Baltic Sea region for both food and non-food products.

The role of the Basan network is to encourage such a development, to define new business opportunities and to initiate transfer of know how, e.g. established within the Commission research programmes, to the individual regions in the Baltic Sea.

Basan activities

Basan will focus on three main issues:

Information exchange

Information exchanges between the involved institutions and regional authorities and entrepreneurs in order to create a "critical knowledge mass" concerning all relevant elements in the innovation chain is an important part of the work.

The work involves the exchange of information concerning local conditions, primarily potential markets and the presence/absence of local "success indicators" such as reasonable market size, infrastructure, recruitment possibilities, state of public services, presence of communication facilities, access to knowledge, access to structural aids etc. The relative importance of these factors will be evaluated.

Besides common exchange of information and presentation of "good practise" the network will exchange views on issues such as intellectual property rights, barriers/incentives and how to attract investment capital.

A web-site open to public with information on contact points, the involved institutions and the ongoing work is being established. Furthermore will be established an electronic communication infrastructure in order to achieve efficient and easy information flow between the participants.

Identification of local barriers and constraints

In order to make the work as realistic and fact oriented as possible two virtual factories will be designed. These units will play a key role in the identification of institutional, demographic, logistic and technical barriers and opportunities in the involved regions and to define a "best practise" for innovation processes.

A business plan will be prepared for each of the two factories, and the network participants will be able to use the virtual factory concept also to compare their practises for helping entrepreneurs in establishing new enterprises and to develop a "best practise."

The case studies will finally be used in the development of a model for selection and transfer of know how and technology from e.g. Nordic and EU research projects to the regions.

Innovation/technology observatory

An information and scout function (innovation/technology observatory) will be established to serve the regional authorities and local entrepreneurs with information about new business opportunities especially suited for their regional conditions. The function will draw upon research and developments in the involved research institutions, new findings from EU research programmes, and the network participants' detailed knowledge of the conditions in the respective regions.

Potential productions

Agriculture in the Baltic Sea region is dominated by a few main crops. Biomass (wood, wood-waste and straw) constitutes the largest raw-material basis, followed by cereal grains and oil crops, especially rapeseed. Also fibre-crops for textile fibres are grown. It would be natural to focus new activities on these crops as raw materials. There is however a considerable interest in diversification and in some regions it will most certainly be feasible to produce specialty crops for high added value products.

Although bioenergy is a low cost and low profit commodity, the prospects of establishing small-scale energy units based on biomass are good. Such units will create new activities and secure additional income to rural area. The products may be both liquid biofuels and solid fuels such as logs, pellets, briquettes- for export /local consumption- or heat and electricity for consumption in the region.

There are numerous possibilities for production of profitable new food products in the Baltic Sea regions. The most obvious product-areas are presumably region specific food and high added value functional foods and food ingredients.

In the non-food area focus will presumably be on the extraction and use of minor constituents with high potential value, from biomaterials. Such products may be used in the cosmetic, pharmaceutical, chemical, paint and varnish industries.

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FORTHCOMING INDUSTRIAL CROPS EVENTS

18-19 March 2002
Natural Products and Cosmaceuticals - Identifying and Developing Opportunities in a Dynamic Health and Beauty Care Industry
Munich, Germany
Email: cust.serv@informa.com
Tel: +44 (0) 1932 893856

24 - 26 April 2002
GreenTech 2002 The International Congress & Trade Show
Floriade, the Netherlands
Contact: Sietske Oord, Europoint
Te: +31 (0) 30 6933 489
Email: soord@europoint-bv.com

4 - 8 June 2002
7th World Conference on Biodegradable Polymers and Plastics
Tirrenia (Pisa), Italy
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The IENICA project is funded by Fifth Framework programme of the European Commission.

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