

Fibre crops

Fibre crops like hemp and flax have been grown in the Baltic Sea countries since ancient times. The fibres were mainly used for clothing textiles, sacks and ropes.

Both crops are still grown in the Baltic Sea area, mainly in Germany and Poland, and the range of application has expanded considerably. Thus today plant fibres are used in a number of products outside the textile area such as:

- ❑ Filters
- ❑ High tech composites (glass fibre substitution)
- ❑ Packaging materials
- ❑ Car interiors- fibre composites
- ❑ Insulation material
- ❑ Plant pots
- ❑ Geo textiles
- ❑ Paper pulp

In addition new fibre crops are being tested in large-scale trials. Such crops are Miscanthus and reed canary grass.

There are still important niche markets for high quality flax and hemp fibres in the textile sector. However the new fibre markets, including matting based products (e.g. simple filters, growth media, geo-textiles, insulation mats) and composites (e.g. automobile parts, building composites) will presumably in the future be the main outlets for fibre crops. The automotive industry alone is expected to consume up to 350.000 tons of fibre (1 million tons of primary product) pr year on a European basis. (IENICA report 2000.).

Flax

Poland and Sweden are the main flax producers in the Baltic Sea area. Flax is grown on approximately 15.000 ha in Sweden. The major traditional use for the flax fibres have been for production of linen and blankets, however the largest single application today is the use in automotive parts (e.g. in Volvo cars). The fibres are also used in building and construction materials.

The market for insulation material is considerable, 36 million m³ pr. Year in Germany alone, however the majority of the mats are produced from mineral wool. Only 5 % are mats based on natural fibres. These fibres are, besides hemp and flax, cotton, sheep wool and waste paper. One serious drawback for the mats from natural fibres is the production costs. They are all at least twice as expensive as insulation mats from mineral wool.

Hemp

Due to the cool climate hemp ripens very late, and the production of seeds is thus limited. The fibre yield seems to be in the same range as in other countries. A new hemp variety, Finola, developed by Finnish breeders is more cold tolerant, and it can yield 1-2 tons seed pr. ha even under Finnish conditions. Small quantities of oil and protein from this variety are already on the market.

Reed canary grass

Reed canary grass has been grown for forage purposes in the 1970's in Finland, but it was abandoned due to a high content of alkaloids. Today new types of alkaloid free varieties have been developed.

There is a considerable interest in growing reed canary grass, especially in Finland, Sweden and Denmark. It grows well in the cool Nordic climate. The yield is relatively high (7 –10 tons/ha) and the fibre quality is well suited for paper production. However, a number of practical problems have to be solved, before a commercial production can be started. Today reed canary grass is grown on approximately 600 ha in Finland.

Both Finland and Sweden are importing large amounts of hardwoods, mainly from Eastern Europe. Finland alone imports yearly 5-10 million m³ of birch from Russia. Grass pulp could replace imported birch, but investments in new processing lines would be required.

Miscanthus

Miscanthus has been grown in experimental fields for many years in the Baltic Sea countries. It is an efficient producer of biomass and therefore also a good energy crop. However Miscanthus is also a fibre crop, and experiments have shown that the quality of Miscanthus fibres is better than hardwood fibres and almost as good as softwood fibres. Miscanthus may also be used for thatching of roofs and for production of growth media.

The existing Miscanthus varieties are not well adapted to the Baltic Sea climate. More cold tolerant varieties are needed and they yield must be improved. More research is also needed to reduce establishment costs, and better post harvest systems must be developed.

Production and multifunctional industrial processing of new fibre crops from agriculture in the Baltic sea area: Rolf Olsson, SLU.

Important basic conditions for success, when growing fibre crops in the Baltic Sea area.

- ❑ Good Agriculture Conditions for the crop in the Baltic Sea Area

Availability of harvesting and handling technology suitable for the selected industrial processing

- Good multifunctional intermediate processing technology available and suitable for small scale processing
- Multifunctional end product processing technology available which give quality advantages to the products compared to products already existing on the market
- At least one of the processed products must be easy to get out on the market

Fibre crops and processing technologies under development in the Baltic Sea area to be presented

- ❑ Reed canary grass for multifunctional use in industry and energy sector
- ❑ New Fibre hemp varieties, which also have good seed production.

Hemp- variety Finola

- ❑ Newly developed by Finnish breeder Jace Callaway, Finola OY.
- ❑ Seed yield in Finnish and Swedish conditions 1-2 tons / ha
- ❑ Oil and protein are already on the market in small scale in Finland

Reed canary grass, Phalaris arundinacea Multifunctional Fibre processing technology

Actual situation

- ❑ First industry / energy variety – BAMSE suitable for Baltic Sea area
- ❑ under commercial introduction by the company Svalöf-Weibull AB
- ❑ The delayed harvest method is possible to use in the Baltic Sea area
- ❑ Intermediate processing as small scale decentralised processing is developed in Bioraf with commercially available technology (UMS/AS)
- ❑ Chemical pulping –Production of high quality paper from Reed canary grass- Engineering and construction of commercial mills is available through Jaako Pöyry OY
- ❑ Technology for mills producing Fibre Board and Particle board (with demand of 50% less glue and resins) is available (and already delivered to USA) by company Daproma AB

Reed canary grass- Environmental and quality aspects on production of fibre products

- ❑ Raw material production with existing agricultural machines can be used
- ❑ Raw material production can be combined with environment improving as decrease of soil erosion, decrease of nutrient leaching to water and re-circulation of ash and municipal sludge if used as fertilisers which can give farmers increased income.
- ❑ Delayed harvesting method is cost effective as it gives a sustainable low input production method
- ❑ Raw material from delayed harvesting gives environmentally more friendly processing of chemical pulp (decreased demand of chemicals and more friendly bleaching).
- ❑ Raw material from delayed harvesting gives environmentally more friendly fibre board and particle board (less glue and resins) production and increased quality as low content of extractives gives less ageing of the board products.

Reed canary grass-Market Aspects on production of fibre products

- ❑ Europe has a shortage in hardwood (short fibre) pulps and is a large importer of Eucalyptus and Acacia pulp (from destroyed rain-forests)

- ❑ The European market for high quality printing papers and white top liner is rapidly increasing
- ❑ The market demand for environmentally friendly fibre board- particle board is increasing (USA market pays 20 % more for the straw/ grass products with less glue and recins).

The Swedish and / or Baltic Sea Strategy for development of Multifunctional industrial processing of fibre products from Reed canary grass

- ❑ Industry investors don't invest in mills that need raw materials not yet existing on the market.- Farmers don't grow crops that lack a market.
- ❑ The introduction of the new crop must go through use in energy sector.
- ❑ The dramatically (during season 2001/2002) expanding pellet market is the key to the introduction of fibre products on industrial scale.
- ❑ The intermediate processing Technology developed in BIORAF is the key for later change to multifunctional use as it produces both a fuel fraction from (out of industrial aspects) bad fibres and gives also high value fibres.

Technology and Competitiveness for pellets made from reed canary grass.

- ❑ Delayed harvested reed canary grass is field dried to moisture content less than 15 % and needs thus no drying equipment
- ❑ New pelletising technologies are now available on the market:
- ❑ ETS technology (Italy. Company under reconstruction by FIAT Company)
- ❑ SPC Technology (Small scale technology on farmer investment cost level- 60 000 euro)
- ❑ The grass pellet has an already existing market all over Europe as it can be used in coal powder burning boilers.
- ❑ The incentives for farmers to be involved is increasing both by proposal for new EU agricultural policy and the expected new oil crisis (within 10 years)