Why Hemp should be a crop of the future
Update, November 2008

John Hobson
President

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History

In the Middle Age until the end of the sailing ship period Hemp was an important crop in many European Countries like UK, France, The Netherlands, Germany, Spain and Italy.
The European Industrial Hemp Association (EIHA), founded in 2005

John Hobson
President, Hemcore Ltd. (UK), since 2005

Bernd Frank
First Deputy Chair, BaFa GmbH (Germany), since 2005

Joan Reverté
Second Deputy Chair, AGROFIBRE SAS (France), since 2007

Michael Carus
Managing director, nova-Institut GmbH (Germany), since 2005
Member of Steering Committee of the „International Year of Natural Fibers“ FAO
Member of Steering Committee „Natural fibre reinforced polymers“ AVK
Present hemp industry

Total Hemp cultivation area in the EU less than 15,000 ha in 2008

The European Industrial Hemp Association (EIHA) has 8 regular members (hemp processors) and 56 associate members from 21 countries (2008).

Hemp processors

- EIHA members
- Non-EIHA members
Cultivation of Hemp in the EU

Hemp Cultivation Area in the EU (ha)

- Czech Republic (since 2004)
- Hungary (since 2004)
- Poland (since 2004)
- Sweden
- Spain
- Others
- Austria
- Italy
- Germany
- UK
- Netherlands
- France
The Hemp Industry

- **Production and processing**, hemp is grown on larger arable farms in the vicinity of a small number of major processing industries. In 2006, 86,685 tonnes of hemp straw was processed into an estimated 22,863 tonnes of hemp fibre.

- **Use**: hemp fibres are mainly used in the special paper industry (75%), with additional outlets for composites materials and insulation materials (“novel” demand). By-products (shives mainly for the equestrian sector) provide additional income.

Cultivation of Flax in the EU

Flax Cultivation Area in the EU (ha)

Years
2000 2001 2002 2003 2004 2005 2006 2007

Hectares
0 20000 40000 60000 80000 100000 120000 140000

Lithuania (since 2004)
Latvia (since 2004)
Poland (since 2004)
Czech Republic (since 2004)
Others
Finland
Austria
Portugal
Spain
Germany
Great Britain
Netherlands
Belgium
France
The Flax industry

- **Processing**: in the EU-27 around 140 processing plants transform 635,589 tonnes of flax straw (2006) into long fibres (112,914 t) and short fibres (61,775 t). This equals 53% of world production of flax fibres.

- **Use**: Long Fibres are used in the textile industry. Some 80% of EU output is exported, mainly to China. Short flax fibres are used for composite material, textiles and paper (new outlets are developing following novel demand). Further income is derived from the sale of linseed and shives.

Hemp agronomy

Key benefits for cultivation (1)

- Robust, adaptable plant, well suited to the central European climate.

- Fast growth (up to 4 m in 100 days), large biomass yields (up to 9-10 t dry matter per hectare in commercial cultivation), with modest fertilisation.

- Strong suppression of weeds thanks to its fast and dense growth, no herbicides are required. In fact no agrochemicals are needed whatsoever, a fact rare in agriculture today.
Hemp agronomy
Key benefits for cultivation (2)

- **Soil-improving and conditioning**, leaves the cultivated soil free of weeds and aerated; yield and quality benefits with successive crops.
- **Good for the rotation**, a complete change from Peas, Beans and Oilseed Rape. Spreads the farm workload.
- **Excellent lead** into a first Cereal, contributes to the preservation of biodiversity.
Regional added value and jobs (1)

- **Compared to other crops**, hemp yields a relatively high regional added value. Storage, processing (fibre and shive separation) and in most cases further steps of the process chain usually take place right next to the field.

- **Regional processing reduces** costs and increases its environmental credibility.

- **According to the Ernst and Young report**, for the EU commission, Hemp as well as Flax leads to more regional employment per Hectare than wheat: Actual figure are 800 jobs on 10,000 farms (4 times as much as wheat per Hectare). 2,000 jobs at 1st processing stage (5 times as much as wheat per Hectare) in around 100 companies.
Regional added value and jobs (2)

- **According to Ernst and Young** the following working hours are required per Hectare: Wheat 4 hours, Hemp 8 hours. This difference is explained by the greater harvesting effort required for Hemp.

- **Also included** in the Ernst and Young report was that Hemp requires 2-3 times more workforce in the primary processing stage than wheat.

- **In summary** the growing of Hemp has a very positive effect on employment, particularly in regional employment in rural districts.

- **Hemp production** takes place in rural districts where it plays an important role in the economic and social environment.
Estimated employment in the flax and hemp sector

- Agriculture: 850
- First processing: 2,000
- External inputs first processing: 200
- Second processing: >1,000
- Total: >4,050


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Source: DG AGRI, Eurostat and AND International
Decortication and fibre separation: From straw to dust, fibre and shives – a zero waste process
Applications and markets for hemp fibres and shives
Hemp

Applications for Hemp fibres 2006 (EIHA 2007)

Pie chart showing:
- 66% Pulp
- 20% Insulation
- 12% Composites
- 1% Garden
- 1% Cress
Flax

Applications for Flax fibres

- Textiles, long fibres (61%)
- Textiles, short fibres (9%)
- Short fibres for non-wovens (13%)
- Short fibres for paper (16%)
- for composites (1%)

Applications for Flax short fibres

- Speciality paper (34.0%)
- Geo- and Agrotextiles (5.6%)
- Composites automotive (0.7%)
- Composites others (1.5%)
- Exports (22.9%)
- Insulation (0.2%)
- Spinning in EU (1.0%)
- Ropes and trad. (0.0%)
Price development Short Fibres (nova 2008)
EU 2007: Production of 24,000 t hemp fibres – main applications

Automotive

Insulation

Non-automotive

Pulp & Paper

Agrotexiles
Valuable and innovative biomaterials

- Along with a high yield, Hemp produces natural fibres of the highest quality. Their mechanical properties are equal to the best natural fibres available.

- Along with biopolymers and wood, Hemp and other natural fibres constitute the “new material generation – biomaterials”. Hemp can be used in many ways with new and innovative material concepts. In particular when natural fibres are mixed with plastics they add and extend the properties of the material.

- Hemp, along with wood and polymers and other natural fibres can play an important part in reducing plastic components and metallic materials – and improve the profile of bioplastics for durable applications.
Natural fibre composites (1) – innovative technology for the automobile industry

BMW 5 Series

Fibre → Non-woven Fleece → Naked Door → Finished Door
German Automotive Industry – ca. 30,000 t
Natural Fibre Composites (2005)

Use of Natural Fibres for Composites in the German Automotive Industry 1999-2005

Use of Natural Fibres in the German Automotive Industry 2005
Total: 19,000 t

- Flax: 64.2%
- Hemp: 9.5%
- Jute/Kenaf: 11.2%
- Other: 7.9%
- Sisal: 7.3%

*without wood and cotton
Natural fibre composites (2) –
wide range of application possibilities
Insulation – CO₂ emission and cost reducing application for construction
Pulp and paper – special utilization of hemp

Pulp
Agrotexiles (1), garden –
easy to handle base for agricultural use

Tree planting
Agrotextiles (2), cress – an environment friendly, annual renewable base layer for the plant industry replacing peat

Cress production
EU 2007: 48,000 t production of Hemp Shives – main applications

- Animal Bedding
- Particle Boards
- Construction
- Garden
Animal bedding – implementation for the comfort of your animal

Horse stable ground

Chicken farming
Garden – decorative alternative to barkmulch
Particle boards – alternative to wood-based particle boards with half the weight
Construction (1) – easy to handle construction material with great qualities

Spraying

Finished Wall
Construction (2) – applicable for large constructions as well

Beer Distribution Centre
EU 2007: Production of 6,000 t, consumption of 12,000 t hemp seeds – main applications
Hemp seeds – food applications

Hemp oil

Hemp nuts

Snacks

www.eiha.org
Ecology
CO₂ Emissions & Sequestration

Hemcrete® sprayed wall mix

1m³ of wall mix contains:

- 110 kg hemp shiv
- 220 kg Tradical® HB
- Water

Sequestration/emission
- 202 kg CO₂/m³
+ 94 kg CO₂/m³
0 kg CO₂/m³

Nett carbon capture
- 108 kg CO₂/m³
Ecology (1)

- Hemp exhibits **excellent ecological credentials in its cultivation**. Virtually all Agrochemicals are completely eliminated. Hemp is also well suited to growing under an organic regime.

- The Ernst and Young study (2005) reported that Hemp is associated with "**an environmentally conscious cultivation**". It requires considerably less input in terms of water, fertilisers and does not require Agro-chemicals.

- Analysis that have been made in several European Countries and North America have studied **life cycle, eco and energy balances for various product lines**. Where Hemp has been used in applications it has yielded **definite ecological advantages**. These product lines include amongst others, Hemp **replacing glass fibres in composites and insulation**, Hemp fibres **instead of Cotton** in the Textile Industry and Hemp Shives **replacing conventional materials in the construction industry**.
CER_p-Cumulated Energy Requirement

MJ/kg

- Energy input
- Raw material input
- Transport and miscellaneous
- Machine usage
- Fertiliser
- Fibre separation

polypropylene
fibreglass
hemp fibres
In the Karus et al. (2006) study on natural fibre reinforced plastics, the summary stated that: "Finite resources were spared, there was less pressure on the environment and CO₂ emissions were reduced. If biopolymers were used these benefits are of course further enhanced."

Murphy & Norton 2008: "All insulation materials are beneficial to the environment because they save energy and reduce global warming potential. However, NFIs (Natural Fibre Insulation) have the added benefit that they sequester CO₂, making a further contribution to reducing global warming potential. The authors therefore consider it worthwhile to take advantage of the scope to develop the environmental profile of the NFI materials and to boost their market presence."

R. Murphy, A. Norton (Imperial College): Life Cycle Assessments of Natural Fibre Insulation Materials. (PDF-document, 2.2 MB) Final Report, published on 2008-02-27. This study was undertaken at the instigation of the National Non-Food Crops Centre (the NNFCC), with funding provided by the UK Department for Environment, Food and Rural Affairs (Defra).
Summary

Hemp is **good for agriculture, the environment** and **enhances regional development**.

Hemp will and is playing an important role in the production of **innovative biomaterials** like natural fibres **reinforced plastics, insulation and construction materials**. Hemp fibre can improve the technical profile of **bioplastics** for use in durable applications.
Economy
Economy
– the currently very difficult situation

- **Competition from other natural fibres** from Asia, Africa and South America which limit the market price of natural fibres.

- **Competition from flax tow**, which is cross subsidized by high processing aid for flax long fibres (160 resp. 200 €/t). Without the short fibre processing aid (90 €/t) this unbalanced situation will lead to extremely unfair competition between flax and hemp (only France, Belgium and The Netherlands will profit).

- **Competition from high cereal prices**, which makes it extremely difficult to get farming areas for hemp and other niche crops.

- **Competition from energy crops**: energy crops receive subsidies in most European countries due to their CO₂ benefits – hemp receives no subsidies at all despite it’s CO₂ benefits. This leads to unfair competition for farming areas.
Economy
– the risk and the solution

- Without processing aid the whole European hemp branch **will not survive the next three years.**

- The **increasing demand for biomaterials**, natural fibres reinforced (bio)plastics, insulation and construction materials has to be met by **natural fibre imports** from Asia, Africa and South America.

- **A great chance** for agriculture, biodiversity, regional development, innovation and ecology – and R & D spending with a volume of a few 100 Mio. € **would be lost!**

- **The ideal solution:** A single processing aid – same amount for all produced natural fibres over the next years (recommended by most natural fibre experts).

- **The minimum solution:** Keep the existent processing aid for short fibres until 2013. That means less than 3 Mio €/year (15.000 ha x 2 t fibre/ha x 90 €/t).
Inequality:
Flax & Hemp processing aid

Traditional Long Fibre Processing

Flax straw

Shives

Long fibre 80% export to China

Up to 90% of the value

Long fibre processing aid until 2008/09 160 €/t
2009/10 – 2010/11 200 €/t
2011/12 – 2012/13 100 €/t

Cross subsidising – inequality between flax and hemp

Total Fibre Line Processing

Hemp straw

Subsidising

Short fibre (tow) 50% export to China

50% of the value

50% of the value

Short fibre processing aid until 2008/09 90 €/t
from 2009/10 0 €/t

Fair competition?