

Biowerkstoff-Report

Report on Bio-based Plastics and Composites



Our Events at HANNOVER MESSE:

20th – 21st April 2010

- Congress on Bio-based Plastics and Composites
- Innovation Award

Picture: Tecnaro

**Visit the
International
Congress on
Bio-based Plastics
and Composites**
20th – 21st April 2010
Convention Center, Saal 2
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Innovation Award

**Bio-based Material of the
Year 2010 | 20th April**

The Nominated

- GreenGran B.V. | GreenGran
- Henkel AG | Arctic Material
- Propper GmbH & Co. KG | Proganic

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Report on Industrial Hemp

22 Extra Pages

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REPORT ON INDUSTRIAL HEMP

Dear Readers,

Welcome to the first edition of The Report on European Industrial Hemp, issued by the European Industrial Hemp Association (EIHA). From now on we plan to inform you annually about the newest developments and products from the European hemp industry and show you the important role of hemp fibre in a sustainable bio-economy, both in the present and for the future.

For example, natural fibres can be used for building and insulating and for the reinforcement of plastics to substantially improve their mechanical characteristics and to create an opportunity for lightweight constructions. Up until now reinforced plastics have still been mainly petroleum-based, but now the bio-based content of the products is already at 30 % for injection molding and at 80 % for compression molding or extrusion. In the future, however, the characteristics of bio-based plastics will also be increasingly optimized by natural fibres. It is possible to produce 100 % bio-based composite materials, which are already on the market in small-scale production.

Flax and hemp have been cultivated in south, central and northern Europe for centuries. Flax is specifically grown for clothing textiles, only its by-product, flax tow (short fibres), is used in technical applications. Hemp is almost entirely grown and processed on modern total fibre lines for technical applications. Hemp fibres are primarily used by European companies, especially in the automotive, building and plastics industries as well as traditionally in the paper industry (cigarette paper, technical papers).

Since the reintroduction of hemp growing in the 1990s many new projects have been launched. This has enabled the cultivation and processing to be technically optimized and made more efficient and in addition, new applications have been developed.

We would like to present to you market reports, new technical developments and products and want to introduce our young Association and its members. The Association was informally founded during the EXPO 2000 in Wolfsburg and then formally in Huether (Germany) in 2005. Hemp processors from France, Great Britain, The Netherlands, Germany and Slovenia constitute the seven regular members of EIHA and guarantee to supply their customers with sufficient raw materials. A further 63 associate members from industry, organizations and research as well as private individuals complete the Association.

We hope you will learn a lot about hemp and its technical possibilities from this first edition. If you are interested in using hemp fibres, hemp shives or hemp seeds in your own manufacturing we would be pleased to co-operate with you. Only through co-operation can we advance the bio-economy and bring about a revolution in the use of raw materials!

Kind regards,
Michael Carus, Managing Director

P.S. If you would like to meet us personally, John Hobson will introduce EIHA and his company, HempTechnology Ltd (UK) at the Biowerkstoff Congress at THE HANNOVER MESSE on April 21st. We also look forward to meeting you at our exhibition stand in hall 6 / B40.



Michael Carus
Managing Director
nova-Institut GmbH



Dominik Vogt
EIHA Office
nova-Institut GmbH

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EUROPEAN HEMP FIBRES FOR DIVERSE BIO-BASED PRODUCTS

Pictures: Hemp Technology, AGROFIBRE

The perfect green material

- good mechanical properties
- good for the environment
- good availability at a low cost
- modern industry with high socially responsible standards
- no competition with food production
- fits perfectly with your sustainable business
- reduction of CO₂ emissions

This brochure shows you many examples of hemp fibre based products, which have already been introduced and established on the market, and where you can buy European Hemp Fibre.

Basic Information on European Hemp

Hemp fibres played an important part in the technical and cultural history of mankind. In 2,800 BC the first ropes were produced in China using Hemp fibres. In 100 BC we know that also in China the first paper in the world was made from Hemp fibres. From the Middle Ages until the end of the sailing ship period Hemp was an important crop in many European countries. Threads, sacks, ropes, water hoses, sails and textiles were all made from Hemp fibres.

Today, China, Canada and Europe are the main Hemp cultivation areas in the world. In 2008 the total cultivation area in the European Union was around 15,000 ha – in 2009 we expect this to have increased to 18,000 ha. These areas will produce around

24,000 t Hemp fibres and 29,000 t respectively. All by-products like shivs (woody part of the Hemp stem) and dust are used. The main countries for Hemp production are France, UK, Germany, The Netherlands and Poland. Hemp fibres, ready to use in your biobased products are price competitive to other domestic and exotic fibres for technical applications. Different qualities are available.

European Hemp fibre is currently used mainly in technical applications like speciality paper (cigarette paper, technical filters), insulation material, natural fibre reinforced plastics (automotive, industrial and consumer goods), mulch and cultivation fleeces. Insulation and plastic reinforcement especially show promising market increases. China and Canada are raising their interest in Hemp fibre instead of cotton fibres in textile applications.



Michael Carus
Managing Director

Last, but not least, we would like to invite you to our 7th International Conference of the European Industrial Hemp Association (EIHA), May 26th–27th 2010 in Wesseling (Germany). We expect about 150 participants from more than 40 countries.

The Board of Directors



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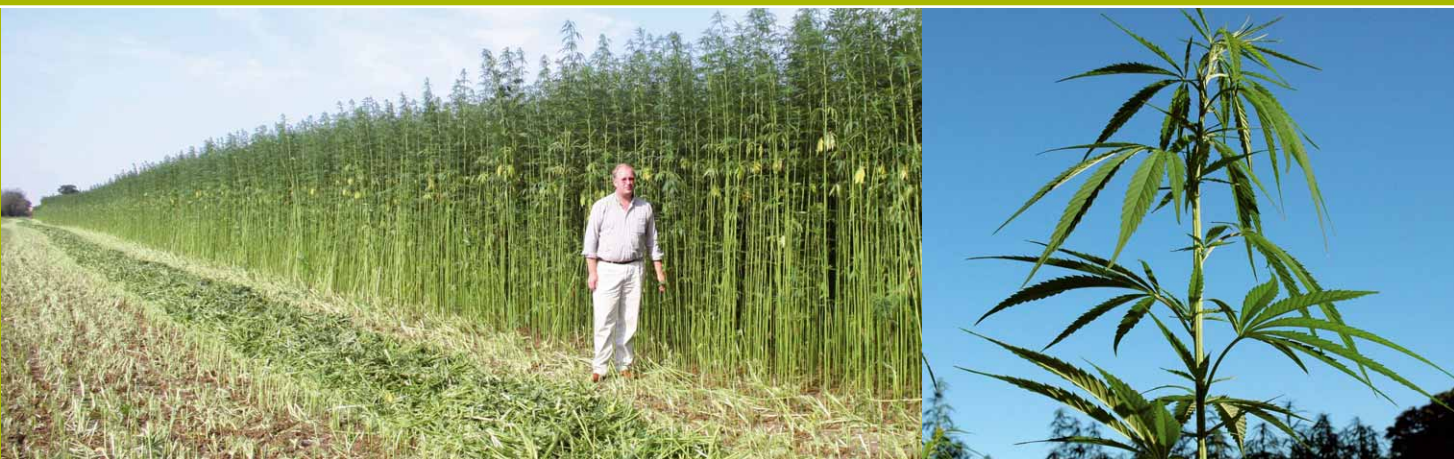
Daniel Kruse
Hempro International GmbH & Co. KG (Germany)



Mark Reinders
HempFlax BV
(The Netherlands)



Dejan Rengeo
HANNAH BIZ d.o.o (Slovenia)



The European Industrial Hemp Association (EIHA)

EIHA has formed itself as an association of Regular members, the Hemp primary processing companies within the EU and Associate members who are associations, national organisations, companies and individuals working in the field of Hemp or other natural fibres. Founded in 2005 The European Industrial Hemp Association (EIHA) today has 70 members from 24 different countries (March 2010), seven regular members (hemp processors) and 63 associate members (companies, association, institutes, private persons). Countries with more than 2 members are: Germany (11), The Netherlands (9), Great Britain (7), France (7), Canada (6), Belgium (5) and Switzerland (3).

Join EIHA to support the European Hemp Industry! Benefits for EIHA members:

- All questions by email, letter and phone about Hemp business are forwarded only to EIHA members
- Reduced fee for EIHA conference
- EIHA-Conference proceedings are available for EIHA members only.
- Free access to the huge EIHA database, more than 300 presentations, reports and documents
- Help the Hemp Industry to grow! Help lobbying! Don't let the policy and industry forget Hemp! The yearly EIHA-budget is mainly used for the dissemination of information on Hemp fibres, shives and seeds for industry and policy.
- It is very easy to join EIHA: "Application form of EIHA (PDF)" at www.eiha.org

The Board of Directors decides within two weeks about the membership. The yearly membership fee for an associated member is only 250 €, regular members (processors) pay 1.000 €/year (minimum, depending on the contracted cultivation area).

EIHA was formed originally to give members a voice at the European Commission in Brussels. It has grown quickly into a respected organisation that is an excellent bank of information and a real support to the fast developing Hemp Industry. Each annual EIHA conference allows members and non members alike to exchange views and important developments with their colleagues.

The European Hemp industry is a young and modern industry with new and improved harvesting and fibre processing technologies. It maintains high socially responsible standards, it is good for the environment with a proven high CO₂-capture. Importantly Hemp does not compete with food production.

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

Hemp Fibres today are already used in many applications: speciality pulp and paper, automotive, brakes, cases and consumer goods. Sanding discs, insulation, construction, agriculture, sports equipment and many more.

Innovation

Hemp will and is playing an important role in the production of innovative biobased products like natural fibre reinforced plastics, insulation and construction materials.

Hemp Fibre can improve the technical profile of bioplastics for use in durable applications.

Environment

No agrochemicals are used in the growing of Hemp crops.

The Cumulated Energy Requirement for producing glass fibres is more than 10 times higher when compared to the production of Hemp fibres in Europe. Also the CO₂-emissions for glass fibres are 10 times higher compared to Hemp fibres.

Life Cycle Assessments (LCA): Where Hemp has been used in applications it has yielded definite ecological advantages. For example for plastic reinforcement: "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". (Carus et. al 2006)

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Authors: Michael Carus (Managing Director), Dominik Vogt (Organisation), Lena Scholz (Standards Certification)

EUROPEAN HEMP PROCESSORS PRESENT THEMSELVES

Hemp processors in the European Union

In Europe you can buy Hemp fibre directly from the processor. The following Hemp fibre producers are members of EIHA and together they can guarantee high quality standards and a secure continuity of supply. These listed five Hemp processors produce on average each year between 10 and 15,000 tonnes of technical Hemp fibre. This is mainly used in natural fibre reinforced plastics and insulation materials. As Hemp is an annual crop this quantity can be easily increased according to demand.



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Hemp Technology Ltd

About Our Company

Since the establishment of Hemcore in 1993 and the birth of Hemp Technology in 2009 we have backed the pioneering vision that Hemp, a once ubiquitous crop, can become an essential industrial feedstock for a

more sustainable future. Due largely to this commitment, industrial Hemp is once again established in the UK, and is helping to create a cleaner and greener World.

Why Us

Put simply, Hemp Technology is dedicated to the production of Hemp primary

materials of the highest quality. Our products are carefully engineered to suit the requirements of customers throughout Europe.

Our Service

At Hemp Technology, we strive to ensure that all our products are available when and where required, and are backed-up with the highest level of technical support. We are particularly experienced at engineering the properties of our products to meet customer requirements.

Hemp Growers

Producing quality Hemp products has to begin on the farm. The Hemp processed by Hemp Technology is all grown in the UK to the highest standards and under the terms of an exclusive supply contract.

What We do

Hemp Technology is actively engaged in almost every aspect of the Hemp industry. This means everything from crop production and Hemp straw processing through to end-product manufacture, R&D and marketing. Without this comprehensive coverage it would not have been possible to build the industry.

Primary Processing

At the Hemp Technology facility in East Anglia, our principal activity is the fractionation of the Hemp stem into three main products – fibre, shiv and fines. The Hemp fibre is famed for its toughness, durability and flexibility. We engineer the fibre to suit client-led specifications for use in applications such as automotive composites, insulation, geotextiles and paper. The shiv, which comes from the woody core of the plant, has some unique properties. At



Sports car Lotus Eco Elise, in the main made from different natural fibre compounds, hand lay-up, vacuum bagging and RTM (UK). Picture: Lotus Cars



Cress mat – Hemp fibre fleece (UK/Germany).

Pictures: Hemp Technology



Natural fibre door panel for BMW 5 Series, compress moulding (Germany). Pictures: nova-Institut

Hemp Technology we grade and bag the product principally for use as high-grade animal bedding and in construction where it is mixed with lime to produce Tradical Hemcrete (an ecological construction material). The fines are graded and compressed for use as a fuel log.

INNOVATION

True to our pioneering principles, the new Hemp Technology facility is the largest Hemp processing plant in the world, with a capacity in excess of 7 tonnes of straw per hour. The facility is capable of producing 12,000 tonnes/year of premium grade fibre and 25,000 tonnes/year of shiv.

GROWING

All our Hemp is grown in the UK under the terms of an exclusive supply contract. Hemp Technology provide all the agronomic information and technical support to ensure that growers are able to maximise yield and quality.

PRODUCT DEVELOPMENT AND MARKETING

As well as supplying primary materials for industry, Hemp Technology are actively engaged in the development of new products and technologies to drive market growth. For this reason Hemp Technology market a number of own branded products such as Hemcore Biomat and Hemp Insulation. Hemp Technology are also committed to supporting the marketing efforts of our customers.

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AGROFIBRE SAS

AGROFIBRE SAS is a company specialized in the first transformation of the Industrial Hemp. The natural by-products from this plant are 100 % recyclable, and they place us into the framework of companies heavily involved in reducing CO₂ emissions into the atmosphere.

AGROFIBRE is a company of EURALIS GROUP, the first food and agricultural cooperative group from the South-West of

France. EURALIS (www.euralis.fr), 15,000 farmers-members and 4,500 employees, achieved a turnover of more than 1.3 billion € in 2008. The strong production capacity of this cooperative group assures the supply of raw material, and places AGROFIBRE as the main supplier of natural Hemp fibre in the world.

The process of grinding implemented in AGROFIBRE is purely mechanical and consists of successive stages of grinding, sieving, refinements/fraying, grading and packaging of intermediate products. The by-products are the fibre and the shives.

AGROFIBRE sells Hemp fibres to second processors for the production of wool insulation, needled felts for reinforced composites, garden and horticultural mulches, and reinforcements in plastic extrusion processes. The shives are sold as animal bedding, garden mulch, and mix with limes to renovate buildings.

AGROFIBRE consistently produce a high responding to industrial applications in the construction market, composites and plastics.

Composites based on Hemp fibre reinforcement:

Thanks to partnership industrial agreements, AGROFIBRE is also able to offer different types of Hemp fibre mats used for composite applications:

- Needled Mats fibre Hemp + polypropylene fibre in different grammages for thermoforming.
- Needle Mats for pre-impregnation with polymer matrices.
- Needle Mats for contact moulding.
- Needle Mats for formatting infusion.

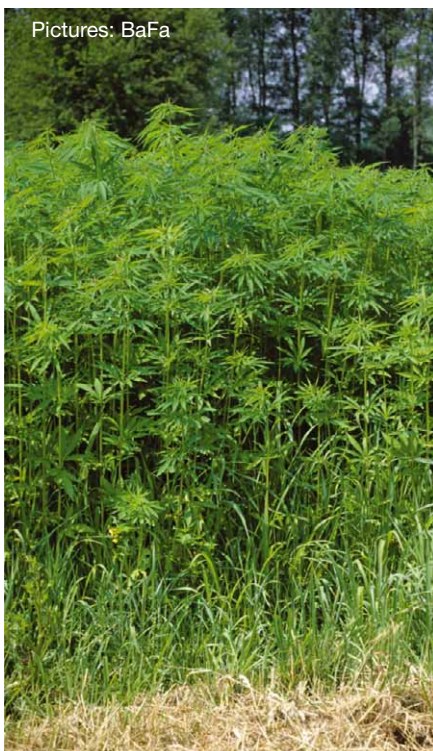
The quality of fibre from process and the expertise of our industrial partners to pro-



Hemp fibre pellets for granule production.
Picture: nova-Institut

Hemp fibre PP-granules. Picture: nova-Institut

Cases, natural fibre and polypropylen, compress moulding (Germany). Pictures: Hempro International, Winter & Linotech



Pictures: BaFa

duce non-wovens, allows us to fulfil the requirements of the consumers. Our production capacity and know-how allows us to supply mats from 400 to 1,800 gr/m², thickness 4 to 12 mm, packed in rolls.

In collaboration with research laboratories and other industries from the South West of France, AGROFIBRE develops industrial Hemp from local production to be marketed all over Europe.

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BaFa Badische Naturfaserauf- bereitung GmbH

- Established in 1996 after the cultivation of industrial Hemp was legalized in Germany.
- Link between agriculture and industry.
- BAFA processes Hemp straw by mechanically separating the fibres from the shives.
- Three quality grades of Hemp fibres are available for the consumer market and are sold on to industrial partners & clients for further processing. Cleaned and dust-free shives are utilized e.g. as horse bedding or in the construction business for structures of almost any kind.
- BAFA has developed a special combine harvester for Hemp in cooperation with corporate partners Götz Inc. (Bühl/Moos), Deutz-Fahr Inc. (Lauingen) and the state-owned Landesanstalt für Pflanzenbau.
- BAFA is con-

tinuously involved in developing new products and solutions, e.g. Hemp insulation for common rafters.

- Active participant in European Union projects like Biocomp and Arbocar.

Technical Fibres VF6 for non-woven applications:

- Automotive industry-Insulation industry-Geotextiles
- Technical Fibres KF S20 for injection moulding
- Technical Fibres SKF 2 for injection moulding

We have a vast amount of experience in developing and modifying natural fibres during the harvesting, retting and decortication stages.

Our ambition is to modify Hemp fibres to meet the demands of our customers and our project partners at the highest levels of quality and durability. The environment comes first in all our various approaches, thus BAFA strives to advance both economic and environmental concerns for the mutual benefit of each.

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HempFlax B.V.

HempFlax in Oude Pekela, the Netherlands, manufactures and processes durable raw materials, semi-finished products and end products made from ecologically cultivated fibre hemp and flax. With its professional approach to the development and



Urn, Hemp fibre and bioplastics, compress moulding or injection moulding (Germany).
Picture: nova-Institut



Basin, Hemp fibre and thermoset, Resin Transfer Moulding (RTM) (The Netherlands). Picture: NPSP Composites



Pictures: HempFlax

innovation of recyclable natural fibre products, HempFlax is the first link in a sustainable industrial chain.

This industrial production chain is a result of sustainable agriculture. Every year, HempFlax obtains new natural fibres, particularly fibre hemp, through contract cultivation with arable farmers in the Netherlands and Germany. By putting recyclable raw materials on the market, HempFlax has gained a leading position in this innovative industrial development. Its main objective is to produce recyclable raw materials for industrial end products and commodities for the consumer market.

HempFlax gives entrepreneurs and consumers the opportunity to give substance to their responsibility for the environment. The sustainable chain functions according to the universal environmental thinking and awareness of right-minded people aimed at continuing the ecological circle as long as possible. Entrepreneurs, managers, banks

and consumers should make an effort to use the possibilities afforded by HempFlax.

With its vision and innovative decisiveness, HempFlax in the Netherlands and Germany gives meaning to the term agri-fication. By providing recyclable raw materials, environmentally harmful synthetic fibres made of fossil raw materials – such as nylon and plastics – can be replaced by fibres made of recyclable raw materials.

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Hempro International GmbH & Co. KG

Love at first bite!

Health tastes good. Especially if delicious, top-quality Hemp specialties appear on your plate. If you've ever spooned tasty Hemp-muesli for breakfast or nibbled on a freshly baked hempnut biscuit in-between, you easily develop an appetite for more! The mm-effect is guaranteed. But whatever enjoyer, also benefits the body. Daniel Kruse, CEO of Hempro International GmbH & Co. KG and designated expert in Hemp affairs explains why: "Because of its polyunsaturated fatty-acid consistence of up to 90 %, hempnut oil is classified as one of the most valuable and vital cooking oils of all. The perfect relation between omega-6 particularly and omega-3 makes Hemp food an ideal com-

ponent for daily nutrition. Apart from that, the oil contains a high percentage of therapeutically significant gamma lenolenic acid, a deficiency of which, can result in severe metabolic disorders. The organism is provided with all 8 amino-acids necessary for natural protein production in the body. 15–20 grams of Hemp oil daily are sufficient to meet the nutritional, essential fatty-acids requirements and protect immune system, heart and cardio-vascular systems effectively. Similarly, the Hemp nut or oil can be used to lower high blood-pressure and cholesterol levels."

Additionally, there are numerous vitamins and health promoting substances such as sodium, calcium and iron that support and enhance body functions.

YOUR PARTNER FOR BOTH INDUSTRIES AND RETAIL CUSTOMERS.

The advantages convince an increasing number of health conscious customers. In the frequently visited online shop www.hanfhaus.de they can order a wide variety of the best available Hemp products at attractive prices, quickly and easily. Besides having a broad variety of foods, there are antiallergics cosmetics, practical, useful accessories for house and home and a designer-collection of nature based, eudermic fashion created exclusively by a selected fashion studio. Trade and industry have also recognised the trend of the times and are focusing on Hemp as a future oriented, sustainable raw material. In the meantime even established bakeries, food manufacturers and specialised stores across Europe are frequent hempnut and Hemp oil customers. And, by the way, Hempro International is the only German producer and main distributor of Hemp products that is



Picture: Hempro Int.

able to hull the hempseed, botanically correctly classified as a nut, from its thin pericarp. This greatly assists the requirements for further industrial processing.

PROCESSING IN A CAREFUL MANNER.

For Hemp oil production the highest sensitivity is necessary. "We only use the cold-press method to avoid any unfavourable rise in temperature. Due to this gentle process, proteins and fats remain the same and the oil's natural nutty taste is retained. Because of its ideal composition, Hemp-oil is also perfect for making highly effective cosmetic products. Whoever suffers from dry or cracked skin will be enthralled by the noticeable healing effect. Through the oil-containing and moisturising Hemp skin-care products even neurodermitits, psoriasis or scars are visibly improved. Additionally: "Even Cleopatra used Hemp ointments and baths to keep her skin beautiful and smooth." reports Daniel Kruse who has worked in the Hemp-market for 15 years and now leads his own company, founded 2002, together with his wife Rebecca.

BEST PROSPECTS FOR THE FUTURE.

With consequent implementation and focus on product-quality, the Duesseldorf based company has succeeded in rising into the top-league of major European suppliers for Hemp products. And is still making further ground. The turnover has grown in the last years at about 20 % annually. The first two months of 2010 show sales already almost twice as high compared to the same period last year. In the meantime, with a requirement of about 500 tonnes yearly, Hempro International's need for industrial Hemp has grown to a remarkable ex-



Picture: Hempro Int.

MATERIAL FOR A THOUSAND AND ONE IDEA.

Hemp can be used in many more ways than any other plant. It offers the basis for clothing and food, oil, energy, paper, building material and cosmetics with skin-care properties. Cultivating this extremely robust crop poses no problems because cannabis sativa needs no pesticides or chemical additives to keep pest and weeds at bay. And even then, a Hemp field produces almost 3 times as much fibres as a cotton field of the same size and even 4 times the amount of paper as a forest! Hemp grows up to 4 meters in 100 days, improves the soil and binds the dangerous greenhouse gas CO₂. With the invention of new fibres and as a consequence of the marijuana prohibition, Hemp was forgotten as a raw material. However now, this long forgotten multi-talented plant is celebrating a ferocious comeback! In the service of good health!

tent. The greater portion of raw material, both organic- and conventional quality, comes from China, where Hemp started its botanical triumphal procession as one of the oldest used materials of mankind about 10.000 years ago. Our local European re-

sources can not satisfy the growing demand.

The food-series "The Hemp Line" is subject to strict quality control and is certified according to EU regulations for organic farming. Daniel Kruse and his nine employees are constantly extending the product program. Creative potential for new ideas is abundant because Hemp's possible and potential application knows no bounds. For example, the team is presently contemplating the development of Hemp-milk in various flavours.

One thing has to be clarified though. How did the former banker Daniel Kruse start in the Hemp business? "I have always wanted to work for a sensible balance between ecology and economy. I was introduced to the subject of Hemp for the first time through a newspaper article. It was like a primary ignition. And as you can see today, that spark has turned out to be a strong passion!", says the successful businessman. By the way, more and more companies are taking environmental responsibility. "Not so long ago, companies from Cologne and Duesseldorf pooled together and formed the association "Das-selbe in Grün" ("The Same In Green")", recounts Daniel Kruse. "We are one of the founder-members, mainly because in an association, sustainability is achieved much more effectively. Apart from that, all parties profit from a professional network with mutual objectives."

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7th International Conference of the European Industrial Hemp Association (EIHA)

www.eiha.org/conf7

May 26th - 27th 2010

Rheinforum, Wesseling / near Cologne (Germany)

Congress language: English



**Don't miss the biggest industrial hemp
event in 2010 - world wide!**

**The congress will focus on the latest developments concerning
hemp and other natural fibres.**

The spectrum of participants will range from

- cultivation consultants,
- primary and further processors,
- traders, mechanical engineers,
- investors to enterprises to
- suppliers (for example: insulation material, pulp & paper, automotive).

**They all share common interest in the industrial utilisation of
hemp fibres and shivs. Other topics are hemp seeds and hemp
oil in nutrition.**

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www.hempro.com

Media Partner

Forum
CSR international
www.nachhaltigkeitswirtschaften.net

bioPress
Fachzeitschrift für Naturprodukte
www.biopress.de

**www.
renewable-resources
.de**
www.renewable-
resources.de

7th INTERNATIONAL CONFERENCE OF THE EUROPEAN INDUSTRIAL HEMP ASSOCIATION (EIHA)

Programme

www.eiha.org/conf7

Day One: May 26th 2010

SESSION 1: STATE OF THE HEMP INDUSTRY – COUNTRY REPORTS

- | | |
|--------------------|---|
| 10:00 h | State of the Hemp industry
<i>Michael Carus</i> (nova-Institut GmbH, Germany) |
| 10:30 h | Hemp Technology Ltd 2010
<i>Mike Duckett</i> (Hemp Technology Ltd, Great Britain) |
| 11:00 h | Hemp production in Thailand
<i>Prof. Arkom Kanjanaprachot</i> (Maejo University and Royal Project Foundation, Thailand) |
| 11:30 h | Industrial Hemp as organic growth medium in Denmark
<i>Bodil Pallesen</i> (AgroTech A/S, Denmark) |
| 12:00 h | Future of Hemp: cultivation, processing and markets
<i>Francois Desanlis</i> (Hemp Farmer, France) |
| 12:30 –
14:00 h | Lunch Break |
| 14:00 h | Polish cultivars and perspective lines of industrial Hemp
<i>Malgorzata Strybe</i> (Institute of Natural Fibres and Medicinal Plants, Poland) |

SESSION 2: HEMP FIBRES: SEPARATION AND MODIFICATION

- | | |
|--------------------|--|
| 14:30 h | High – performance Hemp fibres and industrial applications: brake linings, gaskets, and others
<i>Dr. Volker von Drach</i> (ECCO Gleittechnik GmbH, Germany) |
| 15:00 h | Latest developments in chemical fibre decortication
<i>Herbert Costard</i> (FLASIN Faser GmbH, Germany) |
| 15:30 –
16:00 h | Coffee Break |

SESSION 3: HEMP FOR CONSTRUCTION

- | | |
|---------|---|
| 16:00 h | BRE and the Renewable House
<i>Nicholas Corker</i> (Building Research Establishment Ltd, Great Britain) |
| 16:30 h | The aims of the International Hemp Building Association
<i>Steve Allin</i> (International Hemp Building Association, Ireland) |
| 17:00 h | Development of strong Hemp fibres for building construction
<i>Dr. Mizi Fan</i> (Brunel University, Great Britain) |
| 17:30 h | Characteristics and advantages of Hemp-lime construction
<i>Dr. Mike Lawrence</i> (University of Bath, Great Britain) |



Day Two: May 27th 2010

SESSION 4: HEMP FIBRES: REINFORCEMENT

- 09:00 h **Hemp fibre reinforced plastics from France**
Pierre Amadiou (Sarl Start Hemp, France)
- 09:30 h **Innovative Natural Fibre Reinforced Bio-Composite Granules for Cradle-to-Cradle Solutions – China in our hands?**
Martin Snijder (GreenGran B.V., The Netherlands)
- 10:00 h –
10:30 h **Coffee Break**
- 10:30 h **Polypropylene-Hemp compounding with internal mixers**
Dr. Hans Korte (Innovationsberatung Holz und Fasern, Germany)
- 11:00 h **Innovative bicycle frame made of Hemp and bambus!**
Nicolas Meyer (ONYX composites, Germany)
- 11:30 h **Fibrous materials from the wet supply chain as reinforcement in composites**
Wallot, G.; Gusovius, H.-J.; Pecenka, R.; Hoffmann, Th. (Leibniz Institute for Agricultural Engineering Potsdam-Bornim)
- 12:00 –
13:00 h **Lunch Break**

SESSION 5: HEMP TEXTILES AND MORE

- 13:00 h **Hemp Cultivation and Processing in China – Textiles, particle boards and more**
Lawrence Serbin (Hemp Traders, USA)
- 13:30 h **Hemp in cloths – in the past and today**
Robert Hertel (HempAge AG, Germany)

SESSION 6: HEMP SEEDS AND OIL

- 14:00 h **Hemp foods and Hemp milk from Living Harvest**
Hans Fastre (Living Harvest Food, USA)
- 14:30 h **Marketing for Hemp soap and cosmetics**
Dr. Michael Bronner (Dr. Bronner's Magic Soaps, USA)
- 15:00 h **Hemp for Food – an update from Canada**
Anndrea Herrmann (Hemp Oil Canada Inc., Canada)
- Panel Discussion and Get Together**

Organiser

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Hemp processing: NAFGO taken over by HempFlax

New start announced after restructuring

The HempFlax Deutschland GmbH took over the hemp processing company NAFGO GmbH from Neerstedt (Niedersachsen, Germany) on September 1st, 2009.

HempFlax announced a new start “after the restructuring”; the team, well-known to its business partners, will still be operating as normal for its customers. NAFGO started insolvency proceedings at the insolvency court Delmenhorst. The insolvency administrator was Detlef Stürmann.

Source: HempFlax Deutschland GmbH and Indat.info 2009-10

French make cars from flax

PSA's Green Materials Plan leads to Hemp and flax composites

PSA Peugeot Citroën is today presenting the latest developments in its green materials plan, set up to limit the eco-footprint of Group vehicles during their service life. The Group has set an ambitious target in eco-design: to include 20 % of green materials in the polymers used to build its cars by 2011. A car is made up of 70 % metal, already largely recycled, 5 % miscellaneous materials (glass, etc.) and 5 % fluids. The rest is plastics (polymers).

The term “green materials” covers natural fibres such as linen and Hemp, non-metallic recycled materials and biomaterials, which are produced using renewable resources rather than petrochemicals. The aim is to use fewer fossil fuel plastics and to increase the use of raw materials from renewable sources to make parts lighter, in some cases, to cut CO₂ emissions from plastics production and to promote plastics recycling.

The Earth's resources are dwindling, so it is important to optimise the way in which they are used. End-of-life processing is therefore factored in from the design stage. The aim is to boost recyclability and thus reduce the potential impact of end-of-life vehicles. As a minimum, 85 % of a vehicle's weight can be reused or recycled, and a further 10 % can be used for energy recovery.

The key feature of the action plan set up by PSA Peugeot Citroën in 2008 is that it concerns all Group vehicles and the three families of green materials. The green material content of each vehicle project must be increased. This approach also involves existing vehicles, with green materials being integrated during their production life. Engineering teams are working in close cooperation with suppliers in order to utilise these new materials.

This effort also gives new impetus to the recycled materials industry. The subject of biomaterials is still at the research stage in the automotive industry. To address the issue, scientific partnerships have been set up as part of research groups bringing together public laboratories, chemical firms and parts suppliers. The aim of these partnerships is to accelerate the application of these materials in the automotive industry.

Source: PSA Peugeot Citroën, press release, 2009-10.08

World's first store of hemp-made clothes opens in China

Hemp fiber absorbs moisture and protects against radiation and UV rays

The world's first store selling hemp-made clothes exclusively has opened in east China's Zhejiang Province.

“The Hemp fibre, after being detoxified, excels at absorbing moisture, shielding radiation and ultraviolet rays”, said Zhang Jianchun, a researcher with the General Logistics Department of the People's Liberation Army. “The fiber was worn by soldiers during the national day parade in 2009, and they liked it”, said Zhang.

The store, “Han Ma Sheng Huo Guan,” which opened in Ningbo City Friday, sells hemp-made products including clothes, bath towels and sheets. “I'll try to see if they really have special properties,” said a consumer selecting shirts in the shop.

Source: Xinhua News Agency, 2010-01-13.

UK: Brake pads for trains from Hemp fibre and cashew nut oil

Market launch for Ecobrake is planned by 2011

The production of brake linings for trains currently depends on aramid fibres



Hemp fibre brake pad for regional trains (UK). Picture: nova-Institut

such as Kevlar, phenolic resins and an extremely energy-intensive manufacturing process, which makes it costly both in environmental and financial terms. The pads also incorporate significant amounts of heavy metal compounds that are discharged into the environment as they wear.

With funding from the UK government's Technology Strategy Board, the Ecobrake project aims to introduce a marketable alternative composite product employing Hemp fibre and cashew nut oil by 2011. Bringing together European Friction Industries, Aptec Products and Hemp Technology, along with specialists at the University of Exeter, the goal of the project is to develop a new technology to create greener brake pads for mass urban rail transit vehicles, such as those employed on the Docklands Light Railway (DLR) in London.

In describing progress to date at the recent Natural Fibres conference held in London, project researcher Will Newby explained that before 1990, the only fibre employed for such brake linings was asbestos in phenolic resin. “Since asbestos was banned, no fibre has completely replaced it,” he said. “Aramids are now commonly employed, but also metallic and mineral fibres. But with the cost of aramid fibre around £ 20 per kg, any alternative low-cost fibre that can perform some of the work of such an expensive material in composite structures would be significant. Hemp goes some way to meeting requirements in respect of a stable coefficient of friction and resistance to friction heat. It has adequate compression and shear strength – and it is cheap.”

Industrial Hemp is a fast-growing, disease-resistant plant that absorbs carbon dioxide and self-fertilises the land upon harvest. Bast fibres extracted from the stem

of the plant exhibit specific mechanical properties comparable to E-glass, and have been used in the manufacture of automotive composites for some time. The Hemp for the Ecobrake project is prepared by Hemp Technology based in Norwich, UK, and processed by Aptec based in West Auckland, County Durham, UK, using a Laroche opening machine. It is the resin, meanwhile, that dominates the mechanical properties of the pad. It must withstand cyclic loading of high temperatures and stresses but maintain a stable coefficient of friction throughout its working life. Currently, phenolic-based resins synthesised from non-renewable resources are used to fulfil this requirement, but a naturally occurring alternative has been discovered in the husk of the cashew nut shell.

Cashew nut shell liquid (CNSL) is the viscous, dark brown substance found in the husk of the cashew nut shell. It is a sustainable and naturally occurring source of phenolic compounds that can be used to produce thermally stable resins suitable for use in brake pads. At present, this liquid is considered a waste product by the cashew nut industry.

“A new aggressive mixing process will be the key to the success of the Ecobrake project”, Newby revealed. “Aramid fibrillate and form a dense structure and it is this we want to replicate with Hemp in our process,” he said. “We are also now exploring surface treatment of the fibre. Aptec has so far had some success with blends of aramid and Hemp and we are now looking at fibre surface treatments to increase the Hemp percentage. The current market for such brakes in Europe and North America is an annual £ 200m (US\$ 322 m) and the goal is that 20 % of the 1.5 m sets required each year will be Ecobrake pads by 2013.”

Sources: *MobileTex*, 2010-02.

Hemp Fibre Pellets for Injection Moulding: German Project will start in April 2010

The project's goal is to overcome the most crucial bottle neck in the process chain from domestic natural fibres to natural fibre reinforced plastics: the feed of natural fibres through technically and economically suitable natural fibre pellets into

the plastics industry processes.

Natural fibre reinforced plastics (NFP) constitute a promising material group, for injection moulding and extrusion. For ecological, technical and economic reasons they are able to replace both glass fibre, reinforced plastics and non-reinforced plastics such as PC/ABS. Yet so far NFP have managed to take hold in only a few niche products. The technically and economically unresolved problem of feeding natural fibres into plastics industry processes was identified as the most important reason for this.

Natural fibres such as domestic hemp or flax fibres are not free flowing and therefore, given the existing systems, it is only possible at the cost of long process times and loss of quality to feed them into the extruder or heating-cooling mixer in which granulates are produced from natural fibres, plastics and additives. These granulates, just like common granulates, can be used by the plastics processing industry on injection moulding machines for the produc-



Hemp fibre pellets for granule production.
Picture: nova-Institut

tion of plastic parts.

So far in research and development, fibres or card slivers have been used that are too expensive for industrial production, or special solutions have been developed for small series production that are not suitable for other applications and high throughputs, especially with regard to process times, process safety and economics.

- In the framework of the project, chopping the natural fibres, feeding them into the pelletisation process and pelletisation itself will be developed and optimised into an industrial process on a demonstration plant. The plastics processing industry can then accurately feed natural fibres into their processes without any technical problems and rein-

force plastics with a consistent quality and with a price that will make sustainable use possible for the industry.



Hemp short fibres. Picture: BaFa

Project partners: nova-Institut GmbH, Hürth (project management and economics), Badische Naturfaseraufbereitung GmbH, Malsch (demonstration plant) and Hochschule Bremen (technical analyses). The natural fibre pellets are tested within the project by the companies FKUR, Hiendl and Linotech as well as Fraunhofer WKI.

The project duration is 18 month, and it is financially supported by the Deutsche Bundesstiftung Umwelt (DBU), Osnabrück.

Source: *nova-Institut*

INCREASING DEMAND FOR EUROPEAN HEMP FIBRES: A SUSTAINABLE RAW MATERIAL FOR BIO-BASED COMPOSITES

From a historic point of view, for more than 2,000 years hemp has been an important raw material for industry. Hemp fibres were used for technical textiles such as ropes, hawsers, boat canvas as well as clothing textiles and paper. In the 1990s, hemp was rediscovered throughout the world as an important raw material for bio-based products in a sustainable bioeconomy and ever since then has been in high demand. The most important cultivation and manufacturing regions are Europe and China, and the most important applications are bio-based composites (natural fibre reinforced plastics) as well as construction and insulation materials. The bio-based materials sector in particular, still has large, untapped market potentials for both the reinforcement of mineral oil-based plastics and, to an increasing degree, for bio-based plastics.

SUCCESS STORY AUTOMOTIVE INDUSTRY: CURRENT TRENDS AND NEW APPLICATIONS

In the year 2005 – more recent data is not available – 30,000 tons of natural fibre composites (EU:40,000–50,000 t) wood not included, were used in the automotive industry, requiring 19,000 tons of natural fibres. (EU:30,000 t) European flax (about 65 %) and hemp (about 10 %) were used, with the remaining 25 % covered by imports from Asia (jute, kenaf, coir, abaca). Natural fibre compression moulding is the dominant processing technique (share of > 95 %), it is an established and proven technique for the production of extensive, lightweight and high-class interior parts in medium and luxury class cars. Advantages are lightweight construction, crash behaviour, deformation resistance, lamination ability, depending on the overall concept,

and also price. The disadvantages are limited shape and design forming, off-cuts, and cost disadvantages in the case of high part integration in construction parts. These advantages and disadvantages are well known. Process optimisation is in progress, in order to reduce certain problem areas such as off-cuts and to recycle waste. By means of new one-shot compression moulding presses, soft surfaces can also be directly integrated, something that has not been possible so far with injection moulding.

Between 2005 and 2009, the use of natural fibres in the European automotive industry did not expand, and in Germany even slightly decreased, after it had grown in double-digit figures each year between 2000 and 2005. Since 2009, however, there has been an increasing demand again: new models from almost all automotive companies that will be released on the market this or next year do have considerably more interior parts, made once again with natural fibre reinforcement. On the one hand this is due to the high development of the materials and the fact they have proven themselves in practice, but on the other hand it is also due to the increasing interest by the automotive industry in bio-based materials and lightweight construction – in both fields, natural fibre construction parts can score. In addition, further cost and weight reductions were achieved in recent years especially with regard to compression moulding.

Furthermore new trends are becoming apparent: the automotive manufacturers do not only want to use bio-based materials, but also want to show them to their customers. While up to now natural fibre construction parts have disappeared under a lamination, thus becoming invisible to the

customer, in the near future vehicles will be released on the market that will exhibit the natural fibres under transparent films or lacquers, showing completely new surface effects. Another trend can be noticed in the development of making the plastics matrix bio-based as well, i.e. producing interior parts from PLA or bio-based PP and natural fibres. While such 100 % bio-based compounds will soon be found in Japanese cars, in Europe this still will take a while.

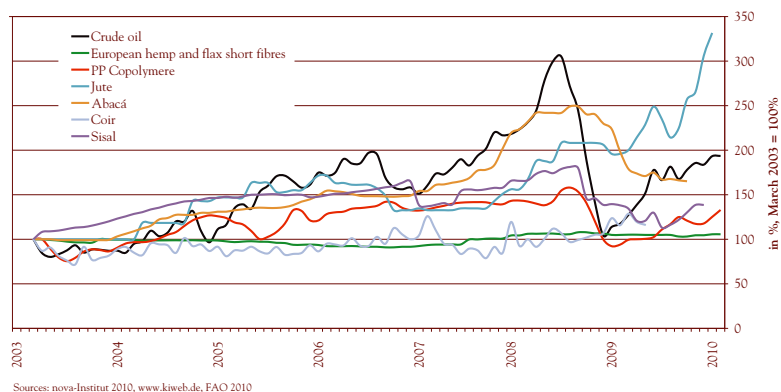
With demand increasing again, new concepts and the support of bio-based products by politics, sales of 40,000 to 50,000 t of natural fibres could be achieved in Europe by 2015, at least 10–20 % of which could be supplied by European hemp.

INSULATION MATERIALS AND MANY OTHER APPLICATIONS

The second road to success are hemp insulation materials of which about 3,000 to 4,000 tons are produced annually and put on the market in the EU. The most important manufacturers and users are Germany, France and Great Britain respectively. The hemp insulation material properties are very good and appreciated by customers. Achieving bigger sales markets is solely hampered by the relatively high price compared to mineral fibre insulation materials. Here only suitable economic-political framework conditions can be of help.

Apart from the automotive and construction industry, there are numerous applications with a smaller volume such as briefcases, other cases, various consumer goods (e.g. letter scales, battery chargers, toys) or trays of grinding/sanding disc and urns. The latter are a good example of a 100 % bio-based product: The urns are produced from PLA, reinforced by hemp fibres, and are fully biodegradable.

Price indices for natural fibres, crude oil and polypropylene (per Euro basis)



European Hemp and Flax – a price rise of less than 10 % in over seven years. Source: nova-Institut

As well as the examples mentioned, in addition to the aforementioned compression moulding, injection moulding plays an important role. The increasing availability of high-grade natural fibre injection moulding granulates will help to quickly develop new applications here.

NEW PROCESSING TECHNIQUES

For some decades, in the EU and North America there has been intense research going on in new processing techniques for flax and hemp fibres, in order to make the development of new, high price fields of application possible for natural fibres. In this issue you can find more detailed information on two outstanding processing techniques that are close to commercial implementation, already today producing modified hemp fibres amounting to several hundred tons per year: First, the CRAILAR Process from Canada which focuses on the use of hemp fibres in the textile industry, and second, the ultrasonic processing technique of the Ecco Company from Germany which focuses on high-grade technical fibres.

AVAILABILITY AND PRICE DEVELOPMENT OF NATURAL FIBRES – A CHANCE FOR EUROPEAN HEMP?

While the technical natural fibre market is increasing worldwide, the question of prices and security of supply arises. In important cultivating countries in Asia, the cropping areas for jute and kenaf cannot be extended, because there is considerable competition for areas used for other purposes. The situation is better regarding sisal: here an extension of cropping areas is possible in the dry regions of Africa and South

America – places, where hardly any other crop can be cultivated. But European production is also under pressure: the cropping areas of flax are decreasing due to strong competition from areas with subsidised bio energy as well as the dependency on exports to China, that is buying less textile long flax fibres. As for hemp, an extension of cropping areas is possible however, provided that rates of return similar to those of the food and feed sector and energy crops can be achieved. Areas under hemp cultivation are also on the rise in China, with hemp being expected to replace cotton in the clothing textile sector.

In December 2009, Bangladesh imposed a ban on jute fibre exports for the first time and it was not before February 2010 that it was partly suspended for certain qualities. The reasons for the embargo were to be found in three years of poor harvests and increasing demand particularly from India (packaging) and China (composites), threatening a shortage of the necessary raw material from the Bangladesh jute industry. Due to the embargo, jute prices rose by 50 to 100 %. At the same time sisal prices were increasing, too, due to a severe drought in East Africa.

80 % of jute and kenaf are used in Asian packaging (bags), sisal particularly in the form of tow ropes and conveyor belts. In contrast to these, natural fibre composites still constitute small markets that can be supplied quite easily.

As a result of farmers reacting more quickly to changes in demand, rates of return and a local shortage of area, there has been a general trend leading towards a more dynamic agricultural market with more volatile prices, and this, fueled by speculators, is now affecting the world of natural fibres. For a long time, prices have

been quite stable compared to other agricultural products or mineral oil. But it is expected in the future that natural fibre prices will definitely stay below 1 €/kg so that they remain attractive for composites.

The graph shows the price developments of important natural fibres, and as a comparison, the price development of mineral oil and polypropylene. European flax and hemp short fibres, after a long period of price stability have only recently shown moderate price increases, and are currently showing particularly good price stability – a price rise of less than 10 % in over seven years.

To sum up: exciting times for European hemp which, with adequate framework conditions, has a considerable growth potential. ●

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IN CELEBRATION OF THE INTERNATIONAL YEAR OF NATURAL FIBRES



EIHA supported the IYNF by activities



The idea of a United Nations International Year dedicated to natural fibres arose from a Food and Agriculture Organisation (FAO) of the United Nations (UN) meeting in 2004. In the following year, the proposal was endorsed and transmitted to the Secretary-General of the UN. Shortly afterwards, the UN General Assembly proclaimed 2009 to be the International Year of Natural Fibres. In doing so, it noted that the diverse range of natural fibres produced in many countries provides an important source of income for farmers, and thus can play an important role in contributing to food security and in eradicating poverty and hence in contributing to the achievement of the Millennium Development Goals.

WHY NATURAL FIBRES?

Each year, farmers harvest around 35 million tonnes of natural fibres from a wide range of plants and animals – from sheep, rabbits, goats, camels and alpacas, from cotton bolls, abaca and sisal leaves and coconut husks, and from the stalks of jute, Hemp, flax and ramie plants. Those fibres form fabrics, ropes and twines that have been fundamental to society since the dawn of civilization.

But over the past half century, natural fibres have been displaced in our clothing, household furnishings, industries and agri-

culture by man-made fibres with names like acrylic, nylon, polyester and polypropylene. The success of synthetics is due mainly to cost. Unlike natural fibres harvested by farmers, commonly used synthetic fibres are mass produced from petrochemicals to uniform strengths, lengths and colours, easily customized to specific applications.

Relentless competition from synthetics and the recent current global economic down-turn have impacted the livelihoods of millions of people who depend on natural fibre production and processing. That is why the International Year of Natural Fibres 2009 aims at raising global awareness of the importance of natural fibres not only to producers and industry, but also to consumers and the environment.

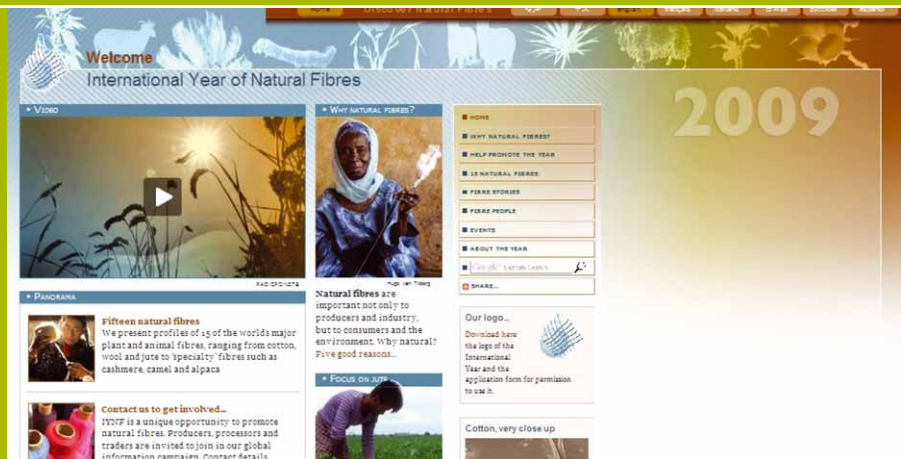
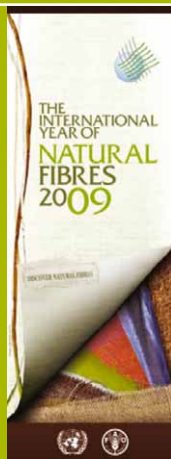
THE IMPORTANCE OF NATURAL FIBRES TO DEVELOPING COUNTRY ECONOMIES

Natural fibres production, processing and export are vital to the economies of many developing countries and the livelihoods of millions of small-scale farmers and low-wage workers. Today, many of those economies and livelihoods are under threat: the global economic recession, and its aftermath, has reduced demand for natural fibres as processors, manufacturers and

consumers suspend purchasing decisions or look to cheaper synthetic alternatives.

Almost all natural fibres are produced by agriculture, and the major part is harvested in the developing world. For example, more than 60 percent of the world's cotton is grown in China, India and Pakistan. In Asia, cotton is cultivated mainly by small farmers and its sale provides the primary source of income of some 100 million rural households. In West and Central Africa, cotton is grown on an estimated 1.5 to 2 million small farms. At least 10 million people work in the region's cotton sector, and raw cotton makes up about 50 percent of exports from Benin, Burkina Faso, Chad, Mali and Togo. Cotton is Mozambique's second most important export, is grown by some 300,000 rural families, and provides work for 20,000 people along the supply chain.

In India and Bangladesh, an estimated 4 million marginal farmers earn their living – and support 20 million dependents – from the cultivation of jute, used in sacks, carpets, rugs and curtains. Competition from synthetic fibres has eroded demand for jute over recent decades and, in the wake of recession, reduced orders from Europe and the Middle East could cut jute exports by 20 percent in 2009. In southern India, the coir industry provides 500,000 jobs. Silk is another important industry in Asia. Raising silkworms generates income



for some 700,000 farm households in India, while silk processing provide jobs for 20,000 weaving families in Thailand and about 1 million textile workers in China. Orders of Indian silk goods from Europe and the USA are reported to have declined by almost 50 percent in 2008-09.

Each year, developing countries produce around 500 000 tonnes of coconut fibre – or coir – mainly for export to developed countries for use in rope, nets, brushes, doormats, mattresses and insulation panels. In Sri Lanka, the single largest supplier of brown coir fibre to the world market, coir goods account for 6 percent of agricultural exports, while 500,000 people are employed in small-scale coir factories in southern India. Across the globe in Tanzania, government and private industry have been working to revive once-booming demand for sisal fibre, extracted from the sisal agave and used in twine, paper, bricks and reinforced plastic panels in automobiles. Sisal cultivation and processing in Tanzania directly employs 120,000 people and the sisal industry benefits an estimated 2.1 million people. However, the global slowdown has cut demand for sisal, forced a 30 percent cut in prices, and led to mounting job losses.

Put together, the sale of natural fibres on the international market place provides as much as US\$18 billion to farmers and processors, but the main beneficiaries to an expanding global market in the last decade have not always been the poorer countries.

OBJECTIVES OF THE INTERNATIONAL YEAR

The declaration of the International Year of Natural Fibres reflects the importance of this group of commodities to a great many countries, particularly the most vulnerable ones. The key objective of the Year is to im-

prove the lives of the poor who are involved in natural fibre production and processing. An important strategy is to find new markets and uses for natural fibres, especially those produced by small-scale farmers. Much can be done by raising awareness and to ensure that the plight of the millions of natural fibre producers is heard, for many of these producers form the most vulnerable communities in the world.

The International Year is also about promoting the efficiency and sustainability of natural fibre industries and to encourage appropriate policy responses to the problems faced by natural fibre industries; and it is also about fostering effective and enduring international partnerships among the various natural fibres industries. Clearly, there is an important role for fibre crops and their commercialisation in promoting economic development while at the same time contributing to the emerging “green” economy. For natural fibres can also be part of the solution to climate change. Natural fibres are a renewable resource, par excellence – they are carbon neutral by absorbing the same amount of carbon dioxide they produce. During processing, they generate mainly organic wastes and leave residues that can be used to generate electricity or make ecological housing material. And, at the end of their life cycle, they are 100 % biodegradable.

FAO was invited to facilitate its observance, in collaboration with governments, regional and international organizations, non-governmental organizations, the private sector and relevant organizations of the United Nations system.

EXPERIENCE IN IMPLEMENTATION

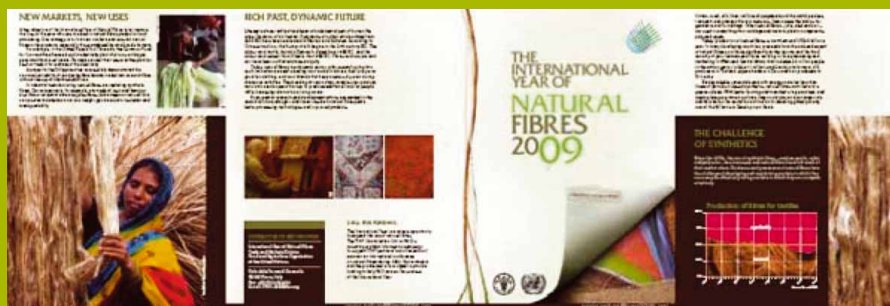
It was unfortunate that the IYNF coincided with the exceptionally difficult economic climate of 2009. Natural fibre commodities, especially those used in industrial applications, are particularly responsive to income changes. Many studies have examined just how sensitive fibre demand is to changes in the level of income. Typically they show that for every 1 percent fall (rise) in income, demand contracts (expands) between 1 to 2 percent. Such responsiveness is much higher than for many other commodities, including food, other raw materials and energy.

Nevertheless, FAO alongside its partners pushed the IYNF agenda to the forefront with noticeable impact. At the heart of the FAO campaign was the IYNF website (www.naturalfibres2009.org) with a presence in 8 languages.

The website contains inter alia profiles of 15 of the world's major plant and animal fibres; fibre factsheets on health, responsible choices, sustainability, technology and fashion; micrographs of 18 plant and animal natural fibres; and a selection of fibre “stories”.

The website also hosts the IYNF logo, a poster and a brochure, in various languages, plus T-shirt and bag designs for printing – all downloadable. A further major highlight of the FAO campaign is the IYNF video produced in seven languages, with funding assistance from the Common Fund for Commodities and the New Zealand Trade and Enterprise.

In April, FAO hosted a fashion show at its Rome headquarters featuring clothing designed by Italian designers who use 100 percent natural fibre textiles such as organic cotton, cashmere, alpaca and silk - in



their creations. The show underscored the connection between the clothes we wear and small-scale fibre producers in developing countries.

Such has been the success of the centralised outreach, that by the end of 2009, around 1000 formal requests to use the IYNF logo had been received, roughly 3000 posters and brochures were distributed, while demand for the video had exceeded several thousand requests. However, key to celebrating the year and promoting its objectives were the host of events that took place outside of Rome. Well over 150 conferences, workshops, exhibitions, seminars, fairs and festivals were organised in 50 countries under the umbrella of the IYNF. These decentralised initiatives have been the key strength in raising awareness about natural fibres. From Belgium to Bangladesh, Egypt to Ecuador, Mozambique to Mexico, China to Canada, Iran to India, Portugal to the Philippines, etc, the sheer number and geographical diversity of the decentralised events underlines just how important natural fibres are perceived around the globe.

BEYOND 2009

There is common recognition that the objectives of the Year cannot be possibly realised in the space of 12 months. For this reason, FAO along with key stakeholders are committed to sustaining momentum beyond 2009. For example, the website will be maintained in the years to come, further media events are being planned in 2010, including the redesign of key publicity material. FAO is also encouraging the continuation of events outside of headquarters that aim to keep the spirit of the Year alive.

In addition, FAO forms the Secretariat of the Intergovernmental Group on Jute and

Hard Fibres (especially sisal, coir and abaca). For the central themes of the IYNF, namely the environmental benefits of natural fibres twinned with poverty alleviation and rural development given the location of production, lend themselves arguably more towards these fibres than for other natural fibres. The Group has a far reaching mandate, but at its core, the Group strives to improve the visibility of jute and hard fibres, to identify new markets through promoting product innovation and standardisation, sustainability certification and fostering greater efficiency through investment in R&D.

It is hoped that readers of this newsletter will embrace the objectives of the IYNF and through your actions a difference can be made to the lives of many that depend on natural fibres. ●

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Picture: FAO

INTRODUCTION

Since the middle of 1980's the cultivation of fibre plants such as Hemp and flax has gained much importance for European agriculture. In 2005, app. 19.000 t of natural fibres (not including cotton and wood) are used annually as reinforcement fibres in composites for the automotive industry in Germany [EIHA 2009]. The traditional production of Hemp and flax fibres in Europe is based on field drying and retting of the crop and subsequent mechanical separation of fibres from non fibrous parts of the input material. At the usual harvest time in September, weather conditions are often hard to predict for the quality of processed Hemp to high quality fibres for industrial purposes.

MATERIALS AND METHODS

A weather-independent post harvest technique is under investigation at the Leibniz - Institute of Agricultural Engineering (ATB). The harvest of Hemp by means of a chopper followed by anaerobic storage is advantageous for the farmer because the weather risk can be avoided in comparison to the traditional supply chain. Additional steps are similar to the ensiling of fodder. Furthermore, with this novel processing technology the whole plant material without any by-products or waste is processed to produce an end product like fibre boards, insulation materials or semi products for composites. A pilot plant with a processing capacity of 1 t/h Hemp silage is built up and tested at the ATB at present (Fig 1).

The technology of the pilot plant enables the processing of different fibre plants from agriculture and forestry. The finished process is a modified dry/half-dry process from the wood industry adapted to agricultural raw materials like wet preserved Hemp (Fig. 2).

FIBRE BOARDS AND COMPOSITES FROM AN ALTERNATIVE PROCESSING ROUTE FOR HEMP AND OTHER NATURAL FIBRES

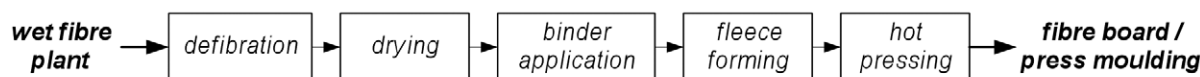


Fig. 2: Process flow for the processing of wet preserved Hemp and other fibre plants

RESULTS

The pilot plant was put into operation in January 2007 and is being tested at present. First samples boards with densities from 150 to 1000 kg/m³ have been produced using different natural and synthetic binders. The mechanical properties of these samples are comparable with the properties of commercial products made of wood fibres (Fig. 3). Disadvantageous silage-like odours are released to atmosphere by means of the thermal treatment of the raw material in the first processing stages. Thus, odour troubles in the products are minimized, but still have to be improved.

Tests related to composite technologies have shown that granulate for injection moulding can also be produced from the fibrous material based on wet preserved Hemp. As one of the results favourable geometrical properties like an aspect ratio of 5 up to 15 were measured. The processability as well as the resulting mechanical properties of the composites with polypropylene as matrix material is being investigated at present.

The ongoing research is complemented by economic studies of the whole process chain from agriculture to end products. According to these studies, production costs of fibre boards for subsonic noise insulation amount to 85 to 90 % of the end consumer price for conventional fibre boards when produced in one shift production, respectively 60 to 65 % when produced in two shift production with this new technology.

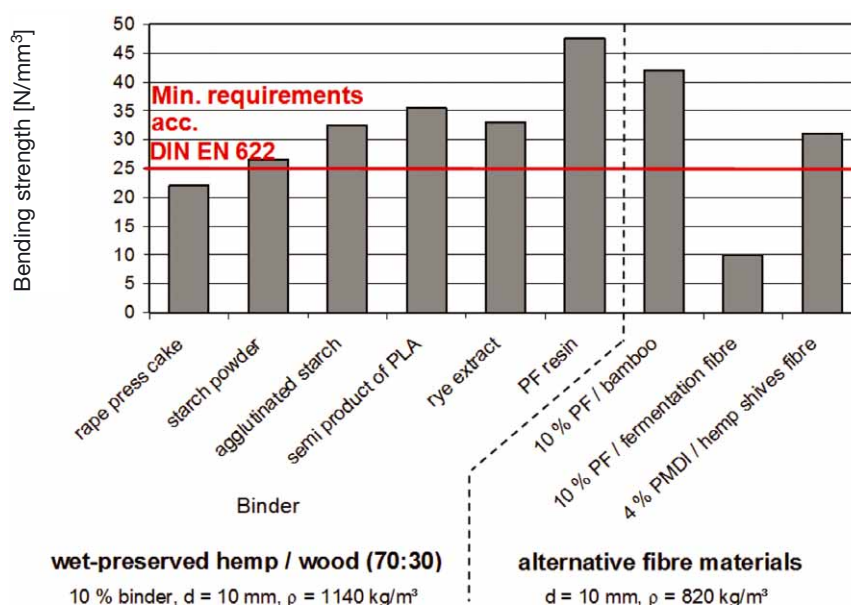


Fig. 2: Bending strength of fibre boards manufactured from different raw materials and binder systems (PLA=Polylactic acid, PF=Phenolic resins, PMDI=Polymeric isocyanate)

CONCLUSIONS

Experiences with a novel fibre processing plant have shown that wet preserved Hemp can be processed to high quality fibre boards. The novel technology is appropriate for establishing decentralized processing plants at farm level. The typical weather risk of the Hemp harvest can be largely eliminated for the farmer. Also other fibre plants from agriculture and forestry or mixtures of different raw materials can be processed in the pilot plant at reasonable costs. Further main advantages of such plants for Hemp processing are the alternative source

of income for farmers combined with the enrichment of crop rotation and the environmentally sound production of fibre boards at competitive prices. ●

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SETRALIT®: ULTRASONICALLY TREATED NATURAL FIBRES FOR INDUSTRIAL APPLICATIONS

A patented ultrasound procedure of the ECCO Group upgrades renewable primary plant fibres to high performance products for multiple application fields.



Ultrasonic pilot plant. Picture: ECCO

Besides their main business, the production of and trade with high-power lubricants, the ECCO group has, for many years, dealt with the research and development of industrial fibres on the basis of renewable resources like annual fibre plants such as flax or Hemp. Before long they encountered a fundamental problem: quality as well as efficiency of the processed plant fibres varied significantly, subject to a number of factors which could hardly be controlled or anticipated: location, soil properties, weather, harvest conditions, agricultural preconditioning, and many other impacts impeded a homogeneous quality standard.

Vegetable fibres could only be used after they had been submitted to the so-called “retting” procedure. In that process the fibre plant straw – after being harvested – is weathered on the land for days or weeks. Bacteria, fungi and other micro-organisms support the rotting by loosening the bonds between fibres and the other straw components as well as among themselves. The main problem is to define the correct moment to interrupt the retting, mainly because weather conditions are often suboptimal. Straw which is over-retted or only half-retted is difficult to process further and yields fibres of inferior performance. Generally this allows outside influences to create considerable and non-predictable quality variations. The so-called “water-retting”, by which the fibre straw is watered for days in basins or rivulets in order to equalize the rotting conditions, could not be established, mainly because of the environmental hazards for biotopes. Therefore it is forbidden in the EU.

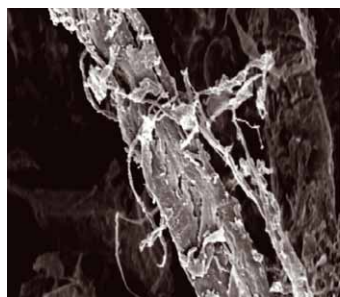
The answer was found by ECCO about 15 years ago. A novel break-down technique produced high-performance natural fibres with an unprecedented quality and at a competitive price. By using the patented

“ultrasound procedure” an upgraded SETRALIT® natural fibre was created. The ultrasound treatment imitates the natural micro-organism retting by a chemo-physical process: Degradation and removal of pectins, waxes, and herbal gums, scents and dyestuffs not only loosens the cell structure but also cleans the material.

Advantages: Compared to conventional field retting requiring days and weeks, the ultrasonic process takes only a few minutes.



Flax fibres gained by ultrasonic treatment. Picture: ECCO



SETRALIT NFU/31-2: ultrasonically treated and fibrillated Hemp fibre. Picture: ECCO

Typically the treated material is in contact with the ultrasound field for only 30 seconds. Moreover, the method developed by ECCO is able to completely control the process, i.e. fibre quality can be planned ahead and will be more homogeneous as compared to traditional production procedures.

Besides the differences in colour, odour,

or wax content which might not always be essential concerning industrial utilisation, the water absorption capacity of the ultrasound SETRALIT® fibres is many times higher than that of conventional plant fibres. Therefore ultrasonically treated plant fibres can be bleached or dyed faster and more evenly, consuming fewer treatment agents. In other applications the minimised content of contaminating particles (dust, mould spores, and others) and organic residuals, the light colour, the soft grip, and the neutral smell of SETRALIT® fibres might also be advantageous.

The ultrasonic method offers an environmentally friendly and CO₂-neutral processing of renewable plant products for the industry. These fibre products are medically harmless, and thus present an alternative to conventional and partly questionable materials such as asbestos, aramid or glass fibres.

SETRALIT® fibres are used or have been tested in many products and technical processes. Following the ultrasonic treatment they can be further processed and refined in multiple ways to meet the requirements of the respective end use: cutting, grinding, fibrillating or ultra-milling are typical mechanical aftertreatments. Consequently, SETRALIT® fibres which are components of friction linings differ from those used as reinforcement fibres in plastic compounds or in construction materials. They not only replace other fibre materials, but are also used in new materials which did not previously contain fibres, e.g. in aerated concrete. Other fibre types can be used in gaskets, greases, glues, emulsion paints (e.g. as delustering agent), or may be applied in the paper, textile and nonwoven industries. ●

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ULTRA FIBRE

Development of a radial cell process for the clean, continuous, high volume production by hydro-acoustic decortication of high quality natural fibres for the SME natural fibre sector.



Pictures: UltraFibre



Fibre reinforced polymers find wide commercial application in the aerospace, leisure, automotive, construction and sporting industries. In recent years there has been much interest in developing natural fibre reinforced polymers for a sustainable substitution of synthetic materials, and also to develop markets for the European non-food crop industry sector.

The major impediment to growth facing the European natural fibre sector is the high processing costs needed to produce the fibres themselves. While natural fibres can be used for a wide variety of applications, other fibres are considerably more cost-effective. The growth in the agro-materials / energy crop sector is causing competition for land with food production and this is driving up the costs of both food and non-food crop products.

There is an urgent need in Europe for more sympathetic integration of food and non-food production; this can be partially achieved through improved process efficiency and productivity. Natural fibre crops

cannot be easily separated into fibres of consistent quality. Therefore, to commercially exploit past research investment on the world market, new research must be undertaken to reduce processing costs and to improve fibre quality, consistency, and efficiency.

The UltraFibre project will address these restrictions in the supply chain by delivering a scalable, economic, continuous, clean- fluidsonics technology to deliver tonnage quantities of high quality fibre, conferring:

- Increased fibre yield from crop mass from 29 % to 40 % by weight.
- Reduced standard deviation in tensile test data by 30 % of the fibres in comparison with conventional retting techniques, indicating improved fibre quality and consistency.
- A 25 % reduction in production costs.
- Integration of a Soft Plasma fibre treatment process conferring a 25 % increase in mechanical properties compared with the untreated fibre.

Commercial thermoplastic and thermosetting composites in targeted end-user applications.

The UltraFibre project started on 1st January 2010, and will run until 31st December 2012. The project is supported by funding under the Seventh Framework Programme of the European Union.

The project consortium comprises SMEs, associations and research organisations from across Europe:

SMEs:

- Kenaf Eco Fibres (Italy)
- Marek RadwaDski EKOTEX (Poland)
- AcXys Technologies (France)
- Omega Makina (Turkey)
- MoveVirgo (UK)
- CESAP (Italy)

Associations:

- ASSOCOMAPLAST (Italy)
- European Industrial Hemp Association (Germany)
- British Plastics Federation (UK)

Research Organisations:

- Smithers Rapra (UK)
- GreenGran (Netherlands)
- InControl Ultrasonics (UK)
- DLO (Netherlands)

For further information about UltraFibre, please visit the project website: <http://www.ultrafibre.org> ●

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NEW PARTNERS FOR HEMP TEXTILE DEVELOPERS

Naturally Advanced Technologies' quest for commercial partnerships to develop its patented "CRAILAR" enzyme process for the commercial production of Hemp fabrics continues apace with a series of new deals.

Intimate apparel and activewear manufacturer Hanesbrands has signed an agreement with Naturally Advanced Technologies to use "CRAILAR" organic bast fibres in some of its commercial knit products. The new multi-phase joint development agreement for this organic-fibre commercialisation will involve the retrofit of existing dyeing equipment at a Hanesbrands facility to develop a commercially viable use of the '100 % organic fibre'.

NAT has been looking to develop new commercial partnerships for the production of yarns and fabrics from bast fibres such as Hemp using its patented 'CRAILAR' process, which uses enzyme technology to produce soft, comfortable textiles that can compete more effectively with organic cotton. It also recently teamed up with Patrick Yarns, a manufacturer of high performance industrial yarns to make and manufacture CRAILAR Organic Fiber yarns and related products for sale and distribution in North America to third party licensees of CRAILAR.

While NAT's Hemp feedstock grows without the use of chemical fertilisers and pesticides or herbicides and meets the USA's National Organic Program (NOP) criteria, the company also confirmed that the enzymes used in the production process are completely natural, and not modified in any way. The chemicals used are also approved by the Organic Exchange and the Organic Trade Association and are commonly used in food production, organic cleaning solutions and organic cotton processing.

"The agreement with Hanesbrands is a significant step in our plan to commercialise CRAILAR Organic Fibers, a technology that employs a 100 % organic process that uses Hemp as its feedstock," said Ken

Barker, CEO of NAT.

"As previously announced, CRAILAR Organic Fibers were successfully spun on existing cotton systems at North Carolina State University in tests that were sponsored by Hanesbrands. These tests demonstrated the evolution of Hemp fibre from a niche market alternative to a mainstream solution."

"Now Hanesbrands is taking action to develop an in-house facility in North Carolina for processing CRAILAR Organic Fiber. We are very excited to continue working with Hanesbrands in this next phase of our partnership, which will include technology development, marketing initiatives and commercialisation planning."

The deal with North Carolina – based Patrick Yarns will also boost its strategy to commercialise CRAILAR technology beyond commercial apparel knit products. The company is hopeful that the partnership will enable it to grow development in denim, work wear and related apparel markets, as well as the home furnishings and carpeting industries.

"We are very excited to be working with Patrick Yarns in a partnership that allows us to create a pull through marketing strategy with fabric and finishes goods brands," added Barker. "The company has an incomparable track record of partnering with its customers to develop yarns that create brand awareness and market share."

An agreement with commission US-bades textile dyer G.J. Littlewoods Son, Inc. to manufacture 'CRAILAR' organic bast fibres for use in apparel will also secure an initial capacity of approximately 40,000 pounds per week, with the capability to aggressively ramp up from there to meet the needs of its commercialisation plans. Littlewoods, located in Philadelphia,

is a commission dyehouse, specialising in the dyeing of synthetic fibres, as well as natural fibres. It intends to use state-of-the-art conventional machinery to process CRAILAR.

With this in mind, the company anticipates delivering its first revenue from CRAILAR in the fourth quarter, which, with a loss of US\$ 966,000 in its second quarter ending June 2009, will be a welcome boon. It was back in November 2008, the company announced test results from its trials at North Carolina State University, which were sponsored by Hanesbrands Inc. In the trials, the testers spun Hemp yarn and knitted fabric on conventional cotton equipment with no modifications using CRAILAR Organic Fibres technology. The resulting yarn was knitted into a five-ounce per square yard jersey fabric, which resulted in a 50 % reduction in shrinkage, a 45 % increase in tensile strength, a 20 % reduction in dye uptake and demonstrated wicking capabilities.

Having now outlined plans to shutter its HTnaturals organic clothing business, which impacted the cost of sales, NAT will be somewhat relieved that CRAILAR can at last begin to pay its way.

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Biowerkstoff-Report

Biokunststoffe, Naturfaserverstärkte Werkstoffe, Wood Plastic Composites – Bioressourcen und stoffliche Nutzung nachwachsender Rohstoffe
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Biowerkstoff-Report – Report on Bio-based Plastics and Composites

Alle Ausgaben



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www.wpc-kongress.de
- **Biowerkstoff-Kongress – International Congress on Bio-based Plastics and Composites (Hannover)**
www.biowerkstoff-kongress.de
- **International Conference of the European Industrial Hemp Association (EIHA) (Wesseling)**
www.eiha.org/conf7
- **Deutscher Elektro-Mobil Kongress (Bonn)**
www.e-mobil-kongress.de

Verbände und Gremien

seit 2003: Mitglied des Industrie-Arbeitskreises Verstärkte Kunststoffe, Technische Vereinigung (AVK-TV), Untergruppe „Naturfaserverstärkte Polymere“; seit 2006 Mitglied des Steering Committees

seit 2005: Geschäftsstelle der European Industrial Hemp Association (EIHA) (www.eiha.org)

seit 2005: Mitglieder der FAO Hard Fibre Group, Rom (für European Industrial Hemp Association)

2007: Gründungsmitglied des Clusters Industrielle Biotechnologie (CLIB 2021) in NRW

seit 2009: für EIHA Mitglied der „Industrial Task Force on BioBased Content of Materials and Products“ (Brüssel, european bioplastics) und CEN/BT/WG 209 „M/429 – elaboration of a standardization programme for bio-based products“ (Brüssel, CEN) (für European Industrial Hemp Association)

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The Winners

Propper GmbH & Co. KG
Progranic

GreenGran B.V.
GreenGran

Henkel AG
Arctic

Innovation Award – Bio-based Material of the Year 2010

For the third year running an Innovation Prize has been awarded to the young, innovative bio-based industry. The aim is to recognize and reward innovative ideas in the industry regarding product development and design, as well as the development of new technologies and processes. The competition seeks to encourage the development of new bio-based materials, along with suitable applications and markets for bio-based products. The focus of the prize is on new developments within these areas, which have had a market launch in 2010.

The winner was elected on April 20th by the participants of the congress.

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The Innovation Award winners (from the left to the right): Martin Snijder (GreenGran), Michael Carus (nova-Institut), Daniel Ridge (Propper), Peter von Hoffmann (Coperion), Oliver Schmid (Propper), Peter Rushe (Henkel), Carolin Wiegand (Henkel). Source: nova-Institut 2010



Propper GmbH & Co. KG | Proganic

Propper GmbH & Co. KG (Germany)

Bio-based material: Proganic® (based on PHA)

Application: Watering Can

PROGANIC® is a new material made from 100 % natural renewable raw materials and minerals. It looks, feels and works just like plastic, and is just as water repellent and resistant, similarly to UV-rays, but it is organic and can be easily reintroduced into the Earth's natural cycle by composting.

The material is based on three main ingredients: Polyhydroxyalkanoate (PHA), Carnuba Wax and a natural mineral filler.

Polyhydroxyalkanoate (PHA) is a biopolymer that is made by bacteria. It can break down naturally, therefore it is biodegradable. PHA has the same qualities as plastic, but it uses renewable raw material such as sugar from crops, instead of finite natural resources such as crude oil, natural gas and charcoal.

Carnauba Wax is the hardest known natural wax derived from the Carnuba Palm leaves. It is harmless to health and is fragrance – free.

A natural mineral is used as filler (bulking agent) which has water-repellent and sealing properties.

Apart from that, only natural color pigments are used for all PROGANIC® products.

The material is produced to have the same hardwearing and versatile uses as plastic and can be processed without problems. It is fully biodegradable and conforms to all worldwide food standards. It has been tested by the American Food and Drug Administration (FDA) and conforms to EU norm 71. It can be used for durable products such as flower pots, watering cans, trays, bottles, bags and containers of all sorts as well as for single use products like disposable cutlery and packaging films (to 80 µ). It is dishwasher proof and heat resistant up to 48 °C. The first product line of watering cans and flower pots is introduced to home improvement stores in spring/summer 2010.



GreenGran B.V. | GreenGran

GreenGran B.V. (The Netherlands/China)

Bio-based material: GreenGran, Natural Fibre Reinforced Granules for Injection Moulding

Application: BioCharger

Using sustainable and renewable natural plant fibres (such as flax, jute, hemp and kenaf) and through industrial production techniques that mix them into plastics, GreenGran's granules are made from a combination of these natural fibres with polypropylene, thus reducing the use of petroleum products. Five times stiffer and 2.5 times stronger than polypropylene, they will not cause wear and tear to the screw and the mould as glass fibres do, and unlike glass fibres, they do not pose safety and health risks and generally show a better energy and CO₂-balance. Their recoverable component comes from these natural plants and can make up over half of their weight, up to 80 percent. All these features make them suitable for the production of durable products. GreenGran granules offer many advantages like good insulation, dimensional stability at high temperatures, a high thermal deformation temperature, and impermeability. They are flame retardant and they possess a stiffness and strength similar to traditional glass fibre filled polypropylene. They can withstand long machine resistance time, have a low water absorption rate, high resistance to UV radiation and demonstrate normal flow behaviour, making them the best substitute for glass-reinforced plastic.

The granules are currently produced for a range of applications in automobiles, construction materials, packaging, toys and electronic products and launched onto the market in 2010.

Custom made orders are also available to cater for clients' products. The type and amount of natural fibres can be adjusted to manufacture products with different features and appearances. These include UL94 FR V0, V1 & V2 grades (flammability standards).



Henkel AG | Arctic

Henkel AG & Co. KGaA (Germany)

Bio-based material: Arctic (based on PLA)

Application: ECOMfort Correction Roller

ECOMfort is the latest Correction Roller from the Pritt Stationery range, to be launched on the market in 2010.

The newly developed and innovative natural 'Arctic' material sets new standards as it replaces a highly technical performance plastic with a sustainable renewable material. The development phase lasted over 12 months in which the base PLA material was optimised to increase specific technical values in line with standard plastics. In parallel, the processing and manufacturability of the material was improved. Standard conventional injection machines were modified to optimise working parameters. Both Compounding and Injection methods were tweaked in order to advance and perfect the processability. Machines were modified and changed gradually to increase performance and output. Finally a material was born – 'Arctic'. The new Pritt ECOMfort is the first Correction Roller in the world made from approx. 89 % natural plastic (device shells, excluding usable material such as correction tape & inner parts). This results in approximately 60 % less CO₂ emissions, compared to a roller made from standard plastic, in terms of the whole life-cycle from production (incl. transportation) until waste disposal (same method e.g. recycling).

