



## **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 wastage. 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**

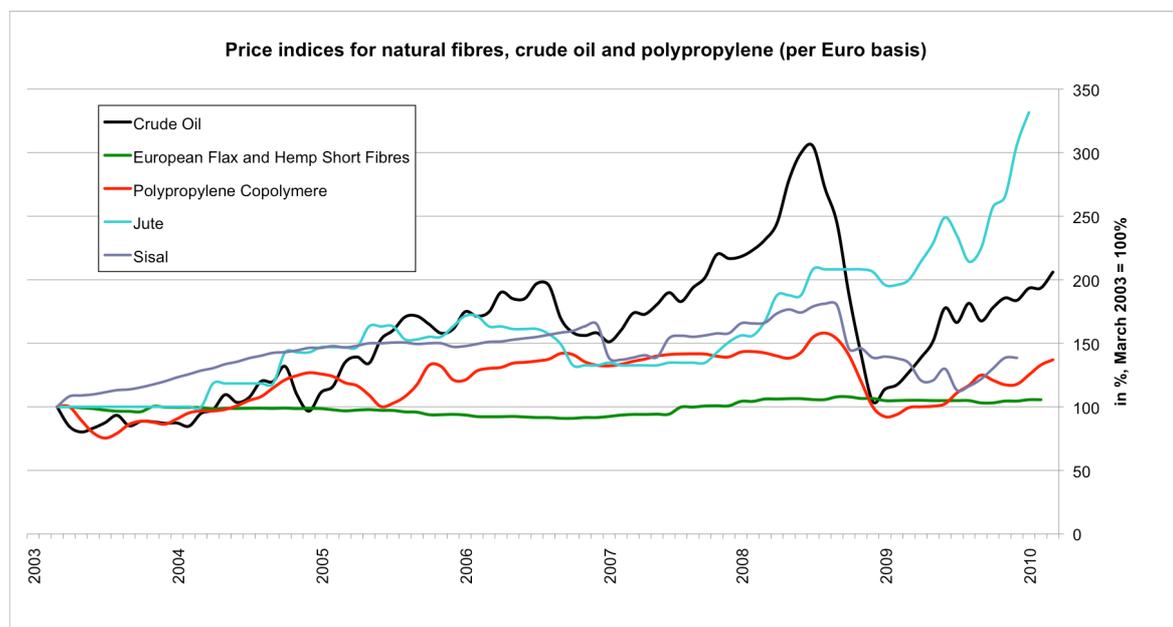
The second road to success are hemp insulation materials of which about 3,000 to 4,000 tons are produced annually and put on the market in the EU. The most important manufacturers and users are Germany, France and Great Britain respectively. The hemp insulation material properties are very good and appreciated 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.

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. 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 Group 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 tows and harvest 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.**

**If you want to meet the leading European hemp fibre processors, please visit our exhibition areas at:**

- International Congress on Bio-based Plastics and Composites (www.biowerkstoff-kongress.de), HANNOVER MESSE (Germany), Hall 6, Market Place for Biomaterials, April 19<sup>th</sup> – 23<sup>th</sup> 2010.
- 7<sup>th</sup> International Conference of the European Industrial Hemp Association (EIHA), Wesseling (near Cologne, Germany), May 26<sup>th</sup> – 27<sup>th</sup> 2010 (www.eiha.org/conf7/).
- Zweiter Deutscher Elektro-Mobil Kongress, Bonn (Germany), June 17<sup>th</sup> – 18<sup>th</sup> 2010 (www.e-mobil-kongress.de).

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