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Hemp: The green solution for our plastic addiction

By: Thatcher Michelsen in Raw Materials from Hemp November 11, 2017 0 6,405 views



People are addicted to plastic in a scary way - and it's getting worse and worse. In the US, only 14% of the plastic is collected and only 5% is currently recycled, so 95% of the plastic waste falls into the disposable system and ends up in the landfill, or worse, in the ocean. As the Ellen MacArthur Foundation noted, by the year 2050, more plastic will be swimming in the oceans than fish should not change soon. This, of course, is a catastrophic situation that urgently calls for affordable and scalable solutions. Attempts to reduce the use of plastic and strengthen recycling programs will only to some extent master the situation. What we urgently need is a redesign of the system and a fundamental shift in the raw materials used throughout the plastic production.

As it turns out, hemp luckily has what it takes to meet this call for change. Hemp oil, lignin, hemp fibers and shives are not only incredibly versatile, but can also be produced exceptionally cheap as profitable. These impressive hemp raw materials can be used to make thousands of different products, such as bioplastic, biopolymer or biocomposite. With hemp not being commercially grown in the US for more than 78 years, current trends towards legalizing the cultivation of commercial hemp have created new economic opportunities for this versatile plant. However, for hemp to be as beneficial to the environmental impact as it is capable of, it still needs full legalization at the federal level, as well as government subsidies and investment to spur new growth.

Hemp fiber plastics will replace fractions of petroleum-based plastics in the future, although there are signs that the big companies are changing completely, as hemp fiber plastics are not only stronger, they are also lighter and pollutant-free. Car manufacturers such as BMW and

Mercedes Benz are currently using hemp-based bioplastics for the insulation of door panels and the interior. In the new BMW i3 hemp was used to increase performance, on the one hand to save weight and on the other hand to meet aesthetic design requirements. Designer Benoit Jacob believes the use of natural materials such as hemp will give the interior of the i3 an ambience as in "a small loft on wheels". Thankfully, these two automakers are not among the only companies that rely on hemp-based biomaterials. Besides them, there are a variety of exciting start-ups who take the opportunity to do environmental protection and at the same time make profits from it.



This article will provide insight into the current corporate landscape of hemp fiber bioplastics and biomaterials in North America.

A young company called c2renew, based in Fargo, North Dakota, is developing performance-oriented biocomposite materials that offer a green alternative at stable prices. Because of their great expertise in biomaterials, they are filling a niche in the field of industrial composites, which is unique considering how much space the company has in the supply chain. Having started to make bespoke biocomposite plastic parts for large companies such as John Deere, Bobcat, Appareo and Toshiba, they initially had to realize that these big companies were basically just value for their cost competitiveness; but now that they too trust themselves to change and pay more attention to the subject of sustainability, ecological added value is just as important to them.

Appreciation of sustainability is something that innovative and responsible smaller companies and start-ups not only live, but also help them make a breakthrough. For example, Earthkind, an

emerging brand selling all sorts of natural air fresheners and insect repellents, sought help from c2renew to produce a high performance and attractive biocomposite plastic product. Another example of a startup working with c2renew is a company called 3DFUEL that produces filaments for 3-D printers. Together, they created three types of bioplastic filament types: "Entwined" from hemp, "Wound up" from coffee waste and "Buzzed" from brewery waste.

A Texas-based company called Greenspring Technologies is using this hemp bioplastic "Entwined" filament to make company pens and other gadgets such as guitar tiles. Owner Mark Linday says they have already begun to mold the hemp plastic pens and that one of their pens was recently used to sign the new hemp law in Pennsylvania.

The co-founder and CTO of c2renew, dr. Chad Ulven, an adjunct professor at North Dakota State University, is a researcher at the Center for Sustainable Materials Science - a research approach at NDSU funded by the National Science Foundation for five years. The main strategic goal is to develop and introduce a transformative approach to the development of sustainable materials derived from agricultural materials to replace petrochemical polymer materials in everyday use. It is a large group of scientists from agriculture, chemistry, engineering and other fields.

Materials research and standardization of production are important first steps in the bioplastics revolution. It is clear that it will be the younger generation of entrepreneurs who will bring these products to market, such as the recent graduates of the Leeds School of Business at the University of Colorado and founders of Sana Packaging, James Eichner and Ron Basak-Smith , Less than a year ago, the young entrepreneurs started their hemp plastics packaging company as a university project during their studies. But soon they were inducted into the Canopy Boulder Accelerator Program. Having successfully completed the university and accelerator programs at the same time in May 2017, they have been working full-time to drive their business forward. Sana Packaging focuses on the production of attractive, environmentally friendly and secure packaging solutions for the medical cannabis market and for recreational use of cannabis. In this market niche, the two are by far the market leaders. They are convinced that this position will help them to reinvest and expand into other markets in the future.

Sunstrand, another technically advanced biomaterial company, is doing impressive work in Louisville, Kentucky. Sunstrand is the premium provider of biomaterials for engineering applications in the US. CEO Trey Riddle and his team claim to have perfected the industrial process for removing the bark, or to provide the best decortication equipment for separating hemp shives and fibers. They also carry out additional processes to meet the material-specific manufacturer specifications. Sunstrand supplies upstream manufacturers in the field of product design.

Sunstrand's products and processes are designed to consistently deliver high quality materials that are compatible with a wide variety of applications. Their focus is on mass-producing raw materials for plastic, polymer materials and nonwovens manufacturing industries. By purchasing their materials locally and creating innovative processing technologies, they enable producers to bring powerful, attractive and sustainable products to market. Sunstrand was not thought to be able to replace traditional materials at some point.

Sunstrand is currently working on a pilot project: a processing machine that holds 3,000 tonnes

a year. However, it is planned to build processing plants for 22,000 tons annually on an industrial scale in the future.

Perhaps the most technologically advanced bioprocessing company in the US, PureVision Technology, Inc. is a 24-year, biorefinery technology company that has founded PureHemp, Inc.'s exclusive global processing technology and market rights for the production of hemp-based raw materials and products. PureHemp has already tested its invention of a continuous countercurrent reactor, the "CCR" technology, in a pilot project that delivered extremely pleasing results. It is planned to produce a four-tonne CCR on a manageable commercial scale before the end of 2018 or the beginning of 2019 with the construction of a 40-ton CCR per day. The use of PureHemp's CCR technology will bring significant value to the emerging industry, as it enables them to use the entirety of the hemp plant for the production of hemp-based products. PureHemp CCR technology can be used to produce traditional, new hemp products, especially pulp, lignin, sugar and extracts.

Hemp can even be used in the future for the production of materials that go beyond plastics, polymer and composites. Scientists in NYC and elsewhere have already successfully used hemp in the production of alternatives for graphene carbon nanotubes, which they call HempPhene. Depending on how HempPhene is produced, it has the property of being 100 times stronger and 1,000 times lighter than steel. But the most intriguing thing is that HempPhene can be produced for a fraction of the cost of producing graphene manually, as the plant does most of the work for us. It is quite possible that we will soon find forward-looking infrastructure based on HempPhene: bridges, skyscrapers and much more could then be hemp.

In summary, it's fun to imagine a future in which plastic is no longer bad. But if we want to live in such a reality, as consumers we not only have to demand but also expect and support the uptake and distribution of hemp-based bioplastic. There is an opportunity to shift industry's pathways and even use the economy to protect the environment rather than destroying it.

By Thatcher Michelsen, founder of EatMoreHemp and Hemp3D