



eco-innovation
WHEN BUSINESS MEETS THE ENVIRONMENT

CIP Eco-innovation

Pilot and market replication projects

Call 2012

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KRAHN

ENEA

Agenzia nazionale per le nuove tecnologie,
l'energia e lo sviluppo economico sostenibile



elluComp
sustainable materials



Co-funded by the Eco-innovation
Initiative of the European Union

EcoAdd

Converting Vegetable Waste Streams into High Valued
Additives for Paints & Coatings



CURRAN®: AN ADDITIVE MADE FROM NANO CELLULOSE AND DERIVED FROM VEGETABLE WASTE STREAMS SUCH AS CARROTS AND SUGAR BEET.

CelluComp discovered an environmental-friendly way of creating a value-add product from vegetables waste streams. The product, Curran®, is designed to enhance products such as paints.

This project aimed to deliver high volume, high value, sustainable materials made from the nano-cellulose fibres of root vegetables and plant waste streams. The aqueous based processes involved in the production of these materials deliver minimal environmental impact at affordable cost. The resultant nano-cellulose materials offer distinct advantages over competing products in terms of both environmental and performance characteristics. Available in a variety of forms these materials may be used as strengtheners and thickeners - principally in paints & coatings - as well as in other potential markets such as concrete, drilling fluids, paper, composites, personal care, home care and food. CelluComp's main objective for the project was to team up with its consortium partners and penetrate the paints and coatings

market. Prior to the start of the project, CelluComp had developed a patented material, Curran®, via a patented process to extract nano-cellulose fibres from carrot waste streams only. At that time, there was no penetration in the market at all and carrot waste streams were not ideal for scaling the process up.

CelluComp and its partners, Tennants Distribution, Krahn Chemie and ENEA managed to obtain their objectives. By the end of the project, CelluComp converted its feedstock from carrot to sugar beet (allowing for larger volumes and easy to handle dry feedstock), and proved Curran®'s competitive value in paints, scaled up production, expanded business development, began to commercialize its product and completed a lifecycle analysis.

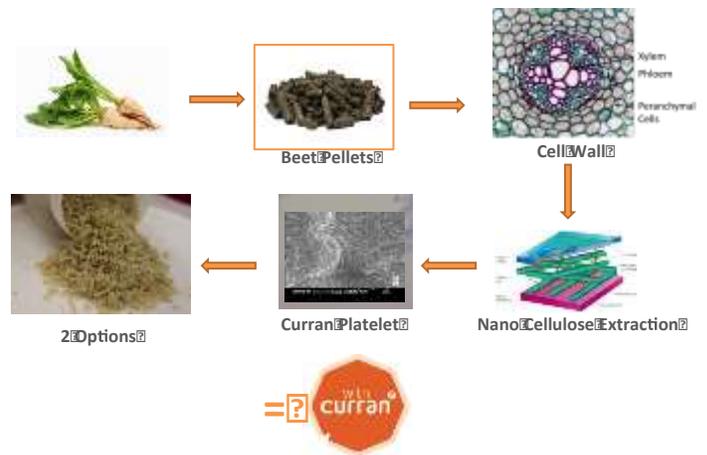


One of the primary initiatives of the project was to design and build a fully-functioning manufacturing facility to make Curran®

CURRAN® IS A “FIRST OF ITS KIND” PRODUCT

Curran® is made by extracting the very strong nano fibres from the cell wall structure of sugar beet pulp (a co-product of the sugar industry). Curran® therefore does not compete for land with food and is entirely natural. A light chemical and enzymatic process to extract Curran makes it environmentally-friendly. The Project has allowed this process and scale-up to happen.

The Curran Product



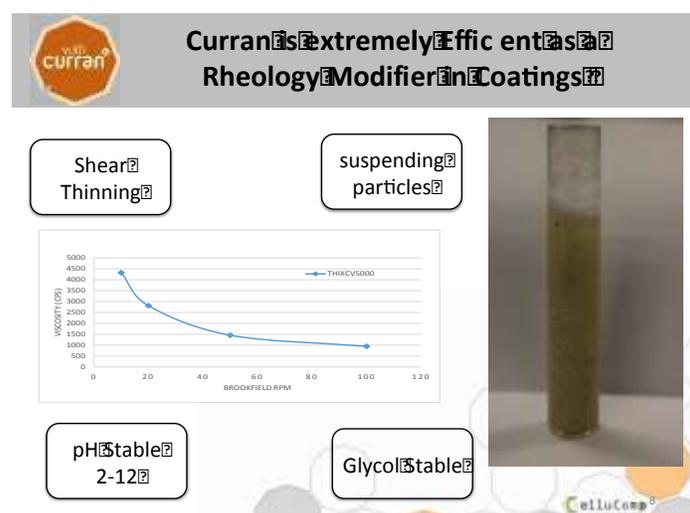
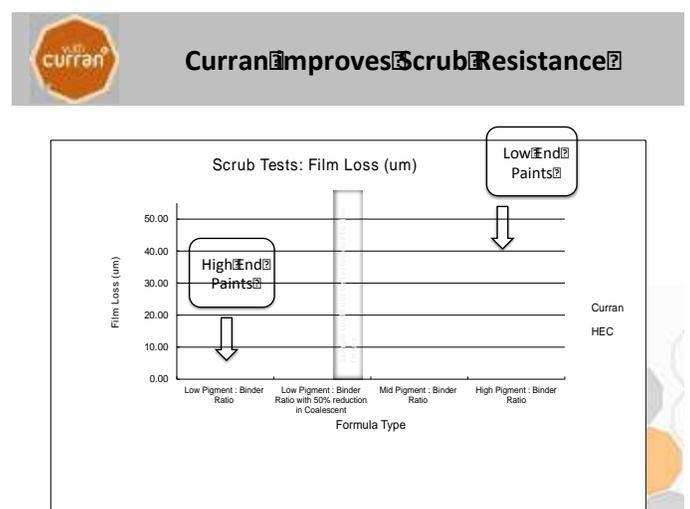
At the beginning of the project, CelluComp had a beta product made from carrots. By the time the project was over, a finalized product from beets was produced with consistency and customers working with the consortium helped validate the product performance.

One of the first tasks in the project was to figure out what Curran® could bring to a paint manufacturer. In other words, what cost-performance benefits would convince technicians and purchasers to want to buy Curran for their formulations. The consortium immediately set out to make Curran® from sugar beet pulp in order to validate a product that was going to be used at scale. The consortium hired additional sales staff, conducted multiple formulations and tests with Curran (in the CelluComp lab, in the Krahn lab and at customer labs). The results from these multiple tests concluded that Curran® brought several key elements to paint formulations.

Not only is Curran® a zero VOC product and environmentally friendly (huge drivers for the paint industry) but it became very clear, very quickly that Curran was an excellent product to help improve key mechanical properties in paint formulations. The first was helping paint companies eliminate mud-cracking. Traditionally, the only way paint manufacturers could avoid mud-cracking would be to load more resins or coalescents into a paint, which is not considered environmentally friendly. However, Curran® brings a “green” mud-cracking solution with very low loadings, as low as 0.2% of the formulation being added.

In addition, Curran® proved to be excellent at helping improve scrub resistance in paints. This is an especially valuable attribute to interior house paints. Again, with small doses of Curran®, other elements in the paint can be reduced which improves the overall performance.

Finally, the hours of experiments have proven that, when formulated properly, Curran® can bring rheological or viscosity advantages to a paint, such as shear thinning, stability in many situations and particle suspension. Curran® proved to be a good product for sag resistance and other application attributes, such as spatter resistance, open time and thick-layer applications.



Curran® is tested by over 200 companies with an active business development programme.

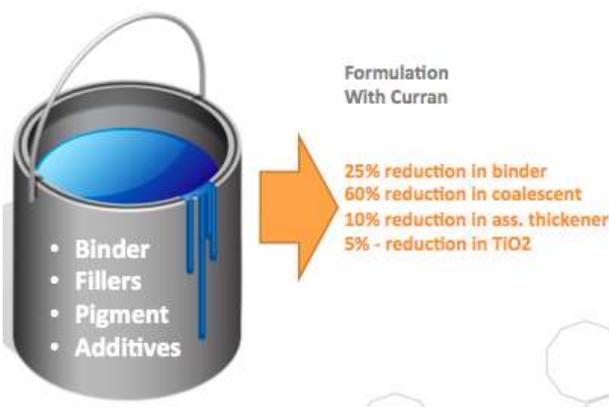
A key project initiative was to make sure that Curran® could get in front of multiple paint companies to assess the validity of the product in a multitude of different formulae.

Given the industry is conservative and that formulae vary from company to company, the project team had to learn about how best to penetrate the market. Because Curran® is a new product, Krahn and CelluComp had to invest time in formulation work to highlight to technicians what the value of Curran® was in their formulations. CelluComp acquired additional lab equipment, invested in technicians and worked with third-party technicians to get the job done.

Paint companies require months of tests in the lab, scale-up success. Tests must be completed for paint application and long term weathering. Every step along the way is a requirement that takes time and could lead to a new series of questions and hurdles. Despite this, CelluComp, Tennants and Krahn managed to reach close to 200 companies and begin work with them. This is an incredible success story. Whilst customers have not converted to commercial transaction in great numbers, developments and progress is solid. In addition, Curran® has now been sold to several small customers in Europe and is close to being accepted with other large corporations in the EMEA region. One of the highlight projects is the acceptance of Whitson's paints to not only incorporate Curran® in their formula, but to also market Curran® on their label and using Curran® as a key marketing point of difference. Another company, Chemi Paints, has used Curran® in putty formulations.



Curran® in new eco-friendly paint range



By Adding Curran® Paints Become More Eco-Friendly

Just a 0.25% loading of Curran® can help reduce Volatile Organic Compounds, Oil-based products and other unsustainable materials

ENVIRONMENTAL BENEFITS OF CURRAN® THROUGH LIFE CYCLE ANALYSIS

Life Cycle Assessment (LCA) is a holistic approach used to quantify the potential environmental impacts of a product or activity throughout its life cycle—from raw material and resource extraction to manufacture, consumer use, and end of life. Results from LCA studies can be used to inform decisions at many levels, including design considerations, corporate strategy, and policy.

Why LCA matters?

Life cycle thinking is a mindset we need to embed in our innovative chemistry and materials product development. Rigorous tools such as product life cycle assessment (LCA) are vital to generate insights and promote a more holistic understanding of the environmental benefits, burdens, and trade-offs of competing solutions. This is the way to make balanced choices that are critical to both current and future generations. As a solution provider, CelluComp is an enabler of improved sustainability across value chains, and fully embrace this role.



CelluComp with ENEA have completed cradle-to-gate analysis for Curran® in compliance with the data quality requirements defined in ISO 14040:2006 and ISO 14044:2006. This effort reflects CelluComp's ambitions to improve and facilitate environmental impact assessments and decision-making for companies using Curran®

LCA (Cradle-to-Cradle) on final products:

However, the most important aspect of the LCA is to consider the performance of the final product when used. For instance, the CO₂ footprint of an additive from a natural source can significantly improve the performance of the final product compared to an additive from a synthetic source.

As far as the comparison with a traditional product is concerned, given that there is not a one-to-one substitution of Curran® with the products available on the market, a putty formulation has been considered as reference for the comparison. The two analysed putty formulations pointed out that the one with Curran® has lower results for all the impact categories.

One of the Key Components for Building the Curran Business was to get the word out that Curran existed. This was done through Conferences, Trade Shows and Press.

Curran® and the project were promoted extensively. Outside of the Project website, CelluComp and the rest of the consortium were present in the market. All parties participate in the 2013 and 2015 European Coating Show (held in Germany), the largest coating show in the world where buyers come to source their product. In addition, Curran® was promoted at the largest UK coating show, Surfex and Curran was also shown in Poland and France, which was the host of Eurocoat.

CelluComp was also extremely present in many conferences focusing on the bio based industries. Project leaders spoke at conferences such as EFIB (held both in Glasgow and Reims), attended and spoke at Bio Based World, participated in Biobased Chemicals Conference in the USA (through its association with IBioIC) and other smaller events. These conferences were an excellent way to bring visibility to the development of Curran®.



Sugar beet waste product could be billion dollar 'wonder material'

Wednesday, September 16, 2015 - 02:16

A natural material made from sugar beet waste to thicken paints, bulk out food, and potentially even manufacture airplane wings has been devised by Scottish scientists. Jim Drury reports.



The Telegraph

HOME » FINANCE » BUSINESS CLUB

The UK's latest 'wonder material' is made from sugar beet

A Scottish start-up is turning root vegetables into an ingenious new material, which can be used to lock moisture into anything from food to cosmetics to concrete

Getting attention from the press was also important. In particular, the Curran® product was promoted in the Telegraph with a fabulous article promoting the virtue of Curran®. Reuters came to Scotland to film in the manufacturing facility and syndicated the film world-wide, which led to more contacts. National Geographic did a feature on Curran®, which was picked up as far as Russia and CelluComp gained additional press from the opening of its manufacturing facility in Scotland



Jobs were Added

Over the course of the project, the team at CelluComp went from just 5 people to 16. Areas of increased personnel were in business development, Research and Development and manufacturing. CelluComp now has staff in 2 locations in Scotland and in France.



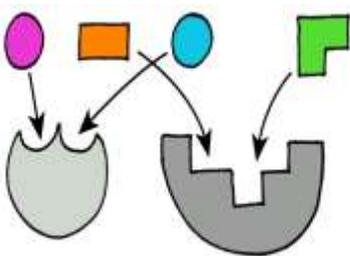
Lifecycle Analysis was Completed

EANA was able to complete a lifecycle analysis of the manufacturing of the product and the positive impact Curran® had on paint. Specifically, Curran has a positive impact on the final formulation because by adding a small dose of Curran to a paint, the manufacturer can eliminate other elements in the paint that do not have a positive contribution to sustainability.



Water Recycling Proved Possible

Whilst the process to make Curran uses quite a bit of water, the good news is that during the project, the team discovered efficient and cost-effective means to recycle the water. In addition, it is likely that when a much larger manufacturing facility is built in the future, the Curran process will be able to accept waste water runoff from other manufacturing processes, thus creating a water-friendly process



Enzymes to Produce Curran®

Even though Curran® is principally produced using a chemical process, during the project, the team successfully proved that an efficient enzyme process was possible to produce Curran®. This is encouraging for future developments of Curran®.



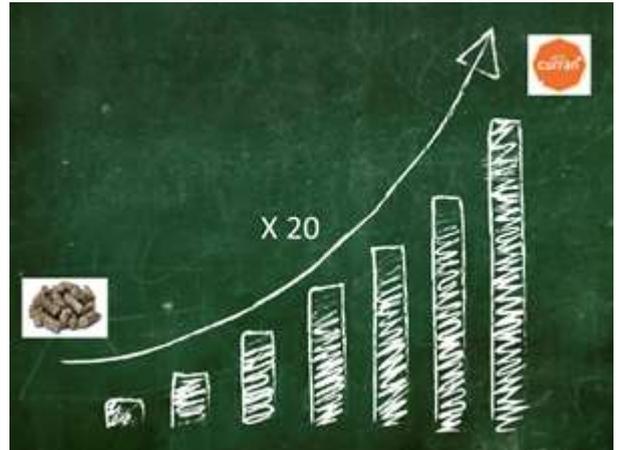
Additional European Benefit & Market Reach

Even though the project team concentrated on only 4 European countries, the reach of the project included many more countries in Europe. Distribution deals landed in the Netherlands, Spain, Portugal, and France to sell Curran®. The CelluComp team also added customers in Scandinavia, Belgium, and others. Curran® was proven to be technically viable in other markets such as pulp & paper, personal care, home care and food. All this builds a beneficial opportunity for Europe with the Curran® product.

Next Steps

Increased Production

CelluComp are working on the scale-up of the manufacturing capacity with a 20X increase in capacity planned.



New Applications

CelluComp will continue with the commercialisation of Curran® in the paints and coatings market and to work with partners on new application markets.



Concrete



Composites



Coatings



Oil



Food



Personal Care



Home Care



Paper/Packaging



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