



The carbon footprint in leather chemicals

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Climate change continues to be one of the greatest challenges facing nations, businesses and citizens, and will influence the way we live and work in future decades. Past and current actions, including the release of carbon dioxide (CO₂) and other greenhouse gases through anthropogenic or human activities such as the burning of fossil fuels, emissions from industrial processes and other sources of greenhouse gases, will have an effect on the future global climate.

While carbon dioxide occurs naturally, it is the most common of the man-made greenhouse gases and is believed to be a significant contributor to global warming. It is not easy for the customer or consumer to know the true value of a product, and specifically the environmental impact. This is in terms of its carbon footprint value, water consumption, resources and harmful substances.

The Life Cycle Assessment approach

The leather market is large and complex and over the years Silvateam has conducted a Life Cycle Assessment (LCA) of its main tanning agents, as vegetable extracts for tanning and retanning, and synthetic tannins. The main goals were to support tanneries with scientific data on the carbon footprint (CFP) and to continuously improve its processes and reduce its environmental impact.

The company is the first leather chemical company certifying the carbon footprint value expressed as kg CO₂e per kg product analysed. The methodology of calculation used are in accordance with ISO 14025:2010 Environmental labels and declarations - Type III environmental declarations - Principles and procedures. LCA and quantification of key environmental indicators were evaluated too.

First, the procedure for the definition of environmental Product Category Rules was established to calculate the carbon footprint for leather chemicals. These product category rules will need to be applied in the future for LCA calculations for leather chemicals within this system.

Second, a cradle-to-grave approach was applied. Site-specific data was collected for all individual processes under the financial or operational control of the organisation. This data was representative of the production processes. Production of raw materials and precursors at supplier facilities were considered too. Main results of this calculation show that:

- Natural tannins, such as chestnut, have a much lower impact compared to other products based on petrochemicals.
- Powder products are higher in carbon footprint than the corresponding liquid products, as spray drying process is energy intensive.

For example, Ritan XCR, a new generation of chestnut extract that has recently been developed, presents a much lower carbon footprint compared to synthetic tannins. This is illustrated in *Panel 1* where basic chromium sulphate is used as reference.

Because of its high solubility and excellent dispersion, Ritan XCR penetrates quickly and throughout the section of the leather during retanning, giving a very fine and elastic grain, good fullness and roundness.

Bio-energy: a major step towards a lower carbon footprint value

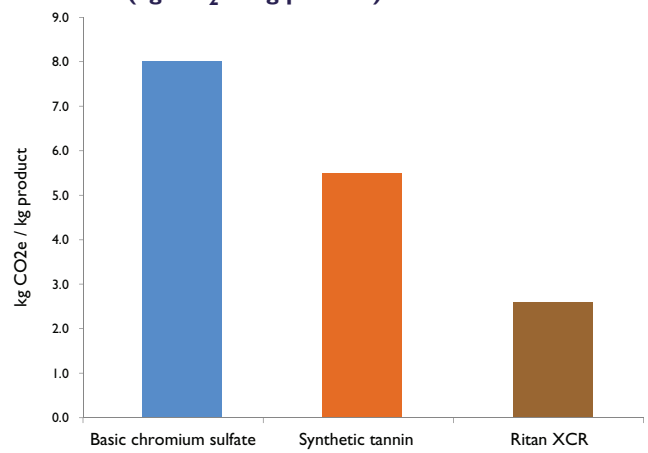
The processing of chestnut wood to produce vegetable extracts is energy intensive, both in terms of electricity and steam consumption. On the other hand, the production of synthetic tannins shows high CFP values mainly due to the raw materials used.

However, it is possible to directly reduce the energy input in these operations. Accordingly, Silvateam is reducing its energy impact by the construction of a biomass power station of 20Mw capacity.

This project is possible because 100,000 tonnes of chestnut timber per year is used for the extraction of chestnut tannin, and wood residues remain. These will be burnt to produce steam and



Panel I: The carbon footprint of different leather chemicals (kg CO₂e / kg product)



thus to provide electricity and heat for internal use, being the most efficient method of capturing the energy contained within the residual chestnut biomass. This use of renewable energy rather than fossil fuels will reduce to almost half the carbon footprint of Silvateam chemical products.

It is noted that this chestnut timber is obtained from an area within a radius of 70 km around the headquarters of the company. The transport distances are short, and the local forest produces ten times more biomass due to its spontaneous growth compared to the amount harvested by Silvateam.

The advantage of vegetable tannins

Another important aspect in the production of chestnut tannin is biogenic carbon. The uptake of carbon dioxide from the atmosphere during the photosynthesis process is a unique feature of biomass. This transformation of chestnut wood biomass (and its embodied biogenic or carbon produced by living organisms) into tannin represents in effect a removal of CO₂, via its continued storage in the product over a period of time.

In practice, the tannin held inside leather actively sequesters the plants carbon dioxide from the atmosphere. It then keeps it separated as long as the leather is not incinerated or decomposed.

Specifically, The International Reference Life Cycle Data System (ILCD) handbook proposes a 100-year assessment period for carbon storage in products. This is consistent with the use of 100-year Global Warming Potential (GWP).

There is historical evidence to support that a leather article will remain stable for more than 100 years in a given product use or end-of-life scenario. In this event the carbon embodied in the leather can be considered sequestered permanently. Egyptian vegetable tanned sandals or Roman belts are typical examples of articles still present in different museums around the world.

The use of vegetable extracts will make it possible to store biogenic carbon into the finished leather articles. No biogenic carbon can be stored using other chemicals, but tannins are bio-based products, and these can contribute in the reduction of CO₂ levels in the atmosphere and address issues of global warming. ☺

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