



Figure 1: Quebracho, chestnut and tara tannins (from right to left).

Tannins: a sustainable solution

In the first of two articles, Italian chemicals manufacturer Silvateam offers insight into sources of sustainable tannins from areas of Italy and South America. The second article will contain information about its use of quebracho from Argentina and tara from Peru. This paper focuses on its efforts to source chestnut tannins from Italy in a manner that respects the environment while also supporting the economic growth of local rural areas.

Chestnut forest coppicing and its management

The sweet chestnut tree (*Castanea sativa*) is widespread in countries around the Mediterranean basin, a region where it grows at an altitude of between 500 and 1,000 metres above sea level. It defines hillside landscapes and mountains of medium-height in entire regions, characterising the phytoclimatic area known by the Romans as Castanetum, the Latin for “chestnut forest”. The tree grows rapidly and reaches its maximum size at 50 years of age, although it can live for more than a thousand years. Considering the scope of the chestnut forest and its vitality and longevity, chestnut trees are one of the most important characters in Italian woodland management, covering almost one-quarter of the total forestry surface.

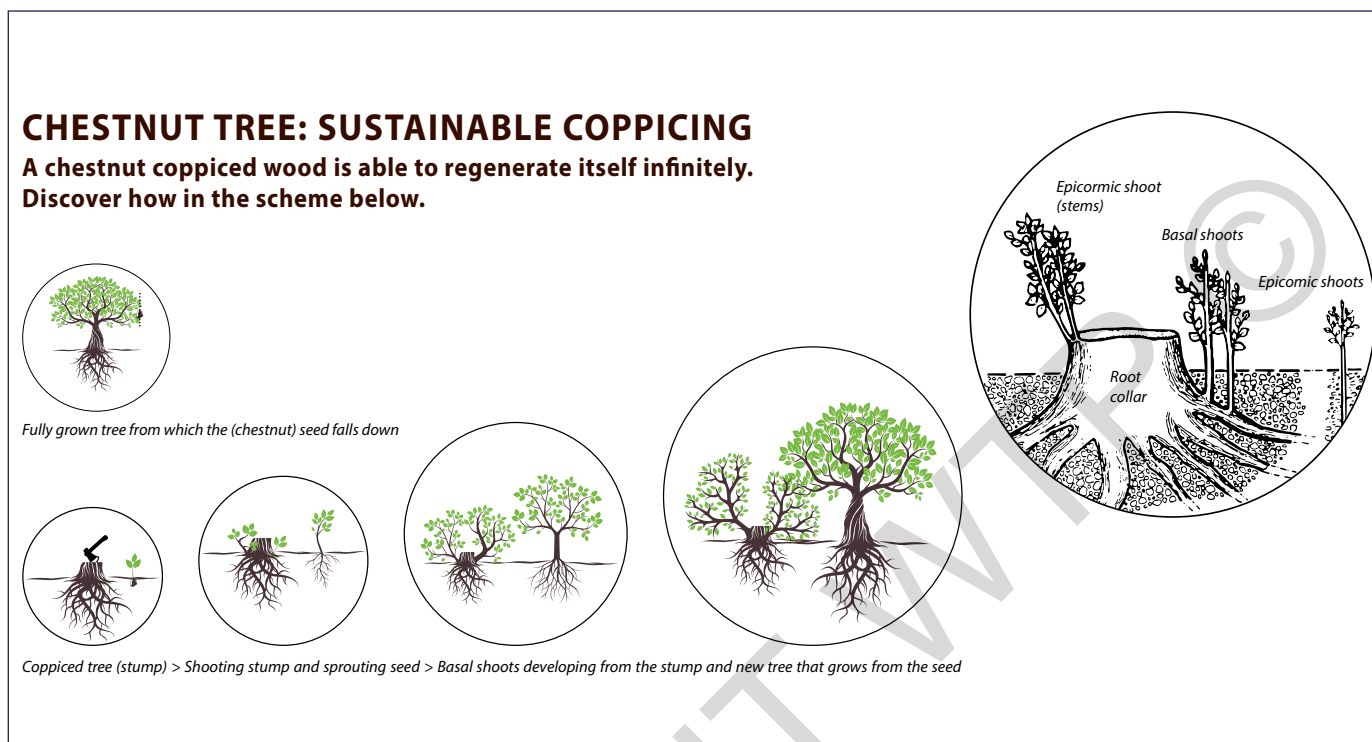
The chestnut tree is a species with a high regenerative capacity and is suitable for coppicing. After being harvested, the forest vigorously renews itself naturally. The cutting of a tree, unlike for many species, does not mean having to plant another tree in order to avoid deforestation. Chestnut coppice forestry management ensures a uniform coverage of the soil, maintains vital and developing root systems and avoids the overturning and breakage of old trees, all without overloading the soil and preventing hydro-ecological instability. Importantly, it does not affect or reduce the chestnut presence in the forest as it allows the continued cultivation of the forest under sustainable conditions and in accordance with forestry and environmental regulations.



Figure 2: Chestnut forest in southern Piedmont (Italy).



Figure 3: Chestnut tree natural propagation methods.



Synergy with the chestnut forest

The main supply of chestnut timber (75-80%) for the production of Silvateam's tannins comes from an area within a radius of 70 kilometres of San Michele Mondovì, where the company has its headquarters. This area includes part of the southern Piedmont region and the whole western Liguria region. The rest of the timber comes from the Tuscan-Emilian Apennine mountain range and from Lombardy. Although Silvateam likes being able to offer 'Made in Italy' tannins to leather producers focused on the country's high-end fashion, furniture and automotive brands, it has no intention of over-exploiting the resources on its doorstep.

To appreciate the sustainability of the tannin, it is important to emphasise that the estimate of the growing stock that can be harvested annually from the Silvateam basin is equal to 950,000 tonnes, according to the 'Survey on the Environmental Sustainability of Tannin from Chestnut Wood'. This a survey carried out by Giorgio Colombo in 2015 and the estimate is based on the planning criteria set out by the Territorial and Forestry Plan of the Piedmont region.

The planning criterion is based on the 'regrowth' rate, that is to say the annual volume increase of the forest and the stock that can be harvested without impacting the environment. In other words, the amount of chestnut timber that can be cut in a sustainable way per year within a district is equal to the increase in volume per year of all chestnut forests in that specific district.

The Silvateam's own chestnut timber is about 100,000 tonnes per year, a tenth of the available annual resource in its natural and main supply area (Piedmont and Liguria regions). Therefore, even in the case of a production increase, the process will still be highly sustainable. Moreover, all these areas are managed in full compliance with the forestry regulations for sustainability.

Promoting mountain economies

An old and symbiotic relationship binds the past and future of the tannin industry to the socio-economic history of many mountain provinces of northern and central Italy. The chestnut tree is valued for both its fruit and lumber. In fact, the chestnut has been an important source of food for mountain communities for centuries, while the development of these local economies is the result of the use of the wood as fuel and the raw material for the production of furniture, musical instruments, caskets, crates and, of course, tannin for leather tanning and for the natural dyeing of silk fabrics.

Although cultivation has progressively decreased in importance and many people have moved away from mountain areas, chestnut wood is and will always be an important forestry resource, due to its broad territorial distribution as well as its irreplaceable environmental and economic role. Together with the fruit production, the wood production, encouraged by the tannin industry, is essential for the economic growth of the area and the preservation of the local ecosystems. In fact, if chestnut trees are not cut every 20 years, as their natural cycle demands, they become rotten and eventually die.

In the leather sector, chestnut extracts are traditionally a key ingredient in the production of sole leather. Using these

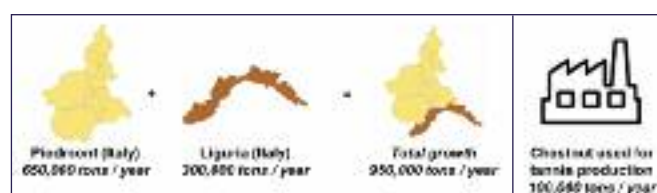


Figure 4: Chestnut wood availability and its usage for the tannin extraction in Italy.



Figure 5: Roasted chestnuts.

tannins, it is possible to obtain a leather with high weight yield, which is also compact, firm, flexible and waterproof. Chestnut-tanned leathers are elastic, lightfast, resistant to abrasion and are characterised by a natural touch and colour. Chestnut tannins are also used for the retanning of chrome-free leathers for a wide range of articles, to which they impart excellent fullness, roundness and light fastness.

Tannin extraction

The chestnut tannin is extracted from trees that are 20-40 years of age. The trunks are delivered to the extraction facility and are stocked in a yard for three to six months before extraction commences. The wood is debarked, reduced to chips and loaded into a battery of extractors, containing circulating hot water under pressure. The extract, after some purification steps, is concentrated to about 50% of dry matter. This concentrate is standardised in the tannin titre and is subsequently conveyed to a spray dryer to turn it into a powder. The process is very simple and effective, designed to extract the best molecules from nature.

The Life Cycle Assessment Approach

In recent years, Silvateam has conducted a Life Cycle Assessment (LCA) of its main vegetable extracts for tanning and retanning. The main goals were to support tanneries with scientific data on their carbon footprint and to continuously improve its processes and reduce its environmental impact. It is also the first leather chemical company to certify the carbon footprint value, expressed as the number of kilogrammes of carbon dioxide emissions (CO₂e) per kilogramme of product analysed.

Key environmental indicators were also evaluated. The methodology of calculation is in accordance with ISO 14025:2010 – environmental labels and declarations. Type III environmental declarations.

Principles and procedures

First, Silvateam established the procedure for defining

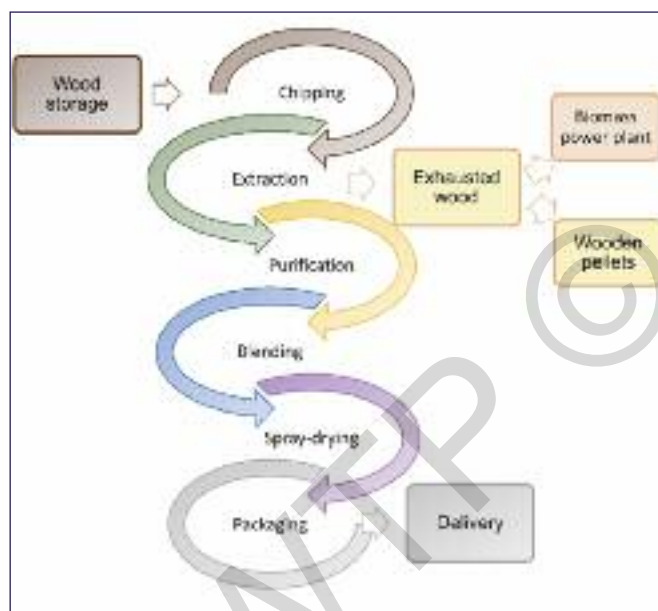


Figure 6: Chestnut and quebracho extraction process.

the environmental Product Category Rules (PCR) to calculate the carbon footprint of leather chemicals. These product category rules will need to be applied in all future LCA calculations for leather chemicals within the Environmental Produce Declarations (EPD) system. Second, a cradle-to-gate analysis was performed. 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 and also considered the steps prior to raw material sourcing.

Silvateam is a family-owned business that has been active since 1854 and a market leader in the production of tannins, including chestnut, quebracho and tara. The company extracts the most beneficial natural molecules to deliver high-performance products based on the biochemistry of plants. It is committed to making a real difference by switching from synthetic to natural chemistry, thereby restoring nature's balance, which is threatened by excessive human exploitation.

With its headquarters in San Michele Mondovì, the company employs more than 800 people across its manufacturing plants and facilities in Europe, the Americas and Asia. Strategically located between the Alps and the sea of nearby Liguria, this was the birthplace of the Italian chestnut tannin extraction industry.

It is also mindful of the needs and well-being of the people who live in the communities close to the forests and plantations from which the plants originate. Respect for the environment is key, achieved by complying with local forestry management systems, maintaining the natural habitat, preventing any environmental hazard or deforestation due to intensive agriculture, and lowering the environmental impact throughout the production process.