

# AGROFORESTRY CONTRIBUTES TO CIRCULAR BIOECONOMY

The potential of bio-based products generated in agroforestry farms



## THE WHAT AND WHY

### How can a farm contribute to circular bioeconomy?

Economic growth has usually been at the expense of the environment. The need to change our development to a more sustainable economic model, makes bioeconomy to be part of the solution to address some of the most eminent European and global challenges: climate change, biodiversity loss, forest fires, the ocean plastic... Furthermore generating less residues across the value chain and recycling those still produced is also key to

close the cycle and conform the circular bioeconomy. Given that most products derived from fossil fuels can be obtained from biomass, either woody or other plant species, the opportunities for agroforestry are manifold. Agroforestry is known for the diversification of products that can be obtained in an integrative way in the same land unit, providing a great variety of raw materials that may be transformed into bio-based products.



Wool in different colors.  
Sampo Luukainen



Wood chip for energy  
Francisco Braga

## HOW IS THE CHALLENGE ADDRESSED

### Which bio-based products can be produced in agroforestry systems?

#### Tree and shrub products

Activities like pruning or felling produce biomass that can be used as fuel (pellets, biochar), soil amendment, compost or mulching material. Trees provide timber for construction, but also wood-based textile fibres (lyocell, ioncell). Trees like birch and mapple provide sap as drink or sweetener. Juice can also be made from spruce needles. Alternative uses of cork are insulation and floors, in transport vehicles and the aerospace industry.

#### Livestock products

It is possible to make textile fibres from powdered milk. Other by-products from livestock are wool, used for textiles or insulation materials, bone meal as crop fertilizer, or manure as mulch, fertilizer or biofuel. Dairy whey can have several uses as lactic acid in probiotics, green solvent,

natural preservative, biostimulant and in bioplastics and personal care products.

#### Crop products

Many fibre rich crops are now used as a source of carbon fibre for cars, planes, tennis rackets, wind turbine blades. Maize, wheat, sugarcane, sorghum can be used to generate bioethanol and biodiesel. Agricultural by-products can be converted into biogas and biochar, they can be used to produce bioplastics for packaging, cutlery, plates, or even toys. Sugar beet pulp provides cellulose for personal care products or detergents and paints, arabinose for flavors. Cardum provides organic acids for lubricants and cosmetics, and can be used for energy and feed. Fruits and vegetables not reaching a commercial quality can be used for juices, jams or as food for snails.



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## HIGHLIGHTS

- Basically all items made from fossil fuels can also be made out of renewable materials.
- The European Bioeconomy Strategy answers to the challenges that Europe and the world are facing: increasing populations that must be fed, depletion of natural resources, impacts of environmental pressures and climate change.
- Farmers and agroforesters together with industry need to join forces for bio-products to become a reality.



Bioplastics made from rice.  
Adobe Stock

### FURTHER INFORMATION

The European Forest Institute has a leading role in developing a European Forest Bioeconomy. Watch the video 'The bioeconomy is the future'  
<https://www.youtube.com/watch?v=hrFQqW45Nn0>

You may find more information at EFI's Bioeconomy Unit  
<https://efi.int/bioeconomy>

The platform AllThings.Bio provides a wide range of biobased products  
<http://www.allthings.bio>

The European Bioeconomy Strategy  
<http://ec.europa.eu/research/bioeconomy/index.cfm?pg=policy&lib=strategy>

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## ADVANTAGES AND DISADVANTAGES

### The pros and cons

Given that industry and producers are always evolving and adapting to new circumstances and demands, there are bio-based products constantly being prototyped, tested and released to the market.

Some bio-based products are not new and have been used in the past (paints, dyes, solvents) until the industrial revolution brought cheaper and unsustainable alternatives. The advantage of producing bio-products is that they provide added value to the farming system, thus increasing farmer profits, whilst also contributing to global sustainable economic growth and to the sustainability of the planet by reducing the environmental impact and lowering greenhouse gases emissions. Biodegradable polymers for instance, could become an everyday reality in a few years, given the existing large amounts of waste in the agri-food chain.

A major concern to develop new products can be the lack of a nearby industry to produce such bio-products and so the demand of these resources from farmers. The lack of demand for materials is the main limitation to increase the number of bio-products originated from farms and so contributing to the bioeconomy and to the farm income. Once the production of bio-products become cost-effective for the industry, they are part of our economic growth. Therefore, policy funds should be directed to the establishment of systems based on bioeconomy, and to develop the needed socio-economic infrastructure to make them profitable.



watch video

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