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THE BIO ART GALLERY

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THE BIO ART GALLERY

The BioArt Gallery presents the most promising feedstock and its related bioeconomy applications in everyday life with 60 stunning pictures. It offers an innovative approach of showcasing to the public some examples of bio-based products and applications currently available in the market through several examples: cosmetics, nutraceutics, tissues, toys and sport, disposable tableware, cleaning products, gadgets, and much more.

BIOVOICES
CONNECTING BIO-BASED FORCES FOR A SUSTAINABLE WORLD

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TOMATO

Consisting mainly of water, tomatoes are rich in B-C-E vitamins, beta-carotene, potassium, folic acid, iron, phosphorus and calcium.

They also contain antioxidants such as lycopene that help to protect the skin from free radicals responsible for ageing and for many types of cancer. Agricultural tomato waste could be used to produce valuable functional ingredients as part of a sustainable strategy that uses innovative extraction methods to create new economic opportunities in the tomato's value chain.

Cosmetics from tomatoes

Tomatoes, particularly the peel, contain remarkable amounts of lycopene, which is the main ingredient responsible for the red colour of ripe tomatoes, having the highest antioxidant activity of all the carotenoids. For this reason, it is widely used in skincare products for its anti-ageing properties.

Pharmaceutical and nutraceutical compounds from tomatoes

Thanks to its antioxidant properties, lycopene can also play a significant role in preventing some diseases: dietary consumption of products rich in lycopene are reported to be associated with a decreased risk of chronic diseases such as cancer and various cardiovascular pathologies.

New functional foods from tomatoes

Functional foods are enriched with compounds with beneficial and healthy properties, such as polyphenols and carotenoids which can be found in high quantities in tomato by-products. A tomato powder can be prepared from by-products of tomato processing, i.e. peels and seeds, following dehydration. The powder, characterised by the presence of natural compounds with proven antioxidant properties such as lycopene and β-carotene, can be used as an added ingredient to be added to cheese, bread and other food products. The resulting product is therefore red-coloured and enriched in natural antioxidant compounds.

Pharmaceuticals and health applications from marine microalgae

There is a range of pharmaceutical products derived from algae. Algae provides an abundant source of bioactive compounds which have enormous potential to be used as pharmaceuticals. Algae are a rich and varied source of pharmacologically active natural products and nutraceuticals.

Restoration of artworks with marine microalgae

More natural materials are being used in the conservation of valuable artefacts over recent years. Natural materials are progressively replacing synthetic ones, meaning fewer invasive interventions on artworks are needed as well as reducing the impact this work has on operators and on the environment. The sea provides an extraordinary source of innovative products that can be tested in the field of cultural heritage. Different types of marine microalgae, for example, have been treated in the laboratory and used for the restoration of paper, wood, metal, and wall paintings.

Colours from marine microalgae

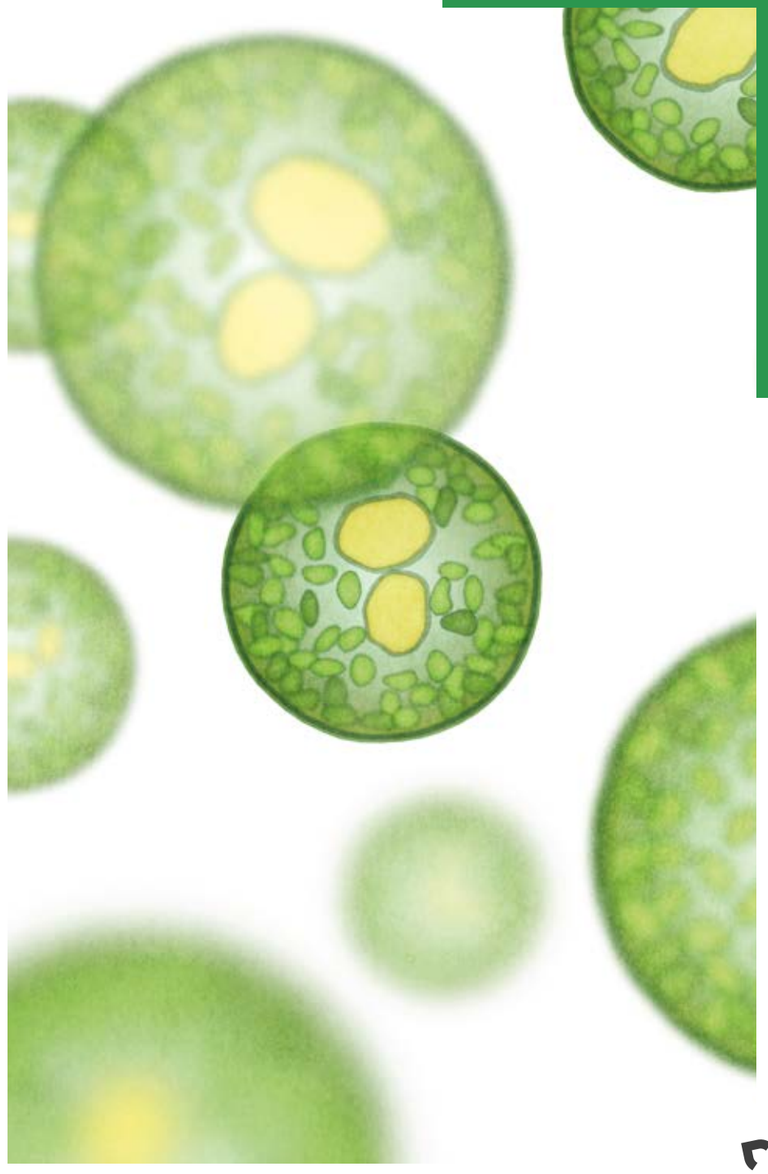
Algaemy is a project that investigates the potential of microalgae as a pigment in textile printing and results are extremely promising. Because the microalgae colour pigments are not lightfast, they transform over time, unlike conventional, chemical-based textile dyes. Algaemy's biodynamic colours gradually change when exposed to sunlight, so, for example, green becomes an intense blue, while pale pink turns bright red and eventually orange. Every textile thus conveys a temporal story based on exposure and use.

Wastewater treatment with marine microalgae

Microalgal biomass can be grown in wastewaters and used as a raw material for the extraction of high-value bio-compounds. This cultivation procedure allows the combination of two or more processes that enhance the production of all the intermediates along the chain and transform wastes into valuable products. The final products derived from this biotechnological process are clean water and algal biomass, from which photonic devices can be also obtained.

MARINE MICROALGAE

There are many microalgal species on the globe growing in both marine and freshwater environments.



Algae are used in many countries in various industries such as cosmetics, agriculture, wastewater treatment and also in the search for new drugs. Taken from the bottom of the marine food chain, microalgae may also soon become a top-tier contender to combat global warming, as well as energy and food insecurity, according to a study by researchers at the Cornell Algal Biofuel Consortium. In fact, industrial cultivation of marine microalgae could reduce the use of fossil fuels by supplying liquid hydrocarbon biofuels for the aviation and cargo shipping industries. The biomass of microalgae remaining after the lipids have been removed for biofuels can then be made into nutritious animal feeds or even be consumed by humans.

OLIVE

The Mediterranean region accounts for the overwhelming majority of the world's olive oil production –97%. What is less well-known, however, is that for the estimated two million tonnes of olive oil produced annually, some nine million tonnes of waste are generated. Olive oil extraction produces by-products, which can become a major environmental issue. Studies have been carried out on these residues regarding phytochemical identification and biological and toxicological evaluation. The bioactive compounds contained in these by-products have a high antioxidant activity, a characteristic fatty acids profile and an interesting mineral composition. These agro-industrial by-products have the potential to be used in many different ways, providing economic and environmental benefits.

Health and Nutraceutical from olives

The health benefits of the Mediterranean diet can be largely ascribed to the nutraceutical properties of olive oil. Mono-unsaturated fatty acids, vitamins and polyphenols are the main nutraceutical substances of olive oil with both antioxidant and anti-inflammatory properties. It has been suggested that these substances have the ability to modulate ageing-associated processes.

Functional cosmetics from olives

Agro-industrial processes, such as the production of olive oil and fruit juices, result in large volumes of waste, including leaves. These by-products contain large amounts of antioxidant compounds, such as polyphenols. These compounds can be recovered from the industrial wastes and used as ingredients to produce natural anti-ageing skincare products.

Bioethanol, solvent or biofuel from olives

Typically, residual oil has been extracted from olive pomace, but the consumers' preference for this product has decreased over recent years due to its low quality compared to extra virgin olive oil. It is therefore necessary to look for alternative ways in which we can reuse this pomace, such as in the production of animal feed, compost and energy. At CIRI Agrifood, based at the University of Bologna, a yeast strain has been identified which is able to grow using olive pomace as a substrate and from this we can produce bioethanol. This bioethanol can be used in many ways by the agri-food, chemical and biofuel industries.

AGRICULTURAL AND FOOD PROCESSING WASTE

In Europe, around 90 million tonnes of food and 700 million tonnes of crops are wasted every year. Common practices for waste management include landfill disposal, anaerobic digestion, composting and wastewater treatment.

Recently, new technologies have been used to produce value-added products from agricultural residues and food processing side streams.

Biofuel from straw

To avoid competition with food production, residual materials such as straw have come to the attention of several biofuel manufacturers. Straw is largely composed of lignocellulose fibres, which have a high potential for energy conversion. A process in which waste biomass, such as wheat straw, is used as a raw material to produce microbial oils for advanced biofuels has been developed. Through a fermentation process with special oleaginous yeasts, straw is being converted into these microbial oils, with a defined chemical composition. The process consists of two steps: an initial saccharification, which transforms the cellulosic component of the raw materials into simple sugars (glucose), and a subsequent fermentation in which yeasts metabolise the sugars and accumulate up to 70% of microbial oils into their cells.

Such oils are then extracted and sent to biorefineries for the production of advanced biofuels, such as Eni's Greendiesel.

Building and construction from straw

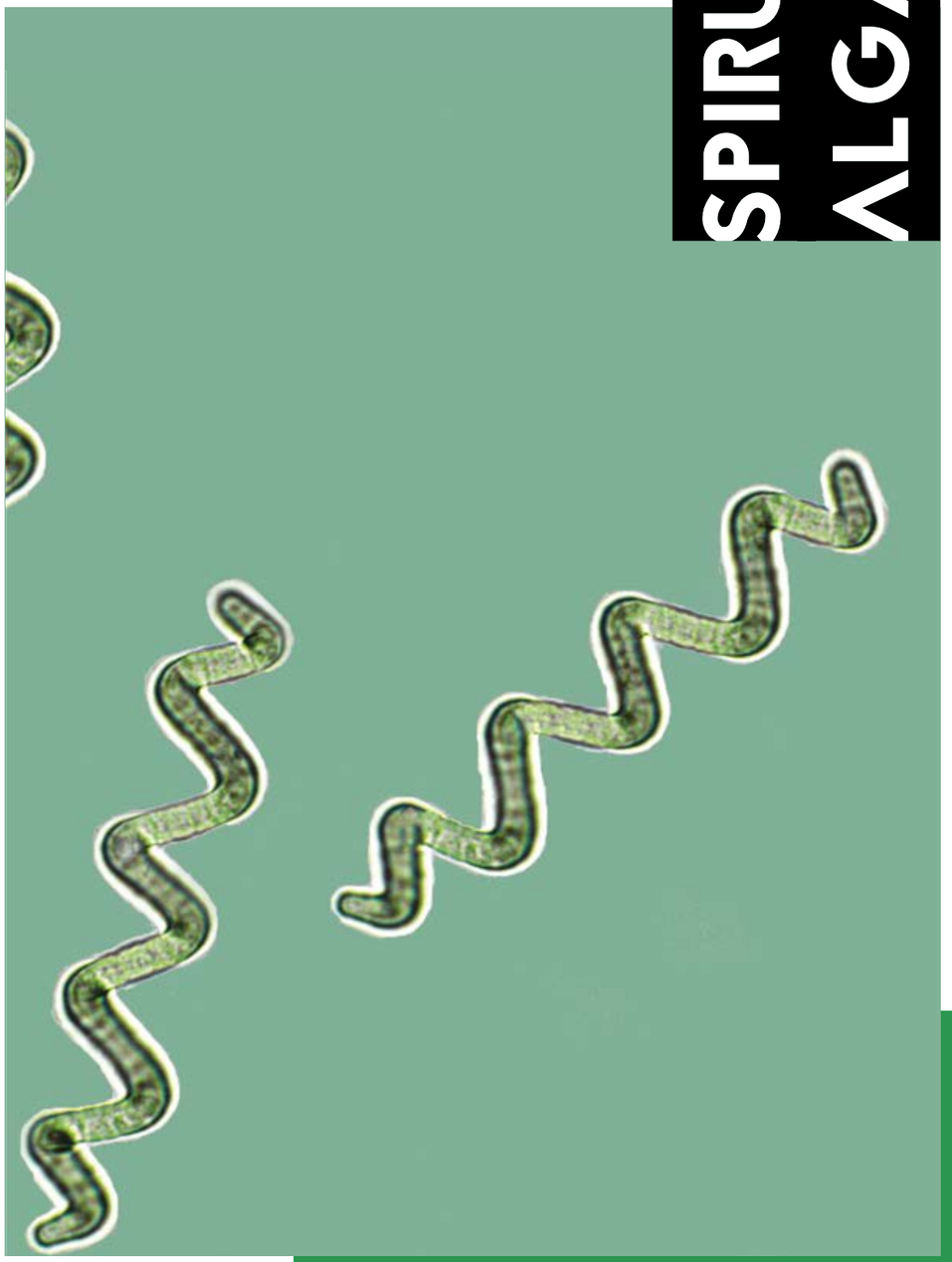
Straw bales are a waste product of arable farming. Once the edible part of the grain has been harvested (such as wheat or rice), the stalks often become a disposal problem for farmers. By bailing the straw, new life is given to the material. Straw bricks and panels offer numerous advantages. They are not easily combustible because the straw is packed so tightly that there is little air within the panels for a fire to feed on, they are breathable, and provide excellent insulation in both hot and cold environments.

Eco-friendly jars from straw

Green Espresso is a kit to grow a completely eco-friendly seedling, using recycled paper, non-GMO seeds, natural peat, and jars that are 100% biodegradable. The biodegradable jar is made of rice husks and is used to nourish the plant once it has germinated and been transplanted.

SPIRULINA ALGAE

Spirulina is a blue-green alga that grows in both fresh and salt water. It has been consumed for centuries due to its high nutritional value and supposed health benefits. It is a microorganism in the form of a bacterium called Cyanobacterium that, just like plants, can produce energy from sunlight, via the process called photosynthesis.



Pharmaceutical and nutraceutical

In the pharmaceutical and nutraceutical sectors spirulina is considered to be a fantastic source of antioxidants, which can protect against oxidative damage, a problem that can cause many chronic diseases such as cancer, diabetes, arthritis and heart disease.
The main active component is phycocyanin. This antioxidant substance gives spirulina its unique blue-green colour. Phycocyanin can fight free radicals and inhibit production of inflammatory signalling molecules, providing impressive antioxidant and anti-inflammatory effects. Spirulina appears to have anti-cancer properties, especially against oral cancer, and some studies show that it may reduce blood pressure, improve symptoms of allergic rhinitis and may be effective against anaemia.

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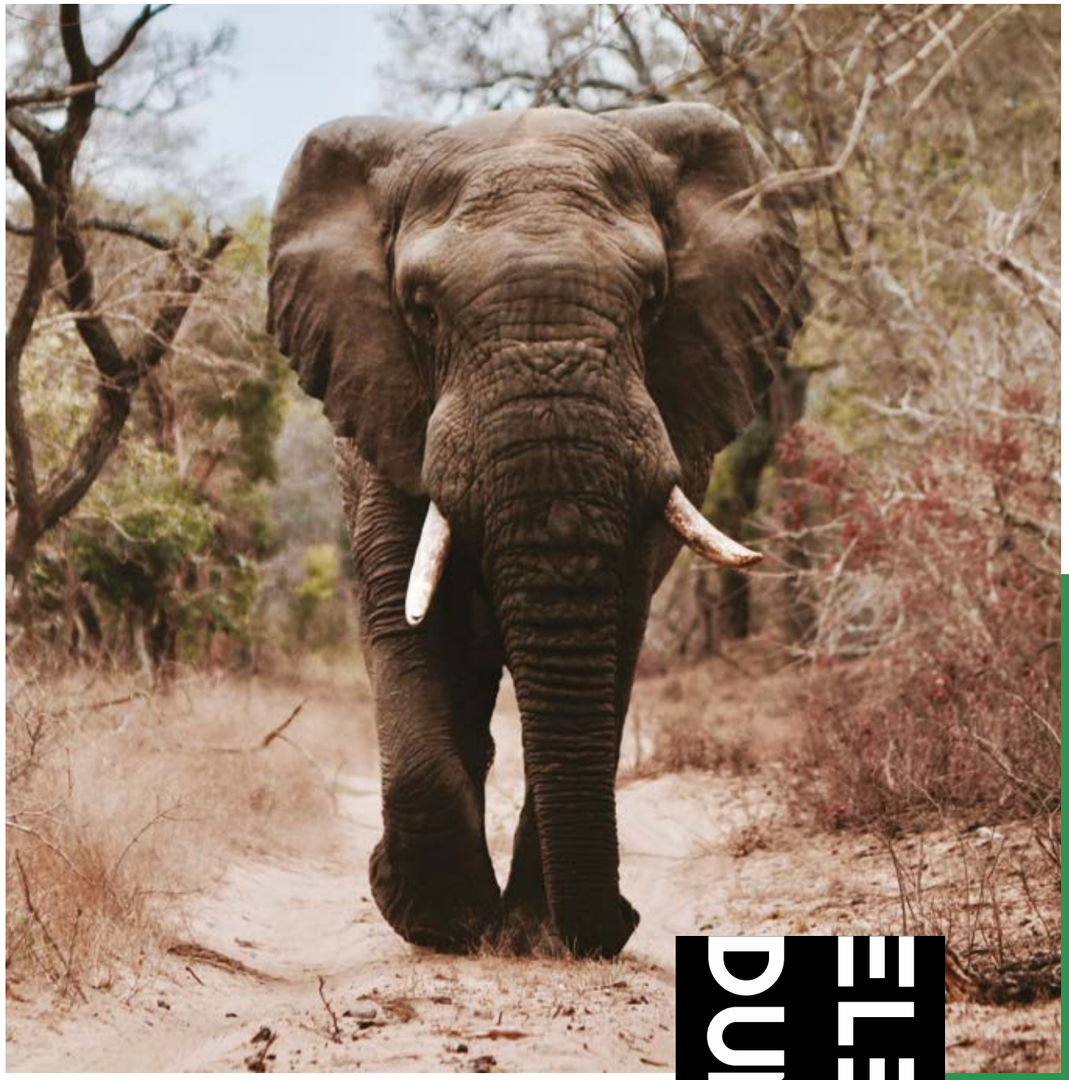
Energy from elephant dung

With the help of biogas digesters, the waste products of herbivores can be used to generate gas for stoves, heat and even electricity. It is well-known that, thanks to the large amount of dung that they produce, elephants are a perfect candidate for this purpose. As the digesters break down the organic waste, methane and carbon dioxide are collected to be used in stoves or gas-powered engines.

Nutrient-rich bio-slurry is also created during this process, which can then be used as a fertiliser. Biogas from manure is not effective enough to meet all of our energy needs, but if used correctly in combination with other processes, it could have a beneficial impact on the world by saving natural fossil resources.

Poo Paper

Despite the vast quantities of food that they consume, an elephant digests only about 45% of what it eats. As elephants are herbivores with highly fibrous diets, much of the undigested material passes straight through them as intact fibres. This is why their excrement can easily be made in to paper products. Today paper is most commonly made using wood fibre pulp, but a similar pulp can be derived from the fibres in elephant dung. The average elephant excretes enough to produce 115 sheets of paper each day.



ELEPHANT DUNG

Recycling elephant dung is an initiative that could help to ensure the protection of these animals and is also a resource that contributes to local development and employment. The use of elephant dung to produce paper is a natural, sustainable and chemical free process.

Due to their enormous size, elephants consume 200-250kg of food every day and the resultant dung is enough to produce a large amount of paper which has an economic value for local communities.

FUNGI

Fungi use cellulose as a nutrient for their growth, colonising empty spaces and binding the organic matter with their "root structure" – the mycelium. MOGU, an Italian start-up, developed products made with agricultural vegetable by-products colonised by fungi. The resulting material is a strong, functional, fully natural biocomposite that is 100% compostable and suitable for many diverse applications and markets - green buildings and eco-friendly design, for example.

Leather from fungi

Leather made from fungi is a revolutionary product made using a range of materials consisting exclusively of fungal mycelium. As opposed to traditional animal leather, bio-based leather can be grown in rather short timeframes, with a limited amount of resources and its production process is not wasteful.

Garden and fungi

Plastic containers, together with plastic pots and boxes, are widely used in agricultural activities and represent a huge issue as they are often left in the field or disposed of with general waste. Mycelium-based containers are fully biodegradable and can be placed directly in the field along with greens and plants.

Building, construction and furniture from fungi

Fungal microorganisms and the employment of their vegetative body - the mycelium - are key ingredients used to bind and transform different types of residual substrates into functional high-value materials. Resilient flooring, thermal insulating panels, acoustic absorbing modules, decorative tiles and engineered woods are some of the products that can be developed for building construction and decoration. The materials do not contain any toxic compounds, are bound by exclusively implementing mycelium as a binding agent and can be formed into custom shapes or provided as flat boards.

Biodegradable shopping bags and agricultural mulching film

Plastic shopping bags are responsible for a great deal of marine and land pollution and cause the death of wildlife including birds, whales, seals and turtles as they ingest the bags. Plastic decomposes over a long period (between 20 to 1000 years). For these reasons, in most of the European countries, plastic bags are banned or restricted in their use. A sustainable alternative is bioplastic shopping bags derived from cardoon, which can be reused for organic waste collection. Meanwnhile, biodegradable mulching film from cardoon is an agronomically and environmentally efficient application.

It is completely biodegradable in the soil and therefore it does not have to be collected and disposed of at the end of the crop cycle.

Packaging materials and disposable tableware

Packaging materials and disposable tableware can be made from cardoon-derived bioplastic, which is both biodegradable and compostable. Tableware, packaging and disposable bags simplifies waste management since the bio-products can be disposed of as organic waste after their use, thus reducing their environmental impact and waste management costs.

Azelaic acid for different applications

Oilseed cultures such as Cardoon seeds can be used to extract vegetable oils to be converted into bio-monomers, such as azelaic acid. Moreover, pelargonic acid has important applications for the formulation of biolubricants and cosmetics, and in the pharmaceutical and personal care fields.

Cardoon is a Mediterranean plant that does not need irrigation and grows on dry, abandoned and uncultivated land. tt provides oil and biomass that can be exploited to produce environmentally friendly bio-based products. Every part of the Cardoon can be used; oilis extracted from the seed, and cellulose and hemicellulose are obtained from the biomass.

During the extraction of the oil a protein flour that could partially replace the soybean currently used to feed animals is also obtained, as well as active molecules to be used in the field of nutraceuticals.

Within FIRST2ZRUN project low input and underutilized oil crops (ie Cardoon) grown in arid and/or marginal lands and not in competition with food or feed, are exploited for the extraction of vegetable oils to be further converted into bio-monomers (mainly pelargonic) as building blocks for high added value bioproducts, biolubricants, cosmetics, bioplastics, additives through the integration of chemical and biotechnological processes.

CARDOON

BAMBOO

Bamboo is one of the fastest growing plants on earth with a growth rate of over 12 inches per day. Bamboo is sustainable, easy to grow, does not require pesticides, chemicals or irrigation. Therefore, it is increasingly used for many applications such as furniture, construction, design and tableware manufacture.

Cosmetics and nutraceuticals from bamboo

Bamboo is also widely used in cosmetics as it is very rich in mineral salts such as silicon calcium, phosphorus, potassium and iron.

BToys

Bamboo shavings can be mixed with cellulose, resin and water-soluble mineral colouring pigments to form a plastic alternative for toy production. The result is a completely biodegradable bioplastic toy. In terms of their robustness and endurance, the toys are comparable to their petroleum-based counterparts.

Textile from bamboo

Bamboo fibre is a natural textile made from the pulp of bamboo grass. Bamboo rayon is made by dissolving bamboo pulp into its cellulose component and then spinning it into viscose fibres. Clothing made of bamboo is durable, breathable, comfortable and UV protective.

Construction with bamboo

There are many varied applications of bamboo canes and shoots, but one of the most interesting is its use in seismic-resistant buildings due to its strength and flexibility. The bamboo cane “sways but does not break”.

OPUNTIA FICUS-INDICA

Design and furniture

From the fruit plant that most characterises the wild, warm terrain of the south Mediterranean comes Sikalindi®, Prickly Pear Cactus fibre. This patented process involves extracting the fibre from the green cladodes of the Prickly Pear Cactus, respecting the plant's life cycle in an ecological way. This is followed by a process of drying, which turns the vegetable fibre into resistant woody fibre used for furniture and other designed objects.

Restoration and construction with Opuntia Ficus-indica

In ancient Mexican tradition, extracts of Opuntia ficus-indica were used to preserve ancient wall paintings and other works of art. The Enea BIOAG-PROBIO group is working on enhancing the biological resources of Opuntia ficus-indica and on the development of innovative bio-based products to be used as additives for restoration mortars and as a preservative for structures in terra cotta, giving good plasticity, structure and durability.

This pruning produces a considerable amount of agricultural waste that can be used in a variety of promising applications.

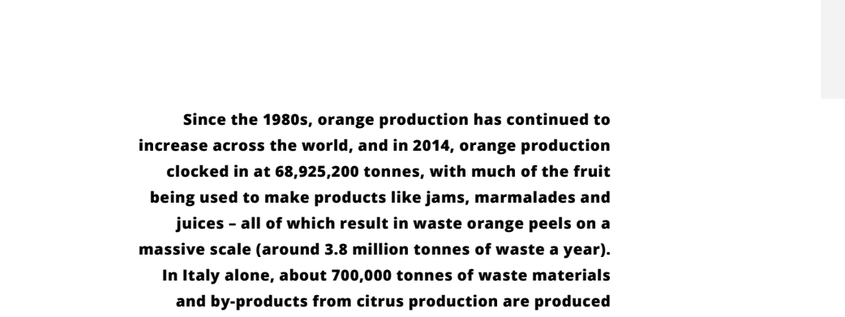
A plant with a thousand uses

The Opuntia cladodes are used as food for animals in many desert areas. The mucilage contained in the cladodes has anti-inflammatory and soothing properties and some research suggests that it can provide drinking water in areas contaminated by arsenic. Moreover, the cladodes have a fibrous structure in the form of a lattice which gives it the necessary rigidity to fulfil their supporting function. These fibres are mostly made of cellulose, a material with various industrial applications.

The Opuntia ficus-indica (Prickly Pear Cactus) is a fast-growing plant that can reproduce at a rapid rate. Grown in many Mediterranean regions for its fruits, it requires frequent pruning to contain its exuberant growing.

Since the 1980s, orange production has continued to increase across the world, and in 2014, orange production clocked in at 68,925,200 tonnes, with much of the fruit being used to make products like jams, marmalades and juices – all of which result in waste orange peels on a massive scale (around 3.8 million tonnes of waste a year). In Italy alone, about 700,000 tonnes of waste materials and by-products from citrus production are produced every year. To make the most of this local resource, science, fashion, manufacturing, government, education and innovators have all identified a potential valuable feedstock from both orange peel and orange pulp.

ORANGE



Bio-plastic from oranges

Spain is the leading grower of oranges in the European Union, producing 3,800,000 tonnes per year. AIMPLAS, a Spanish plastics-technology institute, is exploring the use of orange peel as a potential bioplastic. In partnership with the Spanish government and a wine and juice specialist, AIMPLAS is exploring innovative ways to use the citrus peel bioplastic, including in plastic bottles and replacing of aluminium railway applications.

Fabrics and Fashion industry based on oranges

Orange Fibre is an Italian start-up with the aim of turning orange and citrus waste into sustainable fabrics. The company is already supplying these fabrics to larger fashion brands. To use the orange waste, the cellulose is extracted from the fibres that are then enriched with citrus fruit essential oil using nanotechnology techniques.

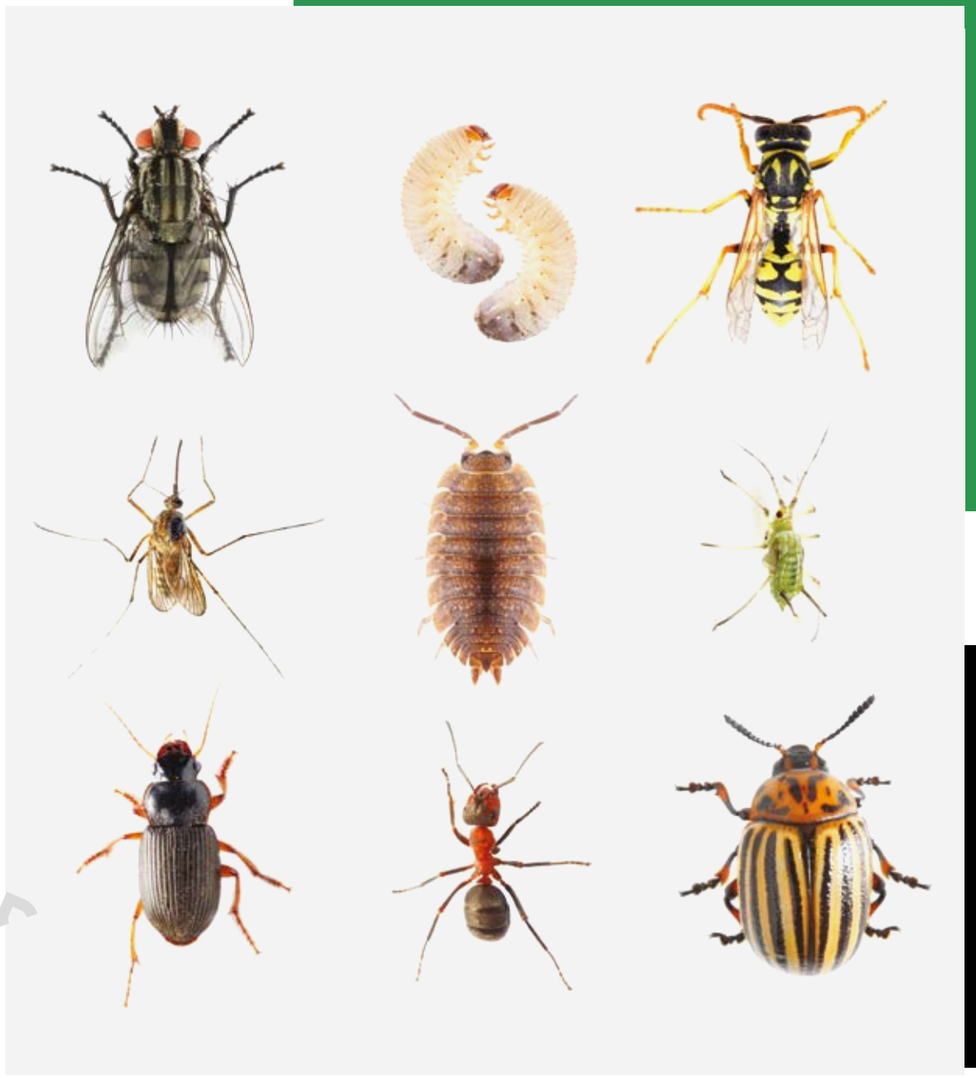
Cosmetics and hygiene products from oranges

Orange peels are rich in d-limonene, an ingredient present in many cleaning products and cosmetics due to its high antimicrobial effect. The natural fragrance of citrus peel, perillic acid, can be extracted from a bio-based feedstock by biotransformation and used as a natural preservative in creams and lotions in the cosmetic industry. The EU-funded project, RoadToBio, in cooperation with stakeholders from industry, NGOs and other groups, has developed a 'Roadmap' showing possible ways to produce organic chemicals from bio-based materials, like citrus industrial waste.

Health and beauty

Insects are a very promising raw material for food, cosmetics and both the nutraceutical and pharmaceutical markets. Thanks to research into the unique chemical and biological characteristics of insects, many start-ups and research centres are proposing new products that use molecules and active ingredients extracted from insects.

Naturins, an Italian start-up, has grasped the potential of this significant source of new molecules by exploiting the antioxidant power of extracts and their anti-aging effects for the development of creams and oils for cosmetics. Other products this innovative start-up is producing include nutraceuticals with a high protein and amino acid content and functional products rich in omega 3 and omega 6 with anti-hypertensive action.



INSECTS

Bioplastics from insects

An incredibly efficient means to convert organic waste into proteins and fats useful in the production of bioplastics already exists in nature - insects! An Italian project VALORIBIO transformed manure and other organic waste from a zoo into innovative bioplastics with specific properties using insects. These bioplastics, mainly for use in the agricultural sector (e.g. mulching films and biodegradable pots), will act as a slow-release fertiliser, releasing nitrogen during their decomposition, once their primary use is over.

Insects make up 70% of the animal kingdom, they adapt to every ecosystem and environmental condition and express extremely high defensive compounds. Insects are a high protein source with the potential to replace conventional sources of protein in many ways.

Insects can be used as ingredients for cosmetics and medicines, to improve the management of organic waste, for direct human consumption as well as indirect human consumption in recomposed foods (using their extracted protein), and as a protein source in feedstock mixtures.

The skin of an apple is generally discarded during the production of jams and juices. Apple skin is characterised by several properties because it is rich in sugars, cellulose and waxes.

In Italy, the Trentino Alto Adige region is the main producer of apples, contributing to 65% of the national production. 10 tonnes of apple waste are produced in one year. It is recognised here that the re-use of apple skin from waste can significantly decrease agro-industrial waste and can be used as a second-generation bioeconomy feedstock.

APPLE

By recycling industrial waste from apple processing it is possible to create a material which is a 75% natural 'leather'.

Apple faux leather

The main advantages of apple leather are its porosity and the fact that it cuts down waste disposal costs in apple processing.
In addition to apple leather having increased material breathability, without modifying its thermosensitivity, the high percentage of organic and natural material in it makes the product eco-friendly, non-toxic and bio-compatible. Apple skin is used to produce leather-like fashion accessories, clothes, furniture (sofas and armchairs) and many other everyday products. This material can be used by vegans as a substitute to animal leather.

Everyday products from apples

Apple skin can also be used as feedstock to create absorbent paper, toilet paper, notebooks, napkins, biodegradable bags and packaging boxes. By taking advantage of the properties of the apple, combining cellulose with apple fibres, all of these products are created without cutting down trees.

Design and furniture

The non-psychoactive hemp varieties are grown as a source of fibre, wood and seed. After processing, these parts of the hemp plant are used in a number of industrial products including particleboards, which are used to make furniture, flooring, insulating material, roofing, windows and door frames, for example.

3D Printing with Hemp

Hemp can be transformed in filament to be used for 3D printing. Biodegradable, recyclable and free from toxins, it can replace petroleum-based plastics. The material has a higher impact resistance than regular PLA. Bioplastic made using hemp is fully biodegradable and compostable. It also makes an odourless print material and, compared to other materials, it has better technical characteristics.

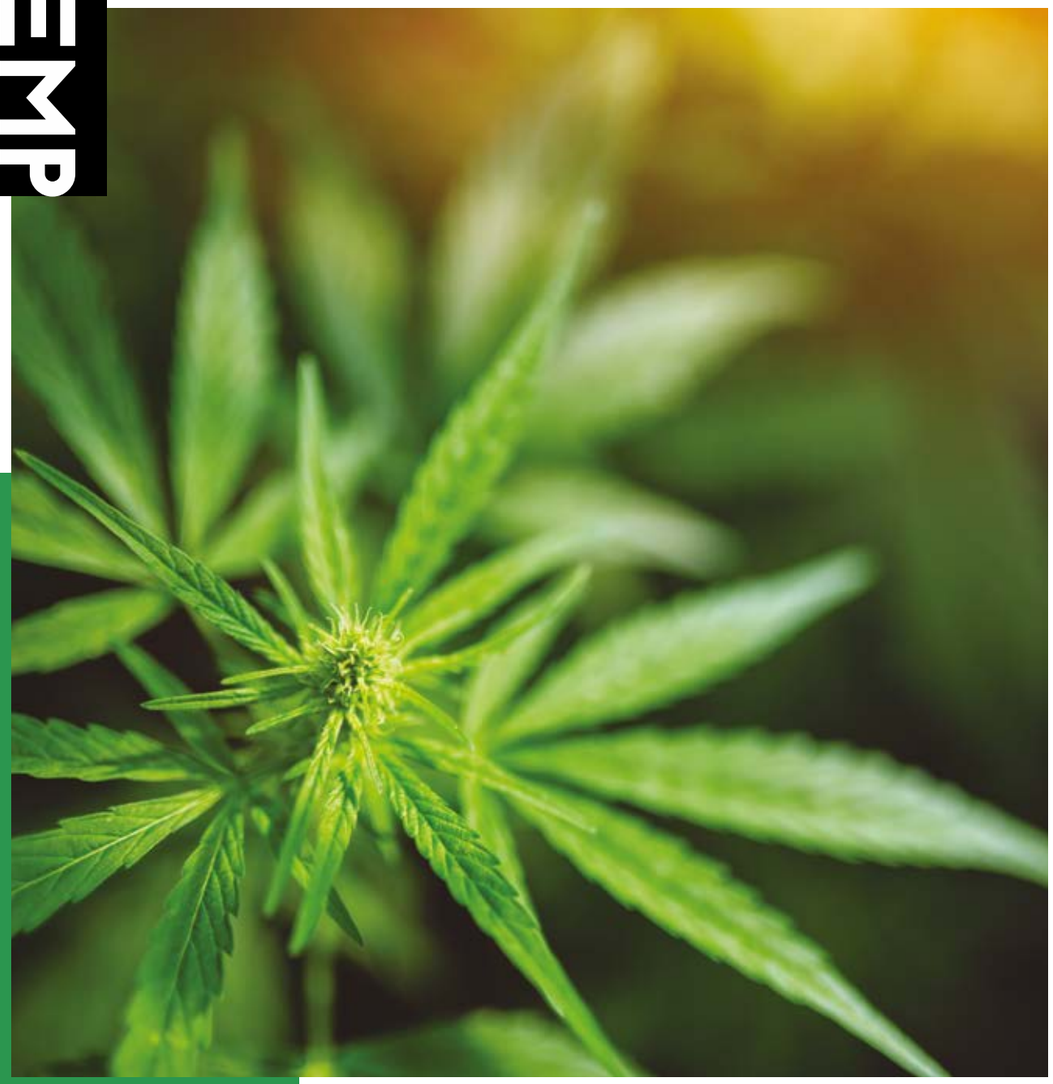
A plant with a thousand uses

Cannabis is increasingly recognised by the international medical and scientific community as a valid tool to fight pain. Cannabis-based medicines are used for a wide range of illnesses, including multiple sclerosis, HIV, epilepsy, side-effects from chemotherapy, chronic pain, glaucoma, anxiety and muscle and joint pain. The oils extracted from cannabis, including 'CBD oil', can also be used in cosmetic products with no restrictions and has a reported impact on combatting the signs of ageing on the body including a reduction in wrinkles and impact of acne.

Cannabis sativa L. is the scientific name for the hemp plant. Hemp is a sustainable crop with high yields and a high adaptability to the European climate, with positive agronomic characteristics.

Hemp requires little water and can be grown on contaminated sites, contributing to soil remediation. While it has been traditionally cultivated for its fibres, seeds and psychoactive substances, there are different varieties of hemp that make ideal multi-purpose crops that can be used in the circular bioeconomy.

HEMP



COFFEE

According to the European Coffee Federation, Europeans consume 2.5 million tonnes of coffee per year, around 725 million cups of coffee. Approximately 50% of coffee beans are used in instant coffee manufacturing facilities where spent coffee grounds are a by-product of the process. These spent coffee grounds are rich in carbohydrates, protein, lipids and bioactive molecules.

Yarns and fabrics

Coffee grounds absorb unpleasant odours, dry quickly and can block UV light. These characteristics make them an ideal resource for the development of sustainable and innovative textiles. The S. Café® technology reuses spent coffee grounds and converts them into fabrics through the extraction of fluids.

Coffee paper

Two-thirds of the fibre used to make paper comes from virgin fibre and the rest comes from waste fibres. Agro-industrial coffee waste can be used to make paper, contributing to a decrease in deforestation. Peels, leaves and small beans that are left from the coffee during industrial processing are used to manufacture coffee paper.

Mushrooms culture

Coffee grounds are a perfect substrate for growing mushrooms as they contain minerals and nutrients vital for growth: One man's waste is a mushroom's treasure! Funghi Espresso is an Italian start-up that uses waste coffee grounds to grow mushrooms (Pleurotus), produce earthworm humus and by-products to support plants. The exhausted substratum of the fungiculture is transformed into earthworm humus by first adding bacteria and then the earthworms. The humus is used as an excellent organic soil improver for both garden and vegetable plants.

URBAN ORGANIC WASTE

Cities are a major contributor to environmental pressures such as climate change, water and air pollution and environmental degradation – however, they also must be part of the solution. There is a need to capitalise on the unique opportunities urban living and urban consumption patterns provide to deliver solutions.. One of these opportunities is circular consumption, based on biomass products and renewable energy. This will help reduce the use of virgin resources as well as reducing greenhouse gas emissions. Cities produce a huge amount of urban waste which can be used as feedstock to produce the biomass for products and renewable energy – and so drive circular consumption.

Urbanisation is increasing rapidly. In 2016, an estimated 54% of the world's population lived in urban areas. That figure is projected to exceed 60% by 2030.

Energy and green fertilizers from urban organic waste

The natural process of anaerobic digestion consists of the degradation of organic matter by bacteria in the absence of oxygen and this produces methane (which is energy) and fertilizer (digestate). Laboratory tests, conducted by IRSA-CNR - an Italian water research institute, have shown very promising results by obtaining up to 100 litres of methane from 1kg of wet, household waste (the daily amount of waste produced by an average family). Furthermore, feeding the earth with digestate can lead to a reduced use of chemical fertilizers, resulting in environmental benefits by helping to put more organic matter back into in the soil.

Wastewater bioremediation from urban organic waste

It is possible to reduce water contamination by different pollutants by using and recycling waste! In fact, after their composting and chemical treatments, several bio-based substances (BBS) which are active against pollutants can be extracted. The BBS can remove harmful substances either by their adsorption or by breaking them down when activated by irradiation (photocatalysis) treatment. The environment benefits twice from this strategy as waste is disposed of and water is purified!

THE BIO ART GALLERY

You can check the interactive version of this Gallery at:

www.biovoices.eu/gallery

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