HEMP

a real green deal

EIHA
European Industrial Hemp Association

Contributors:

Catherine Wilson, Tony Reeves.

Image credits:

Sammy Spratt, Jeremiah Dutton.

EIHA
European Industrial Hemp Association

Francesco Mirizzi
Senior Policy Advisor
francesco.mirizzi@eiha.org
+ 32 470957724

Instagram/@eiha.hemp
LinkedIn/eiha-european-industrial-hemp-association
Twitter/@EihaHemp

Contact us!

LET HEMP LEAD THE WAY!

ALL IN ON THE GREEN DEAL

At the beginning of her mandate, President von der Leyen announced an ambitious plan to lift Europe up from the political, environmental and economic crisis with the aim of making Europe the first continent to reach zero emission by 2050, while decoupling economic growth from resource use.

Recent environmental and health catastrophes urge us to take action and set ambitious objectives for the transition towards a more sustainable society.

The European Industrial Hemp Association welcomes and fully supports the European Commission's vision and commits to work with EU bodies with the aim of pursuing the Green Deal objectives and contributing to the recovery of the EU Economy.

EIHA intends to focus particularly on the new policy framework highlighting **how hemp can make a key contribution to upscaling innovative solutions capable of accelerating the transition towards a regenerative growth model** that gives back to the planet more than it takes whilst creating many thousands of new green and highly-skilled jobs in rural areas and in manufacturing.

However, **many bottlenecks and hindrances** stop hemp from getting the place it deserves in our economies. An **underlying distrust** is still present at different levels of society, stemming from a **lack of knowledge** on this beautiful and versatile plant that perfectly fits the model of qualitative and sustainable growth.

A **major, sincere and transparent support is needed from governments, stakeholders and citizens**, in order to finally start the **#hemprevolution**, from which the society, the environment and the economy will permanently benefit.

ABOUT EIHA

*The European Industrial Hemp Association represents the common interests of **hemp farmers, producers and traders** working with hemp fibres, shives, seeds, leaves and cannabinoids. Our main task is to represent, serve and protect the hemp sector in the EU and international policymaking. EIHA covers different areas for the application of hemp, namely its use for textile, construction material, paper, cosmetics, feed, food and supplements.*

A MULTI-CHAMPION OF BIOECONOMY

CIRCULARITY AND ZERO WASTE FOR A FUTURE-PROOF BUSINESS MODEL

MULTIPURPOSE CROP. The real added value of industrial hemp is its ability to produce different products with one crop: **food, feed, cosmetics, biomaterials, energy while achieving positive environmental externalities with one rotational crop**.

CARBON NEGATIVE RAW MATERIAL. The versatile nature of hemp **potentially** represents **multi-billion € downstream markets**, particularly in manufacturing of **reusable, recyclable and compostable biomaterials**. Therefore, hemp is capable of dramatically contributing to **decarbonising essential products for a future-proof and a thriving sustainable Economy**.

SOURCE of NUTRITIOUS and HEALTH PROMOTING FOODS. While seeds are particularly rich in **high-quality proteins** and have a **unique essential fatty acid spectrum**, flowers and leaves are rich in precious phytochemicals (**cannabinoids, terpenes and polyphenols**), promoting a healthy lifestyle.

ENVIRONMENTALLY FRIENDLY AGRICULTURE. Hemp farming requires **very low or no inputs** and has a **positive effect on soil and biodiversity**, while its processing produces **zero waste**: everything can be used or further transformed!

COST-EFFECTIVE and SOCIALLY RESPONSIBLE BUSINESS. By **maximising the use of land**, hemp represents a valuable and versatile raw material capable of bringing **additional income to farmers and rural communities, tackling the problem of rural depopulation**. Hemp value chains need a **local network of operators**, capable of providing the biomass and first processing, **globally connected** to a community of technology and knowledge.

HOW CAN the EU HELP to unlock the hemp green potential?

Many EU countries still prohibit the use and marketing of flowers, incorrectly considered as narcotic, even if the THC level is below the established thresholds for industrial hemp. In order for hemp to be a profitable crop, farmers need to be allowed to maximise the income from all parts of the plant, especially the flowers and leaves. The income from CBD market can help financing the building of processing facilities for fibres and shives, that could be sold at a relatively low cost for industrial uses.

We call upon the EU to recognise that hemp falls **outside the scope of the United Nations Convention on Narcotic Drugs** and allow the harvesting of the whole plant. In parallel, member States should **not apply the drug control legislations** to industrial hemp and its derived products.

ENVIRONMENTAL EXTERNALITIES OF HEMP FARMING

THE PERFECT CROP FOR A CARBON NEUTRAL ECONOMY

If used as an alternative to carbon-based raw materials, hemp would allow us to capture and store a substantial amount of CO_2. Through photosynthesis, hemp plants have the ability to store considerable amounts of carbon in both the stems and the roots. A high biomass rate corresponds to higher carbon storage potential. Hemp grows rapidly (4 to 5 months), is tall (up to 5 meters) and deep rooted into the ground (up to 3 meters): it is indeed a perfect crop for storing carbon.

But how much CO_2 is actually captured? Although hemp roots capture carbon, it is difficult to assess precisely the quantity retained, therefore, the calculation provided below will only refer to the aerial parts of the hemp plant.

One tonne of harvested hemp stem contains 0.7 tonnes of cellulose (45% carbon), 0.22 tonnes of hemicellulose (48% carbon) and 0.06 tonnes of lignin (40% carbon). Consequently, every tonne of industrial hemp stems contains 0.445 tonnes carbon absorbed from the atmosphere (44.46% of stem dry weight). Converting carbon to CO_2 (12 t of C equals 44 t of CO_2), this represents **1.6 tonnes of CO_2 absorption per tonne of hemp**. On a land use basis, using a yield average of 5.5 to 8 t/ha, this represents **9 to 13 tonnes of CO_2 absorption per hectare** harvested.

Hemp is a Carbon negative raw material!

HEALTHY SOILS & BIODIVERSITY

THE POSITIVE ENVIRONMENTAL EXTERNALITIES OF HEMP FARMING

A study, assessing 23 crops along 26 biodiversity parameters, identified both oilseed and fibre cannabis as superior to most major crops in terms of limiting damage to biodiversity. As it is grown with **little or no synthetic phytosanitary products, hemp can help enhance biodiversity in rural areas.**

The flowering cycle usually occurs between July and September, coinciding with a lack of pollen production from other farm crops. Being a wind pollinated, dioecious and staminate plant, cannabis produces large amounts of **pollen**, a vital **nutritional source for bees** during periods of floral scarcity. A study on the bee population in hemp fields, identified 23 different genera in northern Colorado (US) plantations, with a majority of Apis mellifera at 38%, followed by Melissodes bimaculata at 25% and Peponapis pruinosa at 16%.

Further environmental benefits can be observed **on the soil**. Being a fast-growing crop and having a high leaf turnover rate, hemp will, if grown in ideal conditions, fully cover the ground three weeks post-germination. The dense leaves rapidly form a **natural soil cover material** that reduces water loss and soil erosion. In addition, fallen leaves provide vital **nutrition** for the soil. If intended for fibre, hemp stalks are an important nutritive organic matter for the soil during retting (decomposition of the outer layer of the stalk allowing fibres to be accessible for manufacturing).

Because of its height and shading capacity hemp **efficiently eliminates weeds** leaving the soil in optimum condition. Preliminary results from Rodale Institute (US) trial suggest that the presence of hemp as a summer crop and its earlier harvest date suppressed weeds season-long and provided a wider window for establishing the winter crop. This is considered to be another major advantage of including hemp as a rotation crop.

Due to a lack of natural predator insects, insecticides can be avoided as hemp is susceptible to few serious pests and is usually cultivated **without, or with very little need for chemical treatments** such as herbicides either.

According to an internal survey, already 50% of EIHA members use natural fertilizers like manure or slurry and many indicate that hemp is an ideal crop for organic agriculture and cultivation near surface water.

Beneficial effects on the soil can be observed in **subsequent crops**: studies suggest that wheat yields after the cultivation of hemp increase by 10 to 20 percent. The above-mentioned trial of Rodale Institute confirmed this and identified similar positive effects in the subsequent soybean crops.

Finally, hemp can also be used with great efficiency in land reclamation. Indeed, it is considered as an optimal pioneer crop, notably because of its **phytoremediation** capacity, meaning the ability to remove heavy metals from the ground. It is a cadmium-tolerant plant and is resistant to long term exposure to heavy metals.

FOOD, FEED & FOOD SUPPLEMENTS

NUTRITION AND WELLBEING FROM SEED TO FORK

Hemp has been a **traditional food source** in Europe for thousands of years. All parts of the plant except stems have been consumed. While seeds are particularly rich in high-quality **proteins** and have a unique essential **fatty acid** spectrum, flowers and leaves are rich in precious phytochemicals (**cannabinoids**, **terpenes** and **polyphenols**). In many European countries, Sweden and Poland particularly, old recipes refer to hemp as vegetable.

The nutritional characteristics of hemp make it a great source of nutrients for humans and animals. Hemp can be consumed as **raw or dehulled seeds**, **seed flour or meal**, **seed oil**, **extracts** from leaves and flowers. The pressing of hemp seed for oil generates, as a co-product, **hemp seedcake**, rich in protein and dietary fibre and used as feed.

Hemp contains a relatively high level of cannabinoids, of these the most well-known and naturally abundant is cannabidiol or CBD, along other compounds such as terpenes, phenols, flavonoids and other cannabinoids uniquely working together to contribute to a varied diet. Cannabinoids and terpenes are highest in the **flowers** and have been used in food preparations in much higher concentrations than today. As a matter of fact, varieties used in the past had a cannabinoid content well above the current levels. Therefore, the quantity of cannabinoids that were present in the human diet was much more significant than what is authorised nowadays. Flowers, leaves and other parts were cooked with fat, oil, water and wine, often in combinations, which are, in chemical terms, simple extraction processes similar to those of our days.

Fresh **leaves** of hemp can be eaten raw as salad, or cooked, juiced, powdered and blended into smoothies. The leaves are a rich source of fibres, free radical scavenging polyphenols, flavonoids, 9 essential amino acids (including lysine and arginine), essential oils, as well as the minerals magnesium, calcium, and phosphorous.

Technically a nut, **hempseed** typically contains over 30% oil and about 25% protein, with considerable amounts of dietary fibre, vitamins and minerals. Hempseed oil is over 80% in polyunsaturated fatty acids (PUFAs) and is an exceptionally rich source of the two essential fatty acids (EFAs) linoleic acid (18:2 omega-6) and alpha-linolenic acid (18:3n3 omega-3). The omega-6 to omega-3 ratio (n6/n3) in hempseed oil is normally between 2:1 and 3:1, which is considered to be optimal for human health. In addition, the biological metabolites of the two EFAs, gamma-linolenic acid (18:3n6 omega-6; 'GLA') and stearidonic acid (18:4 omega-3; 'SDA'), are also present in hempseed oil. The two main proteins in hempseed are edestin and albumin. Both of these high-quality storage proteins are easily digested and contain nutritionally significant amounts of all essential amino acids. In addition, hempseed has exceptionally high levels of the amino acid arginine. Hempseed has been used to treat various disorders for thousands of years in traditional oriental medicine. Recent clinical trials have identified hempseed oil as a functional food, and animal feeding studies demonstrate the long-standing utility of hempseed as an important food

resource. With the plant-based food market expected to grow to €2.4 bn by 2025 from €1.5 bn in 2018, hemp represents the **perfect source of sustainable protein** to be grown **locally and organically**.

Used as **feed**, hemp has also a very interesting role in animal nutrition and wellbeing. It is consumed as hempcake, hempseed or as extract, but never as the only compound of their diet. The share of hemp green fodder (whole crop), straw, stalks in the total feed consumption of cattle is usually kept below 15%.

Hemp feed can also serve as **enhancer for the nutritional profile of animal products**: according to results of a 2015 animal study, incorporating hemp seeds and hemp seed oil to hens' diet led to eggs with increased levels of omega-3s in the yolks and a more healthful omega-3 to omega-6 ratio. Another study calculated that a dietary crude proteins concentration from hempcake of 157 g/kg of dry matter, resulted in the maximum yields of milk and energy corrected milk by dairy cows.

HOW CAN the EU HELP

The EU should recognize hemp leaves and flowers as well as hemp extracts from industrial hemp, with a **natural content of cannabinoids**, as **traditional foods**. These products do not fall under the scope of the Novel Food Regulation.

Conversely, extracts that are **enriched and isolated** cannabidiol should be submitted to the application of the **Novel food** regulation.

This position is perfectly in line with the Novel Food Catalogue entries in place until January 2019.

Hemp **seeds and seed oil** should be fully acknowledged as functional foods that could greatly benefit the health of EU citizens. Its use in food preparations and raw consumption should be encouraged.

COSMETICS

HEMP PRODUCTS AS ENVIRONMETALLY FRIENDLY COSMETICS

Cosmetic products containing Cannabis derivates have been on the EU market for decades. In recent years, these products surged in popularity. Their use has evolved into a major skin care trend with numerous products marketed as oils, balms, creams, lotions, and facial serums.

The demand has been driven by **recognised and validated properties related to hemp seed oil and hemp extracts**. As per the EU Database, cosmetic products containing part of the Cannabis plant improve skin condition because of the antioxidant properties, drastically ameliorate antiseborrhoeic skin condition, thanks to CBD, and provide an excellent skin protection.

Unfortunately, there is a lot of confusion over cannabis derivatives relating to their quality and permitted contents, precisely because of a lack of harmonious regulation among member states. This situation risks discouraging many investors from further exploring hemp applications for cosmetics, resulting in lack of R&D and considerable potential missed opportunities.

HOW CAN the EU HELP

All hemp derived raw materials should be permitted as ingredients for cosmetics. On the basis of the fact that hemp is not a narcotic, the **Cosmetics Ingredients Database should be changed** accordingly.

BUILDING THE WORLD OF TOMORROW

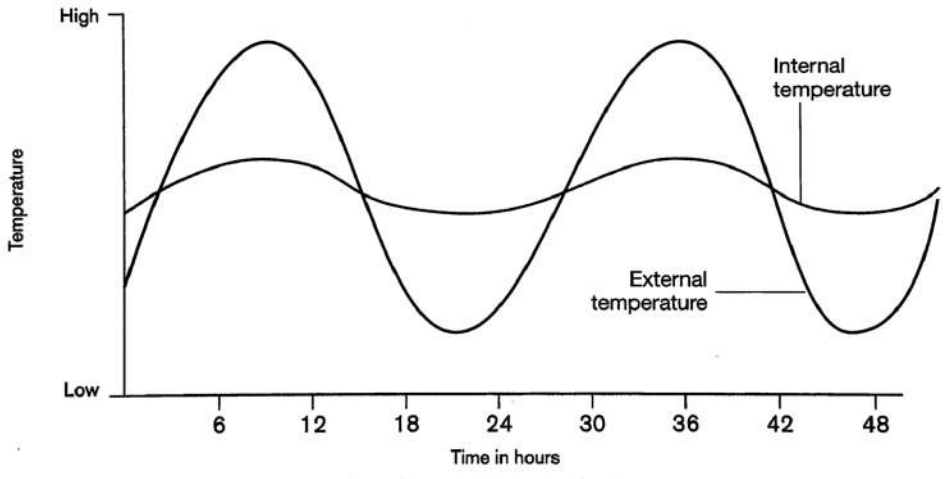
Example of hemp insulation

The built environment in the EU is responsible for approximately 40% of EU energy consumption and 36% of the CO_2 emissions. The construction sector accounts for about 50% of all extracted material and is responsible for over 35% of the EU's total waste generation. At present, about 35% of the EU's buildings are over 50 years old and almost 75% of the building stock is energy inefficient. The annual renovation rate of the building stock will need to at least double to reach the EU's energy efficiency and climate objectives (today it varies from 0.4% to 1.2%). In parallel, 50 million consumers struggle to keep their homes adequately warm or cold.

It is clear that the use of low-embodied-carbon bio-based materials is a key tool for the EU has to reduce buildings' carbon footprint while increasing their energy efficiency**. Hemp-based construction materials have an exceptional thermal performance which reduces energy consumption, while sequestering carbon**. They include hempcrete (a hemp-lime composite walling and insulation material), as well as hemp wool and fibre-board insulation.

Making one ton of steel emits 1.46 tons of CO_2, and 198kg of CO_2 are emitted to make one ton of reinforced concrete. Conversely, **one square meter of timber framed, hemp-lime wall** (weighing 120kg), without considering the energy cost for the transportation and placement of the material, **sequesters 35.5kg of atmospheric CO_2 for the lifetime of the building**.

In addition, hempcrete is **non-flammable, resistant to mould and bacteria, naturally regulates humidity and has an exceptional thermal and acoustic performance**.



Hemp provides both good insulation and thermal mass resulting in steady internal temperature and thus reducing the costs of heating and cooling.

Examples of a hempcrete building in Paris, France

The examples of hemp in the construction industry keep multiplying and gaining in efficiency. A three-story building at Bath University was constructed using a hemp-lime envelope and was so effective that they switched off all heating, cooling, and humidity control for over a year, maintaining steadier conditions than in their traditionally equipped stores, reducing emissions while saving a huge amount of energy. Very recently the first 8-storey hempcrete building was completed in France: a first for in Europe. After more than 30 years of hempcrete construction in Europe, which leads the rest of the world in this innovative construction method, thousands of new build and hempcrete homes exist and hundreds of hempcrete commercial buildings, however there is still work to do to upscale and mainstream this novel construction material which is still unfamiliar to much of the construction industry.

HOW CAN the EU HELP

If judiciously supported, e.g. by **public procurement policies and by demands on the market to produce low embodied energy buildings**, hemp construction materials can significantly contribute to achieving the objectives set out in the National Energy and Climate Plans and at sufficient scale, has the potential to support the achievement of the most ambitious targets in terms of energy efficiency and sustainability.

In order to steer a positive change, the EU has many strings to its bow. While a soft approach may well help direct consumers towards more sustainable products, a normative approach is necessary for driving change among business operators.

In particular, EIHA welcomes the proposals put forward by the Commission in the framework of the Green Deal and the New Industrial Strategy, aimed at imposing **stricter requirements in public procurement and broadening the scope of the Ecodesign directive**.

In parallel, EIHA strongly recommends that the idea of **sustainability certificates is explored**: this soft tool would ensure ease of comparison across a product range and thus facilitate more conscious consumer choice.

Finally, EIHA trusts that in the future **Built Environment Strategy and Renovation Wave initiative**, **bio-based material will be given particular consideration**, not only for their positive impact on carbon reduction and health and wellbeing, but also for the social and economic benefits that they are able to bring to our rural areas.

BIOCOMPOSITES AND PLASTICS ALTERNATIVES

MOLDING HEMP IN THOUSANDS OF SHAPES

By now, everyone on earth is aware that, whilst plastic is tremendously useful, the sheer amount of this synthetic material in our lives has become an environmental problem both at sea and on land, with a demonstrable impact on our environment and ecosystem. Governments have begun to acknowledge this and there is a growing expectation amongst the citizens of Europe that there will be some form of intervention.

Hemp luggage, produced in EU

Sustainable alternatives to synthetic plastics and composites already exist on the market. Several major European car manufacturers are already using hemp fibres in vehicle interiors. Why? Because, **hemp is light weight and as durable as steel**. The switch from the synthetic to the bio-based raw materials results in **higher energy efficiency** and provides a significant **reduction in emissions**.

It has been calculated that the serial implementation of the lightweight biomaterials on the high-volume vehicles will deliver a reduction of 40,000 t of CO_2 emissions and the ability to drive an additional 325 million km with the same quantity of fuel.

The 718 Cayman GT4 Clubsport: the driver and co-driver doors and the rear wing are made of an organic fibre mix, sourced from flax and hemp fibres.

The first and most famous attempt to use hemp in car structures was made in the late 1930s by **Henry Ford**, who conceived a hemp mix fibre car running on hemp derived biofuel. More recently, Renew Sports Car introduced a limited number of hand-made **custom-built vehicles made entirely from hemp**.

The possibilities offered in transports are virtually infinite: hemp is currently being studied in a R&D project promoted by SNCF, the French railway company, with the aim of substituting all petrol based parts of a train, but hemp materials could perfectly fit the needs of other sectors such the aviation and aerospace industry.

Hemp-based plastic ready to be molded

Furthermore, hemp is one of several plant based raw materials that can be used for **compostable packaging** which will contribute to a significant reduction in plastic waste. In 2017, the EU waste plastic mountain was reported as 25.8 million tons; around one third of this waste was recycled, with the remaining two thirds being incinerated or landfilled. Of the 51 million tons of new plastics placed on the EU market in 2018, approximately 40%, or 20 million tonnes, was used for packaging materials. The next step for the hemp sector is to submit an application for registering hemp fibre as food contact material.

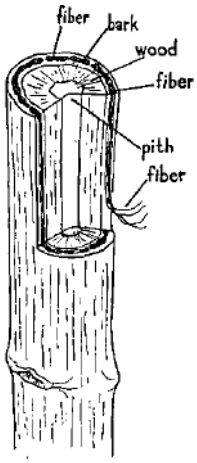
Hemp can be molded in any shape and for any purpose!

HOW CAN the EU HELP

R&D should focus more on the use of hemp, along other crops, for bioplastics and other bio-composites applications. Ad hoc EU project should be established.

TRADITIONAL MATERIAL FOR MODERN APPLICATIONS

Hemp uses significantly **less water and chemicals than cotton**. In 2005 the Stockholm Environmental Institute conducted a study comparing the ecological footprint of producing hemp, cotton, and polyester. The results show hemp being more ecologically neutral than other fibres, particularly in water usage. As an example, cotton requires 9,758 kg of water per kg while hemp needs between 2,401 and 3,401 kg of water per kg. This represents a **75% water saving**.



Section of a hemp stalk

As a consequence of these environmental positives, big brands from around the world are increasingly interested in hemp and some (IKEA, Patagonia and LEVI to name but three) already include hemp textiles in their ranges. Recent European R&D started developing hemp lyocell, an environmentally responsible skin soft fabric.

Hemp's use in the textile Industry is not new at all: together with flax, hemp is one of the **oldest natural fibres** used by humans. A remnant of an ancient hemp cloth was found by archaeologists in modern Iraq and was dated to 8,000 b.C.

For centuries hemp fabric was used not only for clothes, but also for the sails and rigging on ocean–going ships, because of its resistance to salt. **Without hemp, Columbus would have never been able to discover the New World**. The sails and ropes of his three ships were made of hemp.

Landing of Columbus, John Vanderlyn (1775-1852)

A **huge consumers market** existed for hemp fibres **until after World War II**. In the 1930s Russia's hemp area sown was almost 700,000 hectares, providing for 40% of Europe's hemp needs. In comparison, Italy and Yugoslavia accounted for up to 100,000 hectares each. Currently the EU combined barely grows 50,000 hectares.

During 1953 -1954 an Italian magazine entirely dedicated to hemp, brilliantly listed all the advantages of using hemp products in the modern house, featuring famous cinema and TV stars and promoting a quality seal of Italian hemp production. A few years after, things changed quite rapidly. Hemp production in Europe had a **sharp decline** as soon as the new synthetic fibres made their *grand debut* in the 1950s. Only France and some Eastern countries aligned to the Soviet Union retained their expertise and limited manufacturing facilities. Elsewhere, thousands of companies, working with natural fibres closed under the pressure of competition from new man-made fibre products.

Italian hemp quality seal (1953)

Hemp textiles continue to be produced in Europe, unfortunately because of the relatively high raw material prices, due to lack of fibre supply and the scarcity of manufacturing facilities, production is limited as it mainly represents a niche market. However, recent developments on the global scale have given a real **impetus to hemp fibre production**, particularly in China. Their army is issued with hemp uniforms and socks because hemp fabric is breathable, **naturally antibacterial, resistant to UV light, mold and mildew, and extremely durable**. Indian textile traders are eager to import hemp yarns and textiles for manufacturing, as is already the case for flax, and look to Europe as a possible high-quality source market.

Due to **a clear and growing interest from consumers** for natural and sustainably sourced fibres and products, an increased demand and **major growth** is expected in the **coming years**. With the need to re-localise essential production, this will probably be accelerated during the current reshuffling of the global economic system.

HOW CAN the EU HELP

Europe now has the unique **opportunity to rebuild a whole sector in a crucial moment**, sourcing knowledge, raw material, technologies and equipment from its Member States. A bold and ambitious **Textile Strategy** is needed to support the growth of a sustainable textile industry, as well as a broader engagement of stakeholders of the fashion and furniture industries.

The **green recovery plan** needs to take this into account and take dedicated action to promote hemp fibre, yarn and fabric manufacture for clothing, upholstery, bed, bathroom and table linen.

Manufactured **textile products should be compelled to include bio-based raw materials**, with the objective of reducing microplastics pollution.

Enhanced traceability and **sustainability certification** will also be key solutions in ensuring product quality and correct information for consumers.

Finally, **R&D priorities and funding** should be directed at enhancing production, transformation and quality of hemp.

PAPER PRODUCTS

A VIABLE ALTERNATIVE TO WOOD

The world's **first paper** was produced in China by Cai Lun in 105 b.C. and was made from a combination of mulberry, bark of trees, remnants of hemp rags and old fishing nets.

Today, approximately 80% of hemp paper produced is used for cigarette papers and other specific applications, but it has the potential to be used more widely as **heavy-duty cardboard, food packaging, sanitary papers** and also for **filtration** and **absorption** purposes. Past applications included a wide range of everyday products including banknotes, bank bonds and stamps.

Mature hemp stalks are **rich in cellulose**: they contain around 65-70% cellulose (wood contains around 40%, flax 65-75% and cotton up to 90%), and they only take **5 months to mature**. This high cellulose content coupled with the fast growth of hemp stalks – only few months, compared to years for forest wood – in an industrial setting typically yields a pulp **production up to 4 times that of a mature tree plantation**, on a hectare basis.

Furthermore, hemp paper can be **recycled 7-8 times**, compared with only 3-5 times for wood pulp paper.

Hemp paper **does not necessarily require toxic bleaching** chemicals as the whitening can be achieved with with hydrogen peroxide, however, there are other agents more preferable such as oxygen, ozone, peracids and polyoxometalates.

Whilst the demand for hemp paper is steadily increasing, current economic conditions do not make the production of large-scale hemp paper a competitive and viable option due to the vast difference in pulp prices which are affected by subsidies to the wood-pulp industry, economies of scale considerations as well as unequal laws governing the use of the whole hemp plant.

HOW CAN the EU HELP

Although specialist papers are increasingly popular, new opportunities may well arise for hemp paper again once the **legislation is adjusted and a thriving green hemp economy is established**.

To leapfrog the eco credentials of European hemp paper beyond what is currently available worldwide, **further R&D** into improving the current methods of retting and pulp production from toxic chemicals to natural methods is necessary. These higher production standards are currently being sought by clients including larger interests.

WHERE THE EU CAN HELP HEMP

Check our Hemp Manifesto for a green recovery!

FIRST, MAKE IT RIGHT: HEMP IS NOT A DRUG!

- *Member States should **not apply the drug control legislations** to hemp and its derived products, as long as the limits established for THC content are respected.*
- *Operators should be **allowed to harvest, produce from all parts of the plant – including flowers and leaves –** and market any kind of product, whilst maintaining compliance with the THC content limits.*

Industrial hemp products are **not drugs** (they do not have the potential to relieve pain and suffering) **nor narcotics** (there can be no misuse, abuse or dependence). Therefore, and reflecting in particular the spirit and objectives set out in the UN Single Convention on Narcotic Drugs, hemp and its derivatives should be considered outside the scope of international drug controls.

MAKE IT BIG: LET HEMP GROW

- *Public policies should **promote hemp use in food, feed and manufactured products** and finance the development of sustainable value chains in the EU.*
- *The **maximum THC level** allowed on the field **should be restored to 0.3%**, in order to allow the breeding of new varieties and to align the EU with international standards, making our farmers more competitive.*
- *Hemp and hemp preparations containing a naturally occurring cannabinoid content should **not be considered as novel food**.*
- ***Reasonable and science-based guidance values for THC** in food and feed should be established.*
- *All hemp derived raw materials should be **permitted as natural ingredients for cosmetics**.*

Hemp derived food, CBD and cosmetics markets are probably those where the hemp sector has already proved how it can deliver in terms of quality and sustainability. However, a **clear, common and science-based regulatory framework is still missing**. This uncertainty limits investments; hence, the proper development of a fibre and shive value chain.

MAKE IT THRIVING: INVEST IN A SUSTAINABLE FUTURE

- The **contribution to the environment of the hemp plant should be recognised** and the use of hemp for **carbon farming encouraged**.
- The EU should **value and promote the use of hemp fibres** for the production of short and long fibre for textiles and favour the establishment of sustainable value chains.
- The use of **hemp-based construction and other materials should be incentivised** both in public and private sectors, with clear goals for the total or partial substitution of other less sustainable alternatives.

A perfect circular economy will be achieved when hemp will finally be the object of massive **investments for valuing the lower part of the plant**, including the fibre for textile industry, the shives for construction materials and the carbon storage potential for offsetting emissions during the green transition. This will happen only if public policies will finally **recognise the real value of hemp in the decarbonisation of the economy.**

Find out more about our key policy requests on the Hemp Manifesto available in seven languages at the following link: https://eiha.org/hemp-manifesto/

WHERE HEMP CAN HELP THE EU

You will find below a list of policy initiatives encompassed by the European Green Deal, where hemp can make the difference.

EU Policy initiative	Where hemp can help!
Climate ambition	
New EU Strategy on Adaptation to **Climate Change**	Hemp growing is environmentally friendly and has many positive externalities on soil and biodiversity, that helps mitigating the effects of climate change. Being a source of bio-based raw material for a different range of sectors, hemp can dramatically help cutting the emissions in the textile, plastics and construction sectors. It can also be used as a valuable crop for carbon farming.
Industrial strategy for a clean and circular economy	
EU **Industrial strategy**	Hemp value chains can provide growth in rural areas, manufacturing and food processing industry. Processing requires high skilled workers ideally in proximity of the cultivation facilities.
Circular Economy Action Plan and initiatives to stimulate lead markets for climate neutral and circular products in energy intensive industrial sectors	Hemp-based materials are reusable, biodegradable and/or compostable. Hemp-based construction materials have an exceptional thermal performance which reduces energy consumption, while sequestering carbon. Hempcrete is non-flammable, resistant to mould and bacteria, naturally regulates humidity and has an exceptional acoustic performance. Insulation panels are exceptionally performative and used since many years. Hemp can be molded in different plastics materials, that can be used for packaging, technical purposes and are particularly indicated for the automotive industry, because of its strength and lightweight. Hemp textile is particularly interesting from and environmental point of view as it uses significantly less water and chemicals than cotton. Hemp fabric is breathable, naturally antibacterial, resistant to UV light, mold and mildew, and durable.

	Waste fibres from hemp can be transformed into carbon nanosheets and built into supercapacitors that out-perform the standard equivalent.
Greening the Common Agricultural Policy / 'Farm to Fork' Strategy	
Proposal for a revision of the **Sustainable Use of Pesticides** Directive to significantly reduce use and risk and dependency on pesticides and enhance Integrated Pest Management	Hemp already requires a low level of phytosanitary products and is a perfect crop for organic agriculture. When used in rotation it has positive effect on the yield of subsequent cultures and can be used as pioneer crop.
Proposal for a legislative framework for **sustainable food systems**	Hemp is a sustainable multipurpose crop. Nothing goes to waste and everything is upcycled. Local supply chains will need to be established to fully harness the potential of the hemp economy.
Determine the best modalities for setting minimum mandatory criteria for **sustainable food procurement** to promote healthy and sustainable diets, including organic products, in schools and public institutions	Hempseeds are particularly rich in high-quality proteins and have a unique essential fatty acid spectrum. Hemp feed can also serve as enhancer for the nutritional profile of animal products, particularly meat and eggs.
Review of the EU **promotion programme for agricultural and food products** with a view to enhancing its contribution to sustainable production and consumption	Funding should be granted to products respecting particularly high sustainable standards. Promotion programs could greatly benefit hemp fibres and encourage the reconstitution of textile value chains in Europe.
Review of the **EU school scheme** legal framework with a view to refocus the scheme on healthy and sustainable food	EU school scheme should encompass a wider range of products, including hempseed and hempseed oil, rich in fatty acids and other nutrients, particularly adapted for a healthy diet.
EU **carbon farming** initiative	Hemp could represent a great crop for carbon farming purposes. Its use should be encouraged with the aim of capturing carbon in the soils or in manufactured goods.
Examination of the draft **national strategic plans**, with reference to the ambitions of the European Green Deal and the Farm to Fork Strategy	Hemp being a rotation crop, it can bring additional revenues to farmers and give impetus to EU rural areas. Sectoral interventions coupled by rural development interventions will be key in enabling a fully-fledged circular bio economy based on hemp.

Preserving and protecting biodiversity	
EU **Biodiversity** Strategy for 2030	Hemp produces pollen for bees and other pollinators in a period of floral scarcity and nutritious seeds for wild birds. Hemp has a positive effect on soil health because it stabilises erosion, adds nutrients to the soil, naturally removes heavy metals and increases the yield of subsequent crops.
Measures to support **deforestation-free value chains**	Hemp is a good and sustainable source of cellulose for paper making that could help reducing deforestation.
Zero pollution action plan for water, air and soil	Hemp is an optimal pioneer crop, notably because of its phytoremediation capacity. It is a cadmium-tolerant plant and is resistant to long term exposure to other heavy metals.
Mainstreaming sustainability in all EU policies	
Proposal for a **Just Transition Mechanism**, including a Just Transition Fund, and a Sustainable Europe Investment Plan Renewed **sustainable finance strategy** Review of the relevant **State aid** guidelines, including the environment and energy State aid guidelines	Hemp sector has a sustainable approach to business that encompasses economic, social, environmental and public health considerations. Investments in the hemp sector should be encouraged as they would automatically generate positive environmental externalities and reduce dependence on fossil fuels and extraction activities.
Stakeholders to identify and remedy **incoherent legislation** that reduces the effectiveness in delivering the European Green Deal	EIHA is working at identifying bottlenecks and barriers to growth and has already started flagging them to the competent authorities.
Working together – a European Climate Pact	
Launch of the **European Climate Pact** / Proposal for an 8th Environmental Action Programme	EIHA is available for supporting the EU institutions with science-based and transparent information and to contribute to the shaping of the future of a more sustainable Europe.

RESOURCES AND BIBLIOGRAPHY

A MULTIPURPOSE CROP

- https://www.who.int/medicines/access/controlled-substances/UNSG_letter_ECDD41_recommendations_cannabis_24Jan19.pdf?ua=1

ENVIRONMENTAL EXTERNALITIES OF HEMP FARMING

- Hon, D.N.S. (1996) *"A new dimensional creativity in lignocellulosic chemistry. Chemical modification of lignocellulosic materials"*. Marcel Dekker. Inc. New York.
- Puls,J., J. Schuseil (1993) *"Chemistry of hemicelluloses: Relationship between hemicellulose structure and enzymes required for hydrolysis"*. In: Coughlan M.P., Hazlewood G.P. editors. Hemicellulose and Hemicellulases. Portland Press Research Monograph, 1993.
- Bjerre, A.B., A.S. Schmidt (1997) *"Development of chemical and biological processes for production of bioethanol: Optimization of the wet oxidation process and characterization of products"*, Riso-R-967(EN), Riso National Laboratory, Roskilde, Denmark.
- Anne Belinda Thomsen, Soren Rasmussen, Vibeke Bohn, Kristina Vad Nielsen and Anders Thygese (2005) *"Hemp raw materials: The effect of cultivar, growth conditions and pretreatment on the chemical composition of the fibres"*. Riso National Laboratory Roskilde Denmark March 2005. ISBN 87-550-3419-5.
- Roger M Gifford (2000) *"Carbon Content of Woody Roots"*, Technical Report N.7, Australian Greenhouse Office.

HEALTHY SOILS & BIODIVERSITY

- https://rodaleinstitute.org/science/articles/industrial-hemp-trials-preliminary-results
- Bócsa, Iván and Michael Karus (1998) *"The Cultivation of Hemp: Botany, Varieties, Cultivation and Harvesting"*.
- Lotz LAP, Groeneveld RMW, Habekotté B, van Oene H (1991) *"Reduction of growth and reproduction of Cyperus esculentus by specific crops"*. Weed Res 31:153–160
- Berger J (1969) *"The world's major fibre crops: their cultivation and manuring"*. Centre D'Etude de l'Azote, Zurich, p. 219
- Van der Werf, Hayo & MATHUSSEN, E & HAVERKORT, A. (1996) *"The potential of hemp (Cannabis sativa L.) for sustainable fibre production: A crop physiological appraisal"*. Annals of Applied Biology.
- Stickland D (1995) *"Suitability of hemp for ecological agriculture"*. In: Proceedings of the Symposium Bioresource Hemp, pp 255–258
- Michaela Ludvíková, Miroslav Griga (2019) *"Transgenic Fibre Crops for Phytoremediation of Metals and Metalloids"*, in Transgenic Plant Technology for Remediation of Toxic Metals and Metalloids.
- Linger, P. & Müssig, Jörg & Fischer, Holger & Kobert, J.. (2002), *"Industrial Hemp (Cannabis sativa L.) Growing on Heavy Metal Contaminated Soil: Fibre Quality and Phytoremediation Potential"*, Industrial Crops and Products. 16. 33-42.
- Angelova V, Ivanova R, Delibaltova V, Ivanov K. (2004) *"Bioaccumulation and distribution of heavy metals in fibre crops (flax, cotton and hemp)"* Ind Crops Prod. 19:197–205.
- Montford, Suzanne, & Small, Ernest, (1999), *"Measuring harm and benefit: the biodiversity friendliness of Cannabis sativa"*. In: Global biodiversity, 8(4), é-13.
- Nathaniel Ryan Flicker, Katja Poveda, Heather Grab, (2020) *"The Bee Community of Cannabis sativa and Corresponding Effects of Landscape Composition"*. In: Environmental Entomology, Volume 49, Issue 1, Pages 197–202.
- Seshadri, Arathi & O'Brien, Colton. (2019) *"Bee diversity and abundance on flowers of industrial hemp (Cannabis sativa L.)"*. Biomass and Bioenergy. 122, 331-335.

FOOD, FEED & FOOD SUPPLEMENTS

- Ujah, A.. (2014), "Phytochemical, proximate composition, amino acid profile and characterization of Marijuana (Cannabis sativa L.)."
- Callaway, J.C. (2004), "Hempseed as a nutritional resource: An overview". Euphytica 140, 65–72.
- Neijat, M., Suh, M., Neufeld, J. et al. (2016) "Hempseed Products Fed to Hens Effectively Increased n-3 Polyunsaturated Fatty Acids in Total Lipids, Triacylglycerol and Phospholipid of Egg Yolk". Lipids 51, 601–614
- Karlsson, Linda & Finell, Michael & Martinsson, Kjell. (2010). "Effects of increasing amounts of hempseed cake in the diet of dairy cows on the production and composition of milk". Animal : an international journal of animal bioscience. 4. 1854-60.
- https://www2.deloitte.com/content/dam/Deloitte/uk/Documents/consumer-business/deloitte-uk-plant-based-alternatives.pdf

CONSTRUCTION MATERIAL

- https://www.astm.org/Standards/E84.htm
- https://hemptoday.net/astm-fire-tests/
- https://ec.europa.eu/info/news/focus-energy-efficiency-buildings-2020-feb-17_en
- https://www.theguardian.com/sustainable-business/2014/sep/25/hemp-wood-fibre-construction-climate-change
  https://www.constructioncayola.com/batiment/article/2020/03/10/128238/batiment-beton-chanvre
- https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/31773/10-1266-low-carbon-construction-IGT-final-report.pdf
- Arrigoni, Alessandro & Pelosato, Renato & Melià, Paco & Ruggieri, Gianluca & Sabbadini, Sergio & Dotelli, Giovanni. (2017). "*Life cycle assessment of natural building materials: the role of carbonation, mixture components and transport in the environmental impacts of hempcrete blocks*". Journal of Cleaner Production. 149. 10.1016/j.jclepro.2017.02.161.
- Jami, Tarun & M.E Phd, Deepak & Agrawal, Yadvendra. (2016). "*Hemp Concrete: Carbon Negative Construction*". Emerging Materials Research. 5. 10.1680/jemmr.16.00122.
- Gauvreau-Lemelin, C., Attia, S. (2017) "*Benchmarking the Environmental Impact of Green and Traditional Masonry Wall Constructions*", International Conference on Passive and low energy architecture: design to thrive, 03-05 July, Edinburgh, United Kingdom.

BIOCOMPOSITES AND PLASTICS ALTERNATIVES

- https://tech.sncf.com/les-materiaux-bio-sources-la-promesse-de-ter-encore-plus-verts/
- https://www.aisslinger.de/hemp-chair/
- https://www.cnbc.com/video/2017/07/18/this-car-made-from-cannabis-is-stronger-than-steel.html
- https://www.aisslinger.de/hemp-chair/
- https://www.iom3.org/materials-world-magazine/feature/2016/aug/02/material-month-hemp
- http://www.renewsportscars.com
- https://abcnews.go.com/Technology/story?id=98529&page=1
- https://www.financialexpress.com/auto/car-news/forget-electric-cars-henry-fords-cannabis-car-was-made-from-hemp-10xstronger-than-steel-100-green/1384733/
- https://www.ansa.it/canale_motori/notizie/analisi_commenti/2019/08/02/agosto-1941-debutta-prima-e-unica-automobile-di-cannabis_227eb832-a285-4f56-8617-4742b4a291b2.html
- https://mediamanager.sei.org/documents/Publications/SEI-Report-EcologicalFootprintAndWaterAnalysisOfCottonHempAndPolyester-2005.pdf
- https://www.faurecia.com/en/newsroom/breakthrough-lightweight-biomaterials-gains-momentum
- https://newsroom.porsche.com/en/products/porsche-world-premiere-new-718-cayman-gt4-clubsport-16733.html
- Autocar Pro News Desk 3/2018

FIBRES and TEXTILE

- https://www.mit.edu/~thistle/v13/2/history.html
- https://canapaindustriale.it/2013/08/29/canapa-la-rivista-per-donne-del-1954/
- https://www.ikea.com/gb/en/p/heddamaria-cushion-cover-natural-striped-50455917/
- https://www.patagonia.com/shop/hemp-clothing
- https://www.levi.com/US/en_US/blog/article/levis-wellthread-x-outerknown-present-cottonized-hemp/
- https://hanf-lyocell.de
- https://www.museodellacanapa.it/it/blog/post/canapa-tessuto-che-dura-un-secolo_11.html
- https://www.scriptiebank.be/sites/default/files/VanEyndeHannes_KUL_Eindwerk.pdf
- Khan, B. A., Warner, P., and Wang, H. (2014). "*Antibacterial properties of hemp and other natural fibre plants: A review*," BioRes. 9(2), 3642-3659.
- Hao, X. M., Yang, Y., An, L. X., Wang, J. M., & Han, L. (2014). "*Study on Antibacterial Mechanism of Hemp Fibre*" . Advanced Materials Research, 887–888, 610–613. https://doi.org/10.4028/www.scientific.net/amr.887-888.610
- Cherrett, N., Barrett, J., Clemett, A., Chadwick, M. and Chadwick, M. J. (2005). "*Ecological Footprint and Water Analysis of Cotton, Hemp and Polyester*". Report prepared for and reviewed by BioRegional Development Group and World Wide Fund for Nature – Cymru. Stockholm Environment Institute.
- La Rosa, A.D.; Grammatikos, (2019) "*S.A. Comparative Life Cycle Assessment of Cotton and Other Natural Fibres for Textile Applications*". Fibres, 7, 101.

PAPER PRODUCTS

- https://www.mit.edu/~thistle/v13/2/history.html
- http://agro.icm.edu.pl/agro/element/bwmeta1.element.agro-c9eb2861-1d46-4802-9aad-f24e907d5666/c/134_Annals91.pdf
- Małachowska, Ewa, Piotr Przybysz, Marcin Dubowik, Marcin Kucner and Kamila Przybysz Buzała (2015) "*Comparison of papermaking potential of wood and hemp cellulose pulps*." Annals of Warsaw University of Life Sciences - SGGW. Forestry and Wood Technology 91.
- Craciun, Grigore & Dutuc, Gheorghe & Botar, Alexandru & Puitel, Adrian & Gavrilescu, Dan. (2010) "*Environmentally friendly techniques for chemical pulp bleaching*". Environmental Engineering and Management Journal. 9. 73-80.