



# EXPERT WORKSHOP ENVIRONMENTAL SUSTAINABILITY OF CROPS FOR BIO-BASED INDUSTRIES IN EUROPE

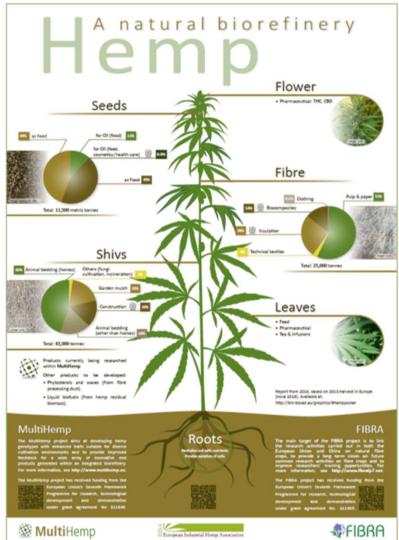
Wednesday 26 June 2024 - 12.00-15.45 Room Samena

Efthymia ALEXOPOULOU CRES

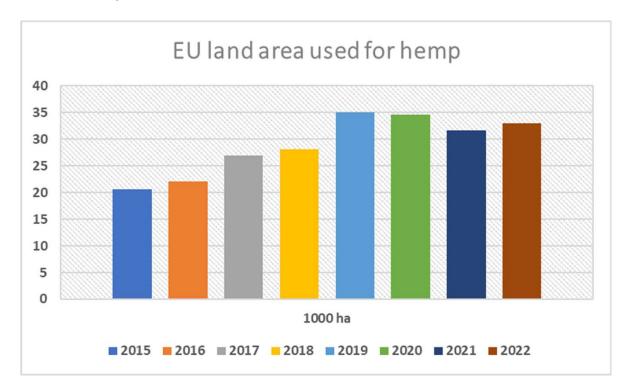




## **Industrial hemp**



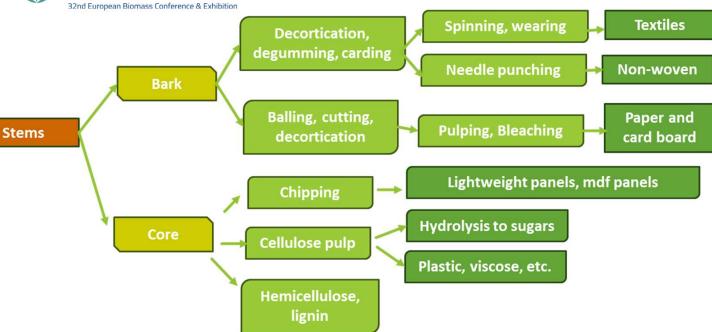
- Hemp is a natural biorefinery since the whole plant can be used for biobased products.
- In Europe the area of its cultivation in 2022 was 33020 ha (179000 tones). It should be pointed out that till 2014 was up to 14000 ha. The main producer is France.



## EUBCE 2024

## **Industrial hemp**

## EFTHYMIA ALEXOPOULOU CRES



- Although the area of its cultivation has been increased, still their value chains need to be improved to fully exploited the produced biomass.
- It can be used on contaminated lands to produce biomass and to contribute to their decontamination (like GOLD project).

In MIDAS project it was selected **as key industrial crop for marginal lands facing natural constraints** and it is grown on innovative intercropping systems and its biomass is being used for resins, insulation materials, particle boards and its remaining as being used for bioenergy.

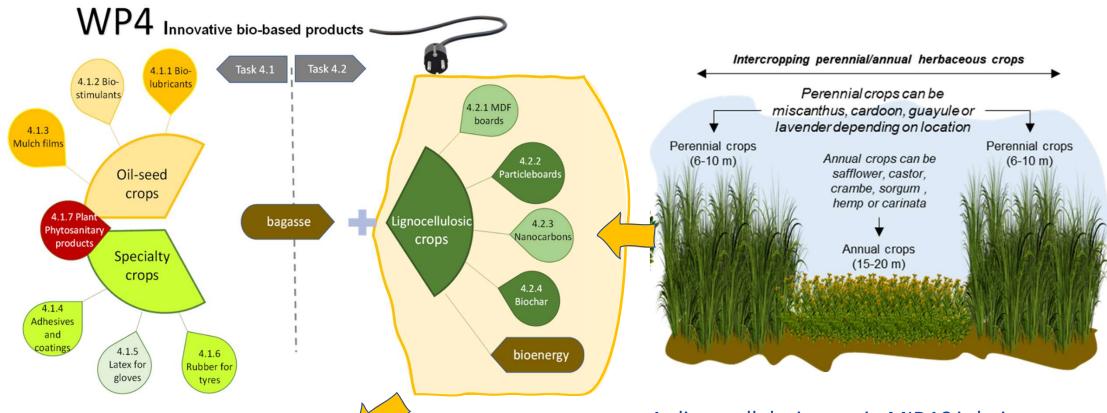




Hemp and sorghum (annual), miscanthus, tansy (perennial crops), willow, poplar and Siberian Elm (woody species) Biomaterials (mdf panels, insulation materials, nanocarbons, biochar) and bioenergy



### **Industrial hemp in MIDAS**

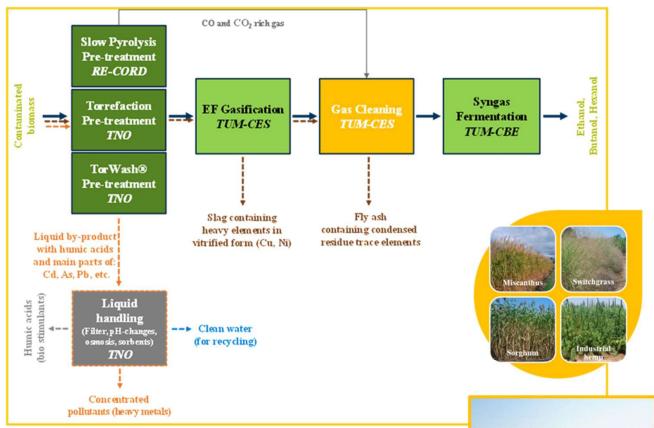


The end applications of hemp in MIDAS project

As lignocellulosic crop in MIDAS is being grown in intercropping with other annual and perennial industrial crops like safflower and miscanthus, etc.



#### **Industrial hemp in GOLD**



- In GOLD project industrial hemp has bee selected as key high yielding lignocellulosic crop to be grown on contaminated lands. Its feedstock is being used for advanced biofuels production.
- In this way industrial hemp is being used for land decontamination and biomass provision to feed the biofuels biorefineries. It is contributing to land remediation.

View of hemp trials operated by AUA in Lavrion







#### **Industrial hemp in**



- Innovative phytomanage ment solutions that will be tested and validated on site
- Development
   of bio-based
   products and
   applications
   from the
   produced
   biomass
   feedstock

#### Crops optimization and phytoremediation strategies

- > 16 microbial consortia to be applied in C&S soils as biofertilizers
- >4 improved genotypes

Sustainability assessment of the under study value chains

- > 20 pathways (biomass-toproducts) will be studied
- A DSS will be developed
- >2 business models
- Regulatory framework

#### High yielding industrial crops



#### Added value biobased products

- From oilseeds: 3 intermediate (dicarboxylic acids, active ingredient, proteins) and 4 end-products (monomers for bioplastics, coatings, resins).
- From lignocellulosic crops: 4

   intermediate (proteins, phenolics, cellulose, nanocellulose) and 3 end products (resins, particle boards, adhesives).
   From bast fibre crops (hemp and nettle): 3 intermediate (long and short fibers, chips) and 3 final products (particle boards, biocomposites and molding biomaterials).

#### Field Case Studies on C&S soils; farmers co-creation

- Contaminated and Saline soils (C&S);
   4 sites each
- 8 FCSs on C&S soils
- 8 high-yielding industrial crops (oilseeds and lignocellulosic ones)
- 8 FGs (>15 farmers each/FCS) for cocreation solutions
- >1 lighthouse/FCS

Curing contaminated and/or saline soils by growing industrial crops and getting low ILUC feedstock to support the biobased industry









