

BeonNAT project advances in developing sustainable bio-based products facing the last phase of its journey

- The team is developing eight new eco-friendly products to replace fossil-based materials.
- Adaptation strategies following the destruction of a key plantation site.
- Significant improvements in essential oil extraction and biochar production.

The BeonNAT project continues to make significant progress towards its ambitious goal of transforming Europe's marginal lands into valuable sources of forest biomass. This initiative aims to develop **eight innovative biodegradable and sustainable products**, offering viable alternatives to fossil-based materials and contributing to a more eco-friendly economy.

Recent developments include a significant setback due to the destruction of a key plantation at the MOARA site. The team has effectively responded by sourcing *Betula* biomass from a German plantation, showcasing their resilience and adaptability. To address potential biomass shortages, the project is exploring temporal alternatives such as sourcing from wild areas and adjusting harvest quantities to ensure continuous progress and project success. The project team is actively working on collecting and processing biomass from various species across Europe. For example, in Spain, species such as *Cistus* and *Ulmus* are being harvested and prepared for distribution. Despite some delays and challenges with specific plantings, efforts are being made to optimize biomass yield and ensure that all required materials are available for subsequent testing phases.

The project has also achieved notable advancements in the extraction and optimization of essential oils and plant extracts. Enhanced processing conditions have produced high-quality essential oils from species like *Rosmarinus officinalis*, *Cistus ladanifer*, and *Juniperus communis*. However, some extracts still require further refinement to enhance their bioactivity and suitability for commercial applications.

In addition, the project has made substantial progress in developing bioplastics and biochar. The production of lactic acid—used for bioplastics production—is yielding encouraging outcomes. The transfer of lactic acid production from lab to technical scale was successful. Purified lactic acid from selected wild materials is currently investigated for its potential to be polymerized, demonstrating positive results for getting poly-lactic acid (PLA). Additionally, the development of biochar and activated carbon through slow oxidative pyrolysis is enhancing the material's properties for various applications, including soil improvement and odor control.

The project is evaluating the potential of selected tree and shrub species for wood pulp and particleboard production. Tree species, particularly *Ulmus pumila* and *Betula pendula*, are promising for pulp production, resulting in pulping yields that are notably higher than those for shrub species. Regarding particleboard production, early tests indicate variability in board properties, and further optimization is planned to improve product quality while adhering to formaldehyde emission standards.

BeonNAT has conducted extensive market analyses and sustainability assessments. The project's findings highlight the growing demand for essential oils and the need for more sustainable production methods. Additionally, environmental and socio-economic life cycle assessments are being refined to ensure that the project's products contribute positively to both the environment and the economy.

As BeonNAT moves forward, the team remains dedicated to overcoming challenges, optimizing production processes, and improving product quality. Future activities will center on finalizing evaluations, addressing any issues that arise, and supporting the broader adoption of these sustainable bio-based products.



About BeonNAT. The BeonNAT project is a groundbreaking initiative aimed at transforming marginal lands in Europe into sources of sustainable biomass. By developing new bio-based products and materials, BeonNAT seeks to address climate change, enhance resource efficiency, and foster economic growth within the bio-based economy.

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