

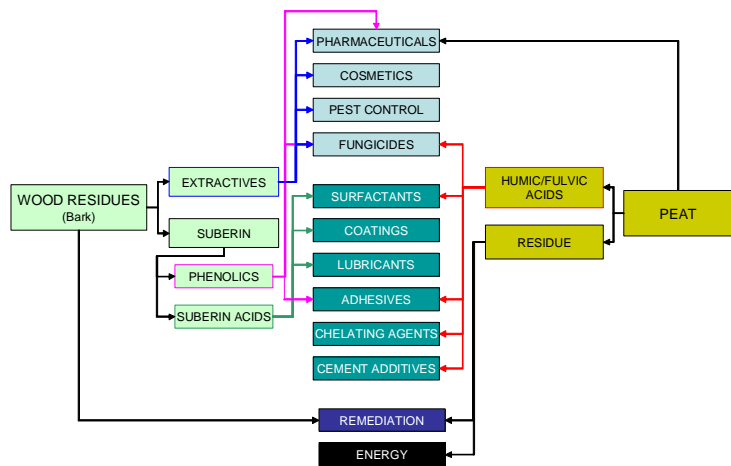
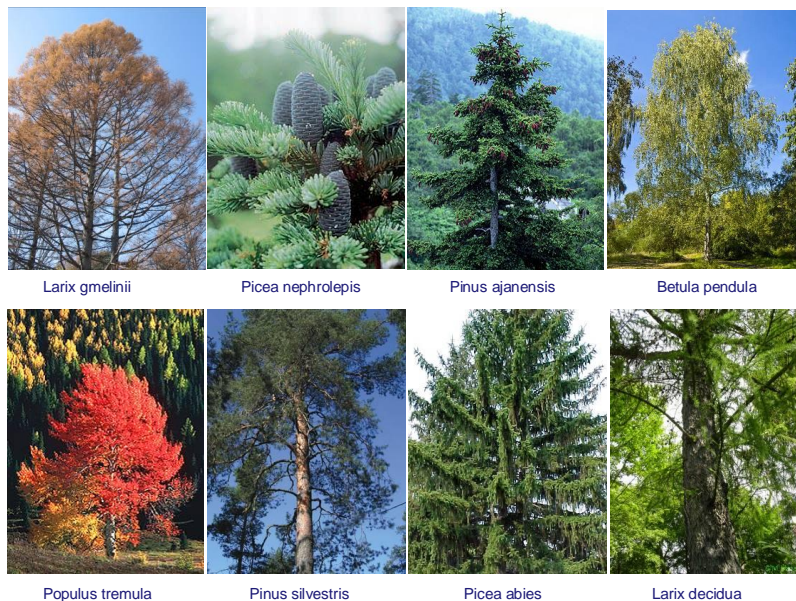
# Bioactive compounds from bark



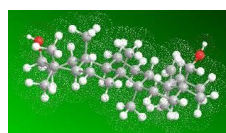
Wood Bark and Peat Based Bioactive Compounds, Speciality Chemicals, and Remediation Materials: from Innovations to Applications

European pulp mills produce annually about 4.3 Mt of bark as a by-product. It is mainly used as a marginal energy source with low economic value. The possibilities of using bark as a raw material for high value-added bioactive compounds, speciality chemicals, or for remediation, have gained only moderate attention. For example in white birches 30-40% of bark consists of the bioactive triterpenoid betulin, whose chemical properties make it an attractive starting material e.g. for various pharmaceutical applications. A new EU-project FORESTSPECS (2009-2012) investigates the potential applications of bioactive molecules from the bark of at least eight economically important tree species, expanding our previous work, which focused on birch.

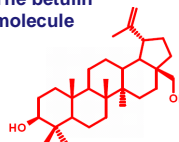
Bark research at the Department of Applied Biology, University of Helsinki, focuses on the pest antifeedant properties of bark extractives, for their potential use in plant protection.



The strategy and value chain for upgrading of wood residues and substances of humic origin to value-added chemicals and materials in FORESTSPECS. The chart describes the two main types of basic raw materials as the starting points (bark on the left and peat on the right hand sides of the chart), the value-added secondary raw materials (towards the middle), and their possible application areas (middle of the chart) as bioactive substances (upper part, light blue), speciality chemicals (middle part, turquoise), as core substances in remediation materials (lower part, dark blue), or as sources of energy (bottom; not a topic for FORESTSPECS).



The betulin molecule

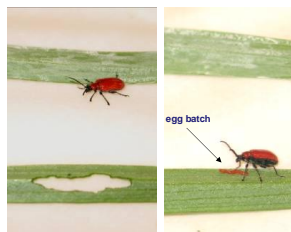


## The FORESTSPECS consortium:

Participant No.	Participant Organization Name	Country	Contact person
1 Co-ordinator	University of Helsinki (UH/EL)	Finland	Prof. Heikki Hokkanen
2	Technical Research Centre of Finland (VTT)	Finland	Dr. Saima Koskimies
3	St Petersburg State Medical Academy (SPSMA)	Russia	Dr. Alexander Shikov
4	University of Surrey (UNIS)	United Kingdom	Prof. Dulcie Mulholland
5	Northern Research Institute of Forestry (NRIFF)	Russia	Dr. Natalia Demidova
6	Far East Forestry Research Institute (FEFRI)	Russia	Dr. Yuri Tagiltsev
7	Research Institute for Organic Agriculture (FiBL)	Switzerland	Dr. Lucius Tamm
8	Trifolio-M (TRIM)	Germany	Dr. Hubertus Kleeberg
9	Oy Granula Ab Ltd (GRAN)	Finland	Dr. Thomas Ahnäs

## Birch bark compounds as antifeedants

Betulin and some of its derivatives have shown strong antifeedant properties towards many important pest species. Scarlet lily beetles (*Galerucella tenella*) avoid feeding and ovipositing on treated leaves, and cabbage white butterflies rather starve than eat foliage treated with a simple derivative of betulin, the betulonic acid. We have shown similar bioactivity with many other pests (e.g., *Deroceras* slugs, *Phyllotreta* flea beetles, *Mamestra* cabbage moths).



Scarlet lily beetles *Liloceris lili*



Cabbage white butterfly *Pieris brassicae*

