

## Company Profile

**Headquarters:** Helsinki, Finland  
**Major products:** Integrated bio and forest (biofore) industry (energy and pulp, paper, engineered materials)  
**Further information:** [www.upm.com/en](http://www.upm.com/en)

As the frontrunner of the new forest industry, UPM is leading the integration of bio and forest industries into a new, sustainable and innovation-driven future. UPM creates value from renewable and recyclable materials. Cost leadership, change readiness, engagement and safety of its people form the foundation of UPM's success.

UPM comprises of three business groups: energy and pulp, paper, and engineered materials. In 2011, UPM's sales exceeded €10 billion. UPM has production plants in 16 countries and it employs approximately 24,000 people worldwide. Its shares are listed on the NASDAQ OMX Helsinki stock exchange.

The current line of products includes paper, pulp, labels, energy, timber, plywood and forest services. UPM sees future opportunities in biofuels, composites and biochemicals.

## Challenges and How UPM Takes Responsibility

UPM products are based on renewable and recyclable raw materials and are produced with due care for resources, eco-systems and local communities. UPM has established a series of 11 principles covering the three pillars of economic, social and environmental responsibility.

The basis of UPM's business is the raw material of wood. Safeguarding biodiversity is a key part of sustainable forest management; therefore UPM has developed a global biodiversity programme that aims to maintain biodiversity in forests.

Sustainable commercial forestry is one of the solutions to the big questions on earth. Global forest loss is a driving factor behind species extinctions and global warming. Sustainable forestry significantly alleviates both of these problems.

## Best Practice: Sampling Mycorrhizal Fungi Across Habitat Types on UPM-Blandin Forestlands

### Fields of Action

- Sites and facilities
- Supply chains, commodities and materials
- Product
- Production and manufacturing processes
- Transport and logistics
- Personnel

### The Issue

Mycorrhizal fungi are essential components of forest ecosystems and play multiple roles in sustaining forest health. Almost all plants, including most tree species, form long-term, beneficial associations with mycorrhizal fungi. These associations are necessary for both the plant and the fungus. Plants deprived of these fungi often display reduced growth and signs of nutrient deficiencies.

Mycorrhizal fungi grow around and through living plant roots and contribute to water absorption and uptake of nutrients, including nitrogen and phosphorous. In certain cases, mycorrhizal fungi also protect roots from pathogens and can make plants more resistant to droughts. In return for these benefits, plants transfer carbohydrates and sugars produced in the leaves to the below ground fungus.

Mycorrhizal fungi were surveyed across a range of habitat types on UPM-Blandin forestlands from 2002 through 2007.





## The Response

The objective of this project was to complete an evaluation of the ectomycorrhizal fungal communities associated with particular habitat types on UPM-Blandin forestlands. Surveys of this type are useful for characterizing the relative abundance and importance of mycorrhizal fungi within particular stands. In addition, by surveying fruiting bodies, the data is limited to species capable of successfully reproducing in these stands. This information can then be used to help identify the particular fungal species that are important in maintaining forest health and vigor on particular habitat types.

Surveys of this nature require multiple years of data to establish links between the ectomycorrhizal fungal community and different habitat types. The surveys accomplished for this project were some of the most ambitious ever carried out for ectomycorrhizal fungi in the midwestern United States. Based on literature surveys, this study represents the longest systematic survey of mycorrhizal fungi ever conducted in Minnesota.

UPM's Blandin operation will continue to manage the forest under its unique Smart Forestry System, which is designed to enhance productivity and support economic and environmental sustainability. The land is certified to comply with the International Sustainable Forestry Initiative. At 76,000 hectares, it defines what is meant by "un-fragmented forest" and stitches together over 9,000 square kilometers of public lands to create a vast area for wildlife to roam and water to flow.

## The Results

In total, 221 species of mycorrhizal fungi were found within the 25 plots. After six years of sampling, the average plot was found to support 20.3 species of ectomycorrhizal fungi, while the average subplot contained 5.8 species. On any given year, an average plot contained 4.2 species of ectomycorrhizal fungi, with 1.2 species per subplot.

During the course of this study, many interesting species were encountered, including many rarely collected species, many species that may be unnamed and new to science, as well as many well-known edible and poisonous species.

Ectomycorrhizal fungi present many interesting management challenges. These species contribute significantly to forest health and appear to have their own set of habitat requirements. While it is difficult to determine whether ectomycorrhizal species occur on particular sites because of particular tree species, or whether particular tree species occur on sites because of particular fungal species, it is clear that both partners are needed to sustain healthy and productive forests.

Ectomycorrhizal fungi are integral parts of forest ecosystems, yet many species remain relatively unknown and some species may have populations that are at risk or threatened. In particular, species that are desirable edibles or that have specific habitat requirements could be at greatest risk from factors such as human disturbance or climate change.

More information is needed to better assess the diversity and population dynamics of ectomycorrhizal species in north central Minnesota. Surveys such as this will hopefully provide baseline data for future work that integrates mycorrhizal fungi into forest management and sustainability guidelines. Without further investigation, many of these interesting and important fungi may be lost before their roles in forest health are fully understood.