ECTOMYCORRHIZAL FUNGI IN URBAN FOREST ENVIRONMENTS

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Ectomycorrhiza is mutualistic interaction of tree roots with certain soil fungi representing a key element of forest ecosystem processes. The symbiosis enables bidirectional nutrient transport, protects plants from drought, pests and abiotic toxic elements. The majority of ectomycorrhizal fungi belong to Basidiomycota or Ascomycota. Many are know for their culinary, medicinal and other values and their collection represents an important recreation activity among population.

Proposed questions and issues to be solved partially or completely within the project:

1. Set up a methodology for representative and statistically supported sampling and monitoring of fungi based on their sporocarps occurrence / ectomycorrhiza presence and the biology of selected fungal species

- Definition of individuum, sampling units and their form, proper sampling approach base, sampling area, repetition etc.)
- This is a part of broader task related to the project

2. Analyse the diversity of epigeous sporocarps of ectomycorrhizal fungi in urban forests (on sites with high/low impact)

- Mapping of fruiting bodies and their identification using morphological and molecular approach (if required)
- Output: definition and quantification of potential commercial species and the contribution to fungi diversity of urban forest sites

3. Analyse the diversity of ectomycorrhizae in urban forests (on sites with high/low impact)

- Soil coring and analysis of vital ectomycorrhizae from more or less impacted sites
- Morphological and/or molecular approaches for identification are proposed
- As an option we propose use of pyrosequencing for faster analysis of pooled samples
- Output: the contribution to below-ground diversity of urban forest sites

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4. Summarise points 2. and 3. into an overall diversity of ectomycorrhizal fungi.

- Application of various diversity indices.
- Output: widely comparable diversity indications and potential indicators for long-term human impact assessment.

5. Monitor the occurrence and dynamics of fructification of selected ectomycorrhizal fungi (as sporocarps) according to the level of human impact on sites.

- We propose selection of few popular species among mushroom pickers, locate their presence (mycelia) in sites and perform a long-term monitoring of fructification in relation to the intensity of the human impact with possible implication for evaluation of the commercial value of extracted sporocarps.
- Output: assessment and quantification of de facto contribution of fungi to the recreation activities and to picker's income.

6. Compare each of the approaches above with comparable yet more natural forests in vicinity of urban centres.

- We propose to perform each of point 2-5 in urban forest sites and (if available and feasible within other tasks and projects) in comparable sites outside the urban area

References:

GREBENC, CHRISTENSEN, VILHAR, ČATER, MARTIN, SIMONČIČ, KRAIGHER 2009. Response of ectomycorrhizal community structure to gap opening in natural and managed temperate beech-dominated forests. *Can. j. for. res.* 39(7):1375-1386

MARJANOVIĆ, GREBENC, MARKOVIĆ, GLIŠIĆ, MILENKOVIĆ 2010 Ecological specificities and molecular diversity of truffles (genus Tuber) originating from mid-west of the Balkan Peninsula. *Sydowia* 62(1):273-291

BENUCCI, GREBENC, etal. 2011 Ectomycorrhizal communities in a productive Tuber aestivum Vittad. orchard : composition, host influence and species replacement. *FEMS microbiol. ecol.*, 2011 76(1):170-184

GREBENC, KUTNAR, BOŽIČ, ČAS 2011 Case studies of forest ecosystem biodiversity assessment at gene, species and habitat level. *Les (Ljubl.)* 63(5):154-160

MAŠEK, GREBENC 2011 Beech (Fagus sylvatica L.) ectomycorrhiza and fine roots in mature forests, regeneration stands and on seedlings. *Les (Ljubl.)* 63(5):192-196

BAJC, ČAS, BALLIAN, KUNOVAC, ZUBIĆ, GRUBEŠIĆ, ZHELEV, PAULE, GREBENC, KRAIGHER 2011 Genetic differentiation of the Western Capercaillie highlights the importance of South-Eastern Europe for understanding the species phylogeography. *PLoS one*, 6(8) 15pp http://dx.doi.org/10.1371/journal.pone.0023602