# FunDivEUROPE

**Functional significance of forest biodiversity in Europe**

Project number: 265171

# Abundance of beneficial organisms for pest regulation

FunDivEUROPE (FP7) field protocol

V1.0

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**Content**

# 1 Introduction

Biodiversity is known to be a key factor for the regulation of pest activities, but the influence of tree species diversity on the level of regulation and the level of population of beneficial organisms is not clearly understood. High tree species diversity is supposed to allow the development of a richer beneficial community and to induce a lower impact of pest species.

# 2 Objective

In the Exploratory Platforms, the two protocols will aim at measuring: (1) the relationship between tree species diversity and the density and diversity of the populations of beneficial insects (Carabids); (2) the relationship between tree diversity and the level of damage observed on tree seedlings under different experimental levels of exclusion from the influence of beneficial organisms (mainly insectivorous birds).

Carabids are generalist predators of other insects and slugs. They can have an impact on pest populations, in the forest as well as outside the forest.

# 3 Protocol 1: Carabid density and diversity

Three pitfall traps will be installed in each plots of half of the Exploratory sites the first year (2012) and the others the second year (2013).

We will use manufactured pitfall traps with a rain shield. Around 450 traps will be needed each year. They will be filled with a solution of conservative liquid (Glycol).

**Figure 1:** Example of a pitfall trap to be buried in the soil. Insects fall in the trap while walking. Trap can be filled with conservative liquid. Size: 10*15. Price: 10$.

The three pitfall traps will be placed on a 3 m triangle located in the core area of the plot but in a place without trampling and away from the experimental designs that will modify ground surface or plant composition. Traps will be installed and closed during at least 15 days in order to reduce the influence of the disturbance by installation. They will be opened for catching twice in summer: 15 days mid-June, 15 days mid-august. Installation procedure will be documented in order to be done by site technicians.

The content of the traps will be sorted out by field technicians to select the main carabid species, thanks to a photo-board for the identification of a set of morpho-species. They will be stored in a jar with alcohol and collected by the PhD student in charge of this protocol for final identification at the end of summer. The insects captured by each trap for each date will be kept separated in order to estimated intra-site variability and trapping efficiency, and to distinguish between early and late communities of carabids. The remaining part of the catching will be store in freezer for quality check (to verify if the sorting did not leave too many carabids). Quality control will be done by the PhD student on a random set of samples.

On each site, we need place to store empty and full jars, alcohol, and a place where to sort out trap catches.

Before field sampling, the PhD student will have to select the manufactured trapping device and will prepare the detailed procedure on how to set them up in the field; He/she will prepare a photo-board and a procedure to sort out rapidly a selected set of morpho-species and all the equipments (jars, alcohol) needed to store the samples.

# 4 Protocol 2: Influence of bird exclusion on damage by herbivory on trees

In close relationship with the protocol "Assessment of forest insect and pathogen damage on mature trees", we will measure how the different levels of experimental exclusion applied to sentinel trees can influence herbivory damage.

Once a year, herbivory damage will be measured on the 27 sentinel trees (see Assessment of forest insect and pathogen damage on mature trees"). The differences of damage between the different levels of exclusion (no exclusion, mammal exclusion, bird and mammal exclusion) will be analysed as a measure of the level of control of herbivory induced by bird predation on insect herbivores.