

### **C.1. DESCRIPTION FOR THE GENERAL PUBLIC**

The main aim of this project is to predict potential geographical distributions of the pine-tree lappet moth (*Dendrolimus pini* L.) and to evaluate the risk of invasion by this species on a global scale. To achieve the main objective of the project it is necessary to conduct important experiments and observations dealing with a number of key questions. We will try to answer the following questions:

**Which factors are responsible for the phenomenon of the large diversity of body sizes and duration of development of larvae?** Theory predicts that larger mothers tend to produce more and larger offspring. Egg size is an important life-history trait because it affects hatching time, survival, duration of development, and larval body size. We therefore expect that the effect of egg size on both growth development of the larvae and adult insect parameters (during rearing on comparable quality food) will help answer the question.

**Why pine-tree lappet larvae prefer 1-year-old needles of Scots pine?** Pine-tree lappet larvae feed especially on old needles of Scots pine *Pinus sylvestris* L. After all of the old needles are consumed, the larvae start to feed on young needles. Food quality (here understood as the quality of needles differing in age) has a significant effect on herbivorous insects. In the laboratory we will rear larvae on different foliar age classes (no choice) and on a proportionally mixed diet to determine a number of parameters characterizing their growth and development.

*The answers to the first and second questions are necessary and will be directly used in experiments examining the effects of 20 species of pines on pine-tree lappet moth.*

**Which species of pine, that are important from an economic point of view, are accepted by pine-tree lappet larvae and how do they affect their growth and development?** Suitability classification of pine hosts for the pine-tree lappet moth will be based firstly on survival and feeding preferences, and then on mean body mass gain and other measured parameters of growth and development. We will focus on pine species that are widely distributed and commercially valuable.

**Which factor, climatic conditions or availability and acceptance of new host plant species, more strongly determines the geographical distribution of pine-tree lappet moth?** It is assumed that the distribution of species of herbivore should coincide with the distribution of its primary host plant. Although pine-tree lappet moths have well-developed wings and are strong flyers, they have not managed to colonise the whole area of occurrence of Scots. We therefore expect that the effect of climatic variables will be revealed as a strongly limiting factor determining the potential distribution of pine-tree lappet moths throughout the world. The potential distribution of pine-tree lappet in the world will use maximum entropy model to perform ecological niche modelling, which can predict the potential distribution of the pine-tree lappet by identifying areas with environmental conditions that will allow them to survive.

We distinguished research tasks and plan to carry out three main experiments that results will serve to prepare model of potential distributions of the pine-tree lappet moth in global scale. There is a need for comprehensive basic research concerning the pine-tree lappet moth, because it is an economically harmful defoliator of pine forests in Europe. As of now, however, the suitable habitats and potential distribution of the species in the world are unknown. Measurable effect of the project will be broad discussion and development of appropriate steps to limit the risks of introduction to particular regions of the globe. The main goals of the proposed project will be prediction of the potential geographical distributions of the pine-tree lappet, acquiring new knowledge concerning acceptance of new host plants by this oligophagous species, and contribution to a better understanding of invasion ecology and interactions in the host plant–herbivorous insect ecological system. In the future, results of this study can be the basis for the development of strategies for limiting the uncontrolled spread of potentially invasive species, which will result in the protection of trees and pine stands, and decrease risks to human health (protection against larval allergens). In addition, popularisation of general aspects of ecological entomology and this project will be carried out in the global community. The place and channel of communication will be a new website/news photo-blog, where research topics and received results of the project will be published in a style accessible to the recipient.