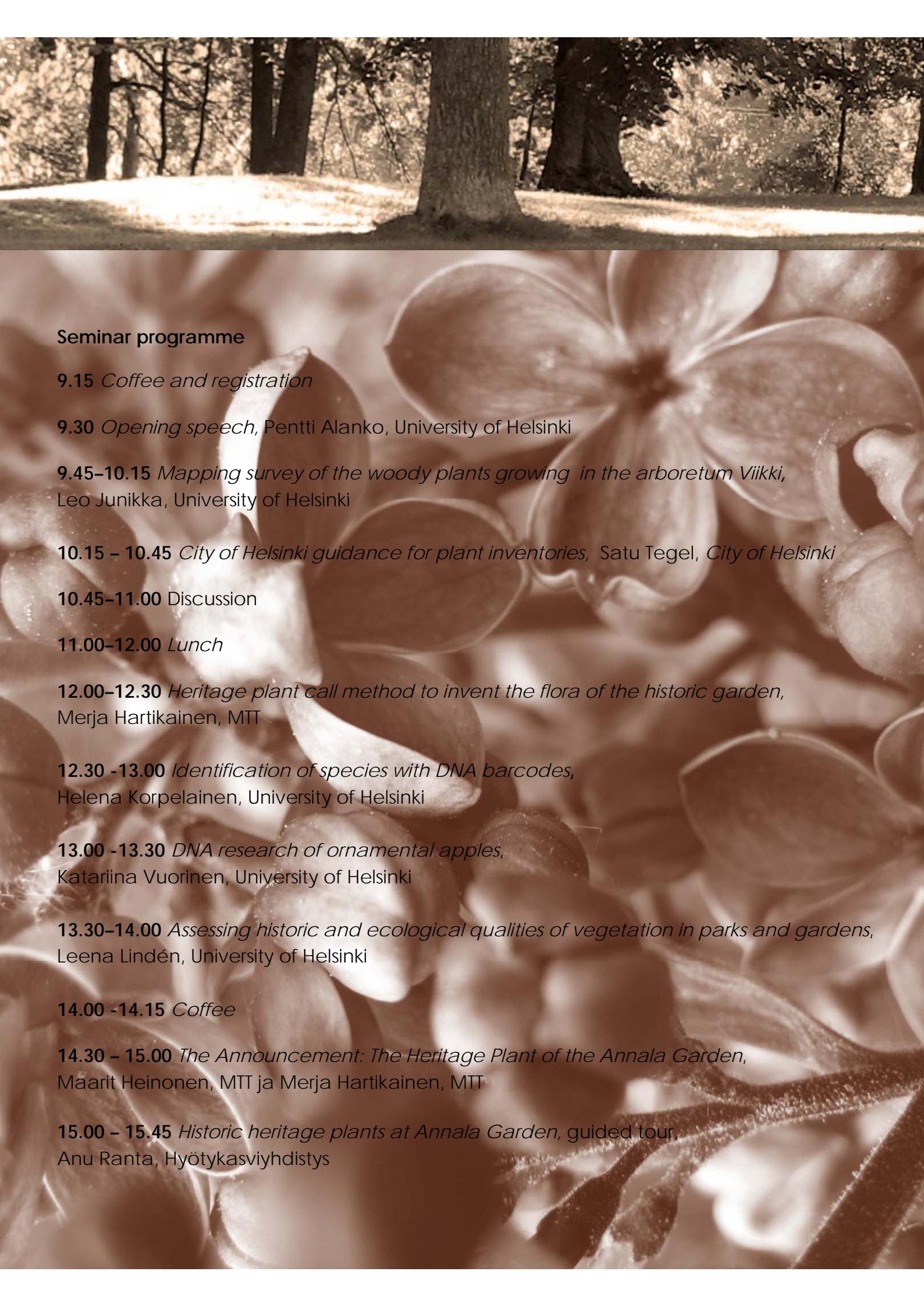




Seminar on mapping methods
for the historic gardens flora



Seminar programme

9.15 *Coffee and registration*

9.30 *Opening speech, Pentti Alanko, University of Helsinki*

9.45–10.15 *Mapping survey of the woody plants growing in the arboretum Viikki, Leo Junikka, University of Helsinki*

10.15 – 10.45 *City of Helsinki guidance for plant inventories, Satu Tegel, City of Helsinki*

10.45–11.00 *Discussion*

11.00–12.00 *Lunch*

12.00–12.30 *Heritage plant call method to invent the flora of the historic garden, Merja Hartikainen, MTT*

12.30 -13.00 *Identification of species with DNA barcodes, Helena Korpelainen, University of Helsinki*

13.00 -13.30 *DNA research of ornamental apples, Katariina Vuorinen, University of Helsinki*

13.30–14.00 *Assessing historic and ecological qualities of vegetation in parks and gardens, Leena Lindén, University of Helsinki*

14.00 -14.15 *Coffee*

14.30 – 15.00 *The Announcement: The Heritage Plant of the Annala Garden, Maarit Heinonen, MTT ja Merja Hartikainen, MTT*

15.00 – 15.45 *Historic heritage plants at Annala Garden, guided tour, Anu Ranta, Hyötykasviyhdistys*



Leo Junikka

Mapping survey of the woody plants growing in the arboretum Viikki

In the summer 2010 was made an AISA hyper spectral image from the Viikki Arboretum with the help of the helicopter. Pixel size was 0.5 cm and bands recorded were 64. Borders of the arboretum and its geographical sections were drawn on this image. Geographical sections are: Japan, Far East, China, Siberia, Europe, western and eastern North-America.

Participants of the Helsinki University Course in GIS-methods (together 20 students) were divided in 7 groups, each of which adopted one geographical section. All arboreal taxa were divided in length classes from 2 m upwards. A special field protocol was designed to collect data. All unidentified taxa were recognized and a herbarium specimen was collected for later identification in the lab. Occurrences of the tree/shrub were determined by the field GPS equipment and all specimens were also photographed. All specimens were given a running collection number, which were used later when saving data in Quantum GIS database.

Data of 523 specimens were entered in the database. Mapping and collecting data from smaller exotic shrubs and perennials from Viikki Arboretum will be continued in future.



Satu Tegel

City of Helsinki guidance for plant inventories

Helsinki City Public Works Department has made plant inventories of parks, manor parks and gardens. Usually they are made for the purpose of city planning or park renovation work. During the last two decades Public Works Department has made more than 40 plant inventories, including nine manor parks owned by the City.

In plant inventories we document the flora of the target area, including plant individuals' condition and value from botanical, historical and landscape point of view. The inventories have been made by students of botany and horticulture or by companies specialized in inventories. Making a plant inventory of a historically significant garden is a demanding task. You have to be specialized in dendrology and also in native and planted herbaceous plants at the same time. In addition you should be familiar with mapping software in order to be able to make a digital map of the inventory results.

The map is the most important result of the plant inventory. There are several methods to do that map. Maps made using the GIS-method are most suitable, because the trees and shrubs are truly in their right places. Public Works Department has made guidance for making an inventory. The guidance includes excel-based tables for flora, pictures and herbarium samples. An inventory of a garden's flora normally includes trees and shrubs and planted herbaceous vegetation. In natural areas the survey is made on biotope level.

The findings of the plant inventories are presented on a map, in tables and in the report. Reports are nowadays published mainly on the internet and they can be found on the web page www.hkr.hel.fi.

Heritage plant call method to invent the flora of the historic garden

Many of the garden plant taxa have been lost in the historical gardens because of many reasons, like cold winters or lesser gardening. It is commonly known in Finland that local people move perennials and even shrubs from the abandoned gardens to their own gardens. So these heritage plants like roses, perennials and ornamentals shrubs can still be found in the neighbouring gardens although they don't exist anymore in the original garden. We call these moved plants as run-a-way plants. We have developed a method for gathering knowledge of original plants in historic gardens and for rediscovering and repatriating them back to the gardens. This method includes an inventory of the existing cultural flora, searching for the lost vegetation (so called run-a-way-plants) and gathering the cultural knowledge of the plants.

Before making heritage plant calls it is essential to invent the existing and historical flora of the target garden. Local people's indigenous knowledge is gathered by interviewing the persons connected to the garden like previous owners and gardeners. As a result there is a map of existing flora, gathered information of the value of the plants and most important of all the list of the lost vegetation. The more defined list of lost plant taxa there is more likely it is possible to get the searched plants. Heritage plant calls require familiarizing to the local history, to local garden and heritage associations, local media and local plant and heritage enthusiasts.

Heritage plant calls include newspaper advertisements in local newspaper, notices on the local boards, letters to the local people, and interviews of the local plant experts. Effective way to inform local people is to introduce the heritage plants call in a local newspaper more than once. It is important to emphasize the value of work done for the preservation of these old plants. Every hint of the plants are important; often other people than plant owner themselves tell hints about the interesting old plants.

The gathered information of the found plant strains are registered to a form and every plant strain has been marked by an individual number. All data is organized to an excel database. Finally it is possible to choose plants and collect them to be preserved in the temporary nursery or in the original historic garden.

This Heritage plant calls method has developed by The Finnish National Programme for Plant Genetic Resources. This work has continued in the Finnish-Estonian project concerning the sustainable management and development of historic parks (DEVEPARK). To collect and repatriate the old original garden plants to the historical garden is *in situ* (on garden) preservation work. It increases the biodiversity of the gardens.

Identification of species with DNA barcodes

DNA sequencing has been used in molecular systematics for more than twenty years to reveal evolutionary relationships. The correct identification of any biological material is very important and not always simple based on the morphology alone, especially if the quality of the sample is not satisfactory. During recent years, researchers have been testing the idea that all biological species could be identified using a short DNA sequence from a standardized position in the genome - a DNA barcode. Automatic and objective identification can be achieved if a genomic region with a suitable speed of evolution is utilized, i.e., with only low sequence variation within a species, but great variation among species. The barcoding region of animals is the mitochondrial COI gene. In fungi, the chosen DNA barcode is the nuclear ITS region, and in plants, a combination of two chloroplast gene regions (matK and rbcL) is used for DNA barcoding.

There are many areas of practical importance, especially those related to knowledge of biodiversity, verification of herbal medicines, foodstuffs or controlled species, monitoring of harmful or invasive species and ecological surveys. Additionally, DNA barcoding contributes to phylogenetic knowledge and is effective in resolving the taxonomy of poorly known groups. DNA barcoding also makes taxonomy more effective for science and society as it enables rapid species identification using a standard methodology by also non-taxonomic specialists. A compiled public library of sequences linked to named specimens together with faster and cheaper sequencing will make DNA barcoding increasingly useful.

The Finnish Barcode of Life (FinBOL, <http://www.finbol.org>) is a national project with the goal of creating DNA barcodes for all species of animals, plants and fungi occurring in Finland. FinBOL is part of the International Barcode of Life (iBOL) consortium, which has the long-term aim of producing DNA barcodes for all species worldwide.

DNA research of ornamental apples

Identification of apple species (*Malus* Mill.) has traditionally depended on morphological descriptions. Cultivar identification based completely on characteristics is problematic at best as original descriptions are often lacking.

As DNA and molecular methods have developed, new ways of species and cultivar identification have emerged. Microsatellites have proven to be especially useful for identifying individual genotypes and for defining genetic polymorphism within a chosen population. Markers designed for cultivated apple (*Malus × domestica* Borkh.) function on all *Malus* species making them extremely useful for research.

In our study, DNA fingerprinting was carried out with nine microsatellite markers covering 12 loci. Study material consisted of 201 samples representing 200 accessions. Most of the 99 study samples were from Finnish nurseries. Reference samples were gained from various botanical collections from North America and Europe. Altogether 47 study samples were re-identified or their original names authenticated. Remaining 52 study samples were either of seed origin or could not be identified. Two KESKAS cultivars were renamed as DNA-fingerprints revealed their true identity.

Microsatellite fingerprinting proved to be a suitable method for ornamental crab apple cultivar authentication. False naming of nursery propagation material was evident and future studies are needed to illustrate the problem further.

Assessing historic and ecological qualities of vegetation in parks and gardens

Vegetation survey is usually a first step towards the evaluation of a heritage garden, and a means to make decisions on restoration or maintenance actions. In addition to listing and mapping of plant taxa, a comprehensive survey should give an estimate of the age of the plants and plantings, and an assessment of the historic as well as biological and cultural merits of the plant material. This presentation considers inventories of gardens in the light of two recent case studies, a residential courtyard from the 1920's at Puu-Käpylä and the garden of Suur-Sarvilahti manor in Loviisa.

The field survey in Puu-Käpylä was targeted to assess the age and authenticity of the plants and plantings in the area of one quarter. All perennial ornamental plants were recorded on species level, with the exception of common lilacs, shrub roses, irises and peonies that were identified on cultivar level. The survey in Suur-Sarvilahti served as a basis for maintenance planning. A major part of the garden surrounding the baroque mansion was last reshaped in the 1930's following the German formal garden style. The present owner seeks to conserve the design form and features of that time.

In the two case inventories, old photographs, plans and drawings proved to be the most useful sources of information on the plant material. Even contemporary gardening books, nursery price-lists and in the case of Suur-Sarvilahti, histories of the estate as well as family memoirs, were helpful, though on a more general level. Evaluation of cultivated plants often calls for expertise to cultivar identification. To enable the judgment of the ecological significance of a garden, the survey should cover not only plantings, but also the spontaneous vegetation, including mosses and lichens.

Garden inventories should use a common registration and report form, to facilitate comparisons with other sites and coordination of information on a regional or national scale. Results of garden surveys could be used for raising public awareness and interest in historic gardens.



Merja Hartikainen ja Maarit Heinonen.

The Announcement: The Heritage Plant of the Annala Garden

A Heritage Plant can be granted to a historic garden or park. According to the Florence Charter (1981) a historic garden is an architectural and horticultural composition of interest to the public from the historical or artistic point of view. A historic garden can be on the other hand a manor or a villa garden, or it can be a simple public park. The value of a historic garden can be based to the unique flora, landscape or ways of using the garden.

The chosen Heritage Plant represents the original and old flora of that garden. A Heritage Plant can still grow in the garden or it can be a run-away plant returned to the garden. On the ground of the choice it is used plant inventory data and other scientific studies, documents, and interviews about the garden's history are used.

The plant strain should be at least 50 years old. The Heritage Plant should have a special importance to the garden. It can e.g. represent a certain era of the garden's history or it can have meaning to the garden design. The Heritage Plant can be taxonomically interesting, or a person or an occasion can be linked to it.

The status of the Heritage Plant is granted by the Finnish National Plant Genetic Programme and the choice is made together with actors of the target garden. The garden will get a short report of the Heritage Plant and a promotional leaflet. The leaflet introduces the basic information of the plant, description of its special features, plant's significance to the garden and the location of the plant.

The Heritage Plant status is not only wished to promote the appreciation and to cherish the original flora of the garden, but also it is wished to be used for tourism purposes. It is possible to demonstrate to the garden history and its old flora to visitors using the Heritage Plant as an example.

The first announced Heritage Plant is an old, rare lilac (*Syringa Vulgaris* -group) grown in Helsinki Old town, Annala garden. More Heritage Plants will be announced in the future.

The concept of the Heritage Plant is developed in the project "Sustainable Historic Park Management and Development in Finland and Estonia 2009–2012 (DEVEPARK)".



Lectures

M.Sc. horticulturalist **Pentti Alanko** has studied horticultural science at the Department of Agricultural Sciences, University of Helsinki. He has worked as a researcher with Satu Tegel in the project KESKAS. Nowadays he is retired but is still working voluntarily as a researcher at Herbarium at the Finnish Museum of Natural History LUOMUS. In the summer time he works for the Finnish Plant Atlas (Kasviatlas). Besides the original wild vascular plants also the cultural plants naturalized in the Finnish nature are mapped to the Finnish Plant Atlas. Pentti Alanko has lectured for many years together with Eeva Ruoff on the course "Cultural landscape and the Flora of old gardens", Aalto University.

Lic.Sc horticulturalist **Leo Junikka** works at the Finnish Museum of Natural History LUOMUS as an intendant. He is writing his doctoral thesis on the South American Genus Oxandra (Annonaceae) and the morphological and microscopic variation of barks. Leo Junikka is in charge of the dating and the loan operations of the Herbarium General. He is an assessor on CITES and a member of the nomenclature committee at Societas Biologica Fennica Vanamo.

M.Sc. **Satu Tegel** works as a specialist in planted vegetation in City of Helsinki Public Works Department. She participated in KESKAS-research 1980's with Pentti Alanko and continued the work with plant hunting of old hardy trees and shrubs in City of Helsinki. She has specialized in planted vegetation in parks of Helsinki and especially old plants of Helsinki. She has been involved with ca. 40 plant inventories made in City of Helsinki.

M.Sc. **Merja Hartikainen** is a biology and a gardener working as researcher in MTT Agrifood Research Finland. She works under the Finnish Plant genetic Resources Programme and is focused to research and preserve horticultural plant genetic resources. She has been developing a method to collect and repatriate original plant strains back to the historical garden. She has gained experience in landscaping, constructing and developing public new gardens for heritage plants. She works on developing the SESTO database for the vegetatively propagated plants.

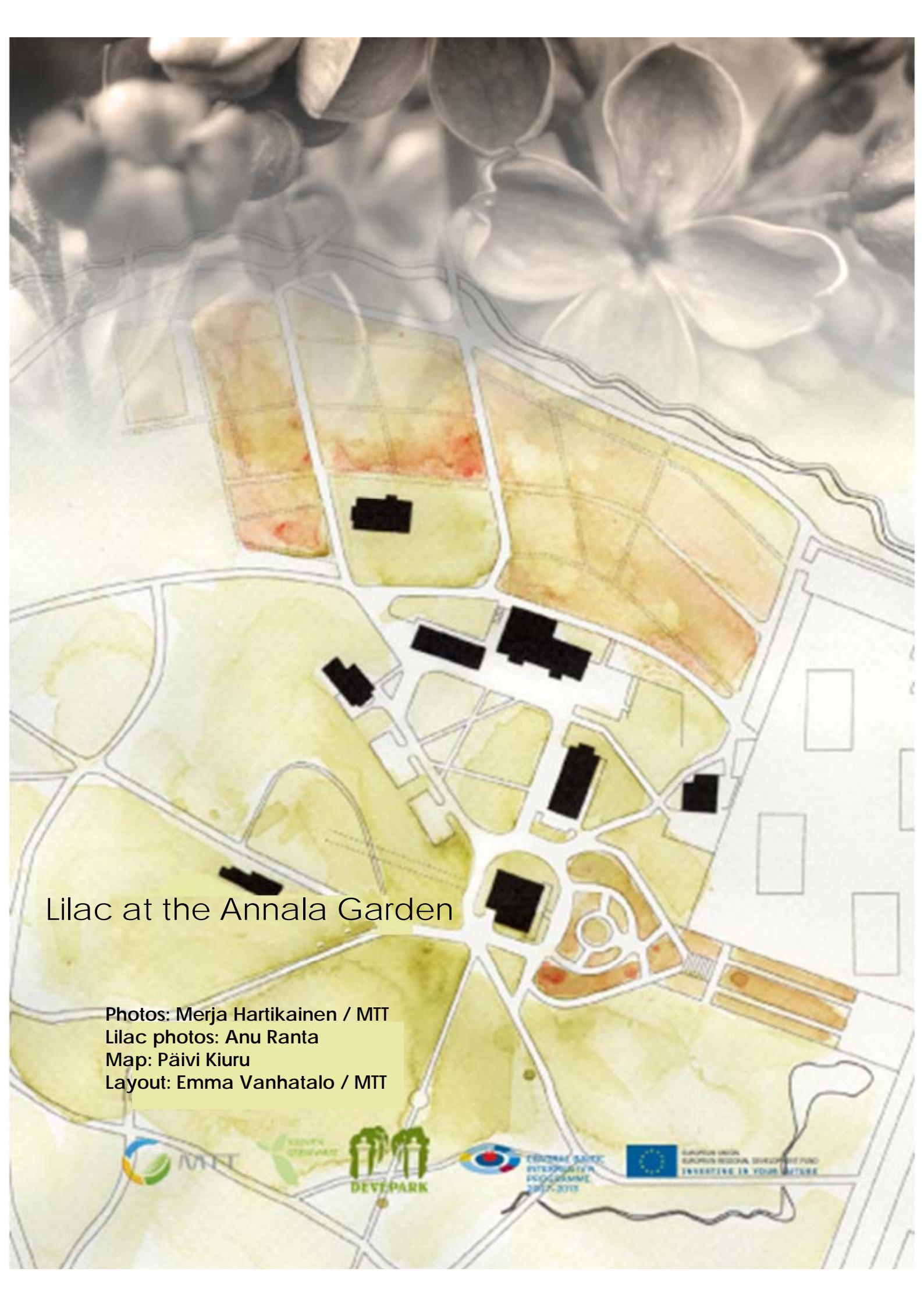


Doctor **Helena Korpelainen** is an adjunct professor in ecological genetics and works as a senior lecturer in applied genetics in the Department of Agricultural Sciences, University of Helsinki. She has specialized in population genetics and molecular ecology. Her research focuses on the genetic adaptation mechanisms of plants, plant genetic resources, population genetics of invasive plants and DNA barcodes.

BSc **Katriina Vuorinen** is a Master's degree student in Plant Production Biology in University of Helsinki with a focus on horticulture. She has finished her Master's thesis on the subject "Ornamental crab apple cultivar authentication of Finnish nursery propagation material". She is currently working for Kekkilä.

Doctor of Agriculture and Forestry **Leena Lindén** is a docent in Horticulture. She is working as a university lecturer in horticulture at the Department of Agricultural Sciences, University of Helsinki. Her students have conducted vegetation surveys in heritage gardens and on semi-natural meadows. We have also studied soil seed banks of urban meadows. She is supervised theses where old common lilac and ornamental crab apple genotypes were mapped and studied for cultivar identification. They have used both morphological traits and DNA-fingerprinting for genotype description and determination of cultivar identity. Literature reviews based on old nursery lists and gardening handbooks provided a background for identification of ornamental plant genotypes traded in old days.

M.Sc. **Maarit Heinonen** is a sociologist working under the National Plant Genetic Resources Programme at MTT. She has several years of experience in the research on conservation genetic diversity, specializing on landraces and local varieties *in situ*. She has studied the value of old varieties and landrace growers, and she has been developing the interdisciplinary method for collecting knowledge related to plant genetic resources.



Lilac at the Annala Garden

Photos: Merja Hartikainen / MTT
Lilac photos: Anu Ranta
Map: Päivi Kiuru
Layout: Emma Vanhatalo / MTT

