Summary of Transnational Access Report to ExpoSCREEN

1. General Information

Project Acronym (ID):	MOMEVIP
Project Title	Molecular and metabolic bases of volatile isoprenoid---induced resistance to stresses
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2. Access duration

Begin of the project	End of the project
2.01.2013	02.02.2013

3. Project summary (max. 250 words)

The MOMEVIP project will produce basic information on the molecular and metabolic mechanisms of volatile isoprenoids formation (VIP) and on the functional roles of these compounds and their potential in mitigating adverse effects of climate change on plant productivity. Plant volatile isoprenoids (isoprene, monoterpenes and sesquiterpenes; VIP) can improve plants tolerance to abiotic stress. But the underlying molecular, biochemical and cellular mechanisms are currently not well understood. To dissect how VIP production improves plant tolerance to abiotic stress, three Arabidopsis MVA pathway mutants from ETH (*aact1, hmgr1, hmgr2*) and four transgenic lines engineered to overproduce mono- and sesquiterpenes provided by Wageningen University (WU/ the Netherlands) were tested under highly controlled environmental conditions in exposure chambers (ExpoSCREEN) at the Helmholtz Zentrum in Munich. The lines included from WU either overexpress terpene synthase (TS-OE lines) to produce increased levels of linalool, limonene and caryophyllene, or have a reduced terpene synthase expression (TS-KO lines) to decrease caryophyllene production. In this collaborative Arabidopsis experiment the selected mutants and transgenic lines together with wild type controls were grown under four different climate change scenarios (S) in four independent chambers..

4. Main achievements (max. 250 words)

So far leaf 6 plant material for subsequent transcriptomics and proteomics analysis has been collected. RNA isolation is currently ongoing. The remaining rosette material (minus leaf 6) will be used for measuring metabolites, ABA contents and selected antioxidants. Chlorophyll fluorescence was measured noninvasively using imaging PAM to record changes in photochemical efficiency during the experimental time course. We also measured the leaf surface temperature using infrared technology because higher volatile emission rates might have a cooling effect at the leaf surface. The collected data are currently being analyzed. To study plant growth under S experimental conditions plant images have been collected at selected time points. Epidermal cell size and number of leaf number 6 are currently being analyzed using microscopy. In the pilot experiment performed at ETH, we found that epidermal cells were smaller in Arabidopsis plants experiencing severe drought stress compared to cells of plants grown under optimal conditions. Therefore it will be of interest to monitor potential differences in cell size between plants grown under the selected experimental conditions in the phytotrons at the Helmholtz Zentrum in Munich. Leaf number 6 will be analyzed in particular because a large set of RNA, protein and metabolite data as well as other data types (phenotype, photosynthetic performance, ribosome number, etc.) have been collected as part of another EU FP6 project (AGRON-OMICS). These data will provide an important baseline for the Arabidopsis experiments performed within the MOMEVIP project.