Characterisation of volatile organic compound profiles of Populus nigra grown under elevated CO2 and elevated O3 and exposed to herbivory stress

A Data Management Plan created using DMPonline-test

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Project abstract:

Plants communicate with other organisms within an ecosystem through the emission of volatile organic compounds (VOCs). A greater range of VOCs can be synthesised, and at increased levels in response to stress, e.g. herbivory or drought. Neighbouring plants receive information about impending herbivore attack, enabling ‘priming’ of their own chemical defences, pollinators locate food source partly by using floral scents, and predators of herbivores use the altered VOC profiles of attacked plants to locate their prey. Tropospheric ozone, an important anthropogenic pollutant, the level of which is predicted to rise to 40 ppbv across most of the Earth's surface by 2100, has been shown to alter VOC profiles, in turn disrupting both primary consumers and their enemies, as well as pollinators. Additionally, CO2 levels, which are continuing to rise, have been shown to have a variable impact on plant secondary compounds, including VOCs. Disruptions to the VOC profiles of plants and the attendant impllications of such disruption could have important implications for plant and animal fitness, and hence ecosystem function. My research intends to examine the changing VOC profiles of black poplar saplings (Populus nigra) grown under either elevated CO2 or elevated O3. The ecological importance of any alterations to the VOC profiles will be assessed using a model herbivore (winter moth (Operophtera brumata)) and it's parasitoid enemy, Agrypon flaveolatum.

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Data description

VOC data will be processed/generated on GC-FID machine in OpenLab, providing files (chromatograms and FID traces) in the *.D format. These will then be converted (via print function) to *.csv file type, ready for use with R.

Leaf area eaten raw data will be captured in photoshop (file type *.jpeg). Calculations will then be carried out in excel (initially saved as *.xlxs files), generating *.csv files ready for use with R

Other measurements should generate data amenable to input into an excel spreadsheet (e.g**soil temp**., **soil humidity**, **light levels**, **PAR** and **stomatal conductance**. *.csv files can then be imported into R for analysis

VOC data will be named: READ_A1_CON_SAMPLEa_REP1-200321-RESTRICTED.D

where READ/BIF is the location-reading or bifor, A is the Array, CON/EXP is the control or elevated status, SAMPLE is the individual tree being sampled, REP is the replicate number (there will be five replicates for each sample). File name will be followed by date of sampling (following year first convention.

Leaf area raw data will be saved in the form of a jpeg for every leaf eaten during herbivory trials-naming convention for this stage will follow the above, with the only difference being extension.

Following this, calculations will need to be done for every leaf area for each sample (sapling) in every condition (array). This data will be collated in an excel spreadsheet for each sampling location and date, and the naming convention will be as follows:

LEAFEAT_READ-210320-RESTRICTED.xlxs

Other measurements will be collated in an excel spreadsheet, again organised in files by place and date of sampling, with the naming convention the same as above apart from filename, which will be as follows:**SOIL_LIGHT_PAR**_READ-

Data storage and archiving

Initially, data will be transferred from the lab computer onto an external drive.

This drive will be backed up to the BIFoR RDS

No

The Birmingham Institute for Forest Research RDS

Data sharing

Question not answered.