Effects of Perfluorooctane Sulfonic Acids (PFOS) on the Growth and Development of Plants

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The purpose of this investigation was to evaluate the effects of per- and polyfluoroalkyl substances (PFASs) on plant growth and photosynthesis. This work involved growing Arabidopsis thaliana plants on clear media that contained varying amounts of PFOS, the most common PFAS chemical found in the environment. Vertical and horizontal plates were used to germinate the Arabidopsis thaliana seedlings. Vertical plates were used to monitor the root length by allowing the roots to grow straight downwards more naturally, while the horizontal plates were used to measure rosette diameters without worry of overlapping leaves. Once the plants had grown, they were assessed for non-invasive root lengths, rosette diameters, fresh weights, chlorophyll contents, and photosynthetic activity. The chlorophyll contents were found through a spectrophotometric assay, using acetone as the diluent, where the plant material came from the fresh weight portion of the experiment after it had been frozen. Additionally, the Photosystem II efficiency and electron transport rate data were collected from the IMAGING-PAM system present at the lab. Two types of Arabidopsis thaliana plants were used in this study: wild type and orrm6-1. The orrm6-1 mutant has been shown to have reduced photosynthetic efficiency. Results indicated that wild-type and orrm6-1 mutant plants grown in the medium containing 100 μM PFOS had shorter roots, smaller rosette diameters, lower fresh weights, decreased chlorophyll contents, reduced photosynthetic activities, compared to the plants grown in 0 μM PFOS.

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