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Barsberg, Søren Talbro; Rasmussen, Hanne Nina; Kodahl, Nete

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1.21.21 poster

BREAKDOWN AND LONGEVITY OF ORCHID SEEDS IN SOIL: ANALYSES OF TESTA IN *CYPRIPEDIUM CALCEOLUS*

S. Barsberg, H.N. Rasmussen, N. Kodahl

Institute of Geosciences and Nature Resource Management, University of Copenhagen, Denmark

In spite of a thin seed coat, some orchid species have a long life in the seed bank after dispersal and germinate sparsely over several years. Our purpose was to learn more about the resilience of these highly specialized seeds and stimulatory processes towards germination.
Natural components of testa and embryo were analyzed in intact seeds and after 7 years of natural weathering in soil, as well as after surface sterilization by means of $Ca(OCl)_2$. We used Attenuated Total Reflectance (ATR) FTIR spectroscopy, which proved ideal for minute sample sizes.
A lignin-like polymer is an essential testa component that undergoes degradation through soil processes, as well as by hypochlorite extraction. In both cases we found a build-up of $CaCO_3$ on the testa, which could interact with lignin to enhance germination. Very minor changes occurred in embryo reserve nutrient content even after a long sojourn in the ground. We suggest that degradation of lignin and binding of Ca^{++} are essential stages for germination enhancement.

1.22.22 poster

ELUCIDATING THE CARBON AND NITROGEN GAINS OF ORCHIDS IN MOUNTAINOUS HABITATS – A STABLE ISOTOPE APPROACH*

J. M.-I. Schiebold, G. Gebauer

Laboratory of Isotope Biogeochemistry, Bayreuth Center of Ecology and Environmental Research (BayCEER), University of Bayreuth, 95440 Bayreuth, Germany

We screened orchids in the Northern Limestone Alps in the Austrian province of Vorarlberg near Marul for their carbon (C) and nitrogen (N) gains (e.g. autotrophy, partial or full mycoheterotrophy) and habitats. Leaf samples of 9 species from 8 genera belonging to the two subfamilies Epidendroideae and Orchidoideae and accompanying autotrophic non-orchid plant species as references for site-conditions were collected from 8 locations, covering mountainous habitats from closed forests to open sites. We conducted stable isotope natural abundance analyses to test whether C and N are gained through autotrophic means or *via* the mycorrhizal fungi route. Our results show that full mycoheterotrophy among the investigated adult orchids is exclusively found in *Neottia nidus-avis* of the Epidendroideae subfamily growing in light-limited forests. Most orchids of open habitats (meadow orchids) showed slight but noticeable enrichment in ^{15}N, whereas ^{13}C signatures remained modest indicating low N gains from fungi and apparently no C gain from the fungal source. Relative abundance of ^{15}N and ^{13}C is expressed by enrichment factors ε. Ongoing measurements of δD and the identification of fungal partners by molecular methods are expected to further elucidate the degree of mycoheterotrophy among the green orchids.

* Data collected in an interdisciplinary field course in 2012 in Marul/Austria by A. Aures, M. Christé, A. Endreß, L. Heuss, A. Makiola, N. Sänger, J. Schiebold, M. Thieme