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Useful methods: Herbarium of duckweed specimen

In 1 collection

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Duckweed

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ABSTRACT

This protocol details about preparation of herbaria for duckweed specimens. It contains protocols from the The International Steering Committee on Duckweed Research and Application (ISCDRA) Newsletter. A complete list of these news letters can be found here.

ATTACHMENTS

384-846.pdf

Herbaria of plant specimens can be used to identify plants, to certify their nomenclature, to validate scientiEc observations and many more other applications (Kew Herbarium). In order that these advantages are extended to the members of the plant family Lemnaceae, we prepared herbaria of duckweed species. A representative clone of each duckweed species was selected for this purpose. We have currently made 4 sets of these herbaria. One set has been presented to the Herbarium Hausknecht, University of Jena, another was recently presented to Prof. Dr. Marvin Edelman, Weizmann Institute of Science, Rehovot, Israel on the grand occasion of his 80th birthday in 2019 and the other two remain in the labs of Dr. K. Sowjanya Sree at Central University of Kerala, India and that of Dr. Klaus-J. Appenroth at Friedrich Schiller University of Jena, Germany. It is very pertinent to mention here that the Landolt's duckweed collection, Zurich, Switzerland hosts herbaria vouchers of many thousands of clones of duckweeds belonging to all species that were originally curated by Prof. Landolt himself during his career.

In the course of the preparation of our duckweed herbaria, we had to standardize several parameters and had established a standard protocol for the same. In this article we will share the protocol in detail which could be of help to anyone who would like to prepare similar herbaria for duckweed specimens.

References cited:

Bog, M., Sree, K. S., Fuchs, J., Hoang, P. T. N., Schubert, I., Kuever, J., et al. (2020). A taxonomic revision of Lemna sect. Uninerves (Lemnaceae). Taxon, Doi: 10.1002/tax.12188.

Sree KS, Appenroth KJ (2020) Worldwide genetic resources of duckweed: stock collections. In: Cao, X.H., Fourounjian, P., Wang, W. (eds.), The Duckweed Genomes. Berlin, Heidelberg: Springer. ISBN 978-3-030-11045-1

Sree, K. S., Bog, M., and Appenroth, K. J. (2016). Taxonomy of duckweeds (Lemnaceae), potential new crop plants. Emirate J. Food Agricult. 28, 291–302.

Kew Herbarium. https://apps.kew.org/herbcat/gotoWhatCollectionFor.do

Materials

- stock cultures (University of Jena, Germany)
- inoculation loop
- culture flask
- blotting paper sheet
- herbarium sheet
- parchment sheet
- plant press

Method

1 For preparing herbarium samples, select the representative clones of each of the duckweed species from the stock cultures at the University of Jena, Germany (Sree and Appenroth, 2020).

2 Cultivate under optimal conditions for four weeks by sub-culturing them each week. Use the plants from such well-grown cultures herbarium sample preparation.

3 Using an inoculation loop, collect the plants from the culture Bask and place on a thin, porous nylon sheet which is placed on a blotting paper sheet. This allows the removal of excess water or medium that may be stuck to the plant.

4 Using a thin paint brush, place the plants on the herbarium sheet.

> **Note**
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> Note: Some plants were placed with their dorsal side up and some were placed with their ventral side up and so on. This allows all the features of the specimen to be viewed properly.

5 On top of the specimen, place a parchment sheet (of same size as the herbarium sheet). Above this, place 5-6 layers of blotting paper sheets (of same size as the herbarium sheet).

6 Place these layers in a plant press (this comprises of two thin wooden planks secured by straps). Place the layers of the different papers as described above in between the two planks and tighten the straps equally on both ends to apply equal pressure on all sides.

7 Place about 10 to 15 specimens layered individually one above the other in the same press at a time. Set aside this set up in a cool dry place for 2 to 3 days.

8 After drying, remove the blotting sheets.

9 Most of the plants were stuck on the herbarium sheet in the process of drying. However, there were some which got stuck to the parchment paper that was placed above the plants. In this case, pick up the plants from the parchment paper with a tooth pick dipped in a liquid glue, and transfer onto the herbarium sheet.

10 Label each herbarium sheet with the scientific name of the species and the international four-digit ID number of the clone, following the tradition of Elias Landolt, as well as information concerning the origin of the clones.

Note

This way, 37 specimens were conserved according to the available knowledge at the time (Sree et al., 2016). Meanwhile, the two species Lemna valdiviana and Lemna yungensis were combined more recently based on new data, retaining L. valdiviana as the valid name for all the clones designated under L. valdiviana and L. yungensis. Now, L. yungensis is a synonym of L. valdiviana. Therefore, the number of recognized duckweed species is reduced to 36 (Bog et al, 2020).