

**Plant community assessment in different habitats of Georgia, South Caucasus,
through soil environmental DNA sequencing with Oxford Nanopore Technology
(ONT)**

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Statement

As the author of the submitted thesis, I declare that the work is my original work and does not contain material previously published, accepted for publication, or submitted for defense by other authors, that is not cited in the work in accordance with the proper rules.

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Abstract

Georgia is part of the Caucasus biodiversity hotspot and has high plant diversity, but genetic reference databases for the region are still limited. This study tested whether environmental DNA (eDNA) metabarcoding, using Oxford Nanopore sequencing, can detect plant diversity and reflect vegetation patterns in forest, vineyard, and grassland habitats. The results were compared with traditional botanical surveys.

The botanical survey recorded 293 plant species, belonging to 192 genera and 53 families. In comparison, eDNA analysis detected 33 species, 56 genera, and 32 families. Both methods correctly identified significant differences in plant community composition between habitat types. In the botanical survey, habitats formed clear groups, and habitat type explained a large part of the variation in community composition. In the eDNA data, habitat type was also significant, but the groups overlapped more, and site-level differences were stronger.

The two methods showed a significant positive correlation, meaning that eDNA reflected some of the same community patterns observed in the field survey. Although eDNA detected fewer species, it also recorded groups that were missed or difficult to identify during fieldwork, including bryophytes and green algae.

Overall, nanopore-based eDNA metabarcoding is a promising future alternative for traditional vegetation surveys, but it can be a useful complementary tool for biodiversity monitoring, especially in understudied regions.

Keywords: eDNA metabarcoding, Oxford Nanopore sequencing, plant diversity, vegetation survey.

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