Extended Abstract

The Germination of Spores and Gametophyte Development in Ferns under Extracts Influence [†]

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The aim of this study was to establish the influence of ferns extracts (*Asplenium scolopendrium* and *Dryopteris filix-mas*) on spore germination and gametophyte development in two *Dryopteris* species.

The extracts were obtained from *Asplenium scolopendrium* (EA) and *Dryopteris filix-mas* (ED) leaves. Some variants contained, beside the extracts, Ag nanoparticles (EAN, EDN) [1,2]. Variants with alcohol were also tested (HA). For each variant, dilutions were made (1:10, 1:100).

The percentage of germinated spores decreased after extracts exposure (Figures 1 and 2). In variants with AgNPs, no germination was observed regardless of extract, dilution or species. In the variants with alcohol, the germination of spores was significantly inhibited compared with the control (C, Figure 3) at the smallest dilution, in both species (Figure 4). The lack of the spore’s rhizoid affected the gametophyte development (Figure 5).

Figure 1. The influence of extracts on spore germination in *Dryopteris affinis*.

Figure 2. The influence of extracts on spore germination in *Dryopteris filix-mas*.

Figure 3. *Dryopteris affinis*—germinated spores: Control, $\times 100$.

Figure 4. *Dryopteris filix-mas*—germinated spores: HA 1:10 variant, $\times 100$.

Figure 5. *Dryopteris affinis*—ungerminated spores EAN variant (100), $\times 100$.

Overall, the ferns extracts had a negative influence on ferns spores by reducing the germination percentage and by inhibiting gametophyte development in both species.

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References

1. Şutan, A.N.; Fierăscu, I.; Fierăscu, R.C.; Manolescu, D.Ş.; Soare, L.C. Comparative analytical characterization and *in vitro* cytogenotoxic activity evaluation of *Asplenium scolopendrium* L. leaves and rhizome extracts prior to and after Ag nanoparticles phytosynthesis. *Ind. Crops Prod.* **2016**, *83*, 379–386.
2. Soare, L.C.; Şutan, N.A. Current Trends in Pteridophyte Extracts: From Plant to Nanoparticles. In *Current Advances in Fern Research*; Fernández, H., Ed.; Springer: Cham, Switzerland, 2018; pp. 329–357, doi:10.1007/978-3-319-75103-0.

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