

Genome Conservation for Rare and Ornamental Species of Russian Far East Ferns by Cryopreservation

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At present, “in situ” approach is a preferred option for plant conservation. However, “ex situ” approach is effective for plant conservation in botanical gardens. One of the “ex situ” conservation methods is long term freezing of germ plasma in liquid nitrogen (−196°C) in genome banks. This method allows saving the threatened species and the versification of their genome pools.

The aim of the study: to identify effective methods of spore cryopreservation for rare and ornamental ferns of Russian Far East.

Species studied: *Aleuritopteris argentea* (S.G.Gmel.) Fée (Fig. 1) and *Asplenium ruta-muraria* L. (Fig. 2) - fern species rare for Russian Far East, both included to the Red Books for Khabarovsk Krai and Sakhalin Oblast, as well to the lists of rare and disappearing plants of Russian Far East, Amur Oblast and Primorsky Krai; *Dennstaedtia wilfordii* (Moore) Christ (Fig. 3), included to the Red Book for Jewish Autonomic Oblast. We tested several decorative and perspective for introduction species, *Pseudocystopteris spinulosum* (Maxim.) Ching (Fig. 4), *Phegopteris connectilis* (Michx.)Watt (Fig. 5), *Polypodium sibiricum* Sipl. (Fig. 6), and *Adiantum pedatum* L. (Fig. 7).

Spore location: natural populations of Amur Oblast, collections of the FEBRAS Botanical Garden-Institute.

Method: collected spores were divided into two groups of samples, tested and control ones. The control samples were kept in normal laboratory conditions under room temperature, in paper packages, without nitrogen freezing. The test samples were kept in cryocups in liquid nitrogen at -196C during 14 days. After this, seeds from control and test samples were grown in Petri dishes with distilled water. Germination was calculated as the average value of three replications in each Petri dish.

Results: reaction of spores to cryopreservation was different (Fig. 8). After freezing of *Asplenium ruta-muraria* и *Pseudocystopteris spinulosum* spores, germination of test samples was 84% higher in relation to control samples, 45% higher for *Phegopteris connectilis*, 14% higher for *Aleuritopteris argentea*. Cryopreservation of *Dennstaedtia wilfordii*, *Polypodium sibiricum* и *Adiantum pedatum* spores has not affected considerably their germination ability..

Conclusion: Liquid nitrogen freezing does not affect negatively the vitality of studies spores of Russian Far East ferns; in some cases, it affects the vitality positively. Cryopreservation is a perspective method for long term conservation of fern spores and for creating “genome banks” of rare and ornamental species of ferns.



Fig. 1. *Aleuritopteris argentea* (S.G.Gmel.) Fée



Fig. 2. *Asplenium ruta-muraria* L.



Fig. 3. *Dennstaedtia wilfordii* (Moore) Christ



Fig. 4. *Pseudocystopteris spinulosum* (Maxim.) Ching

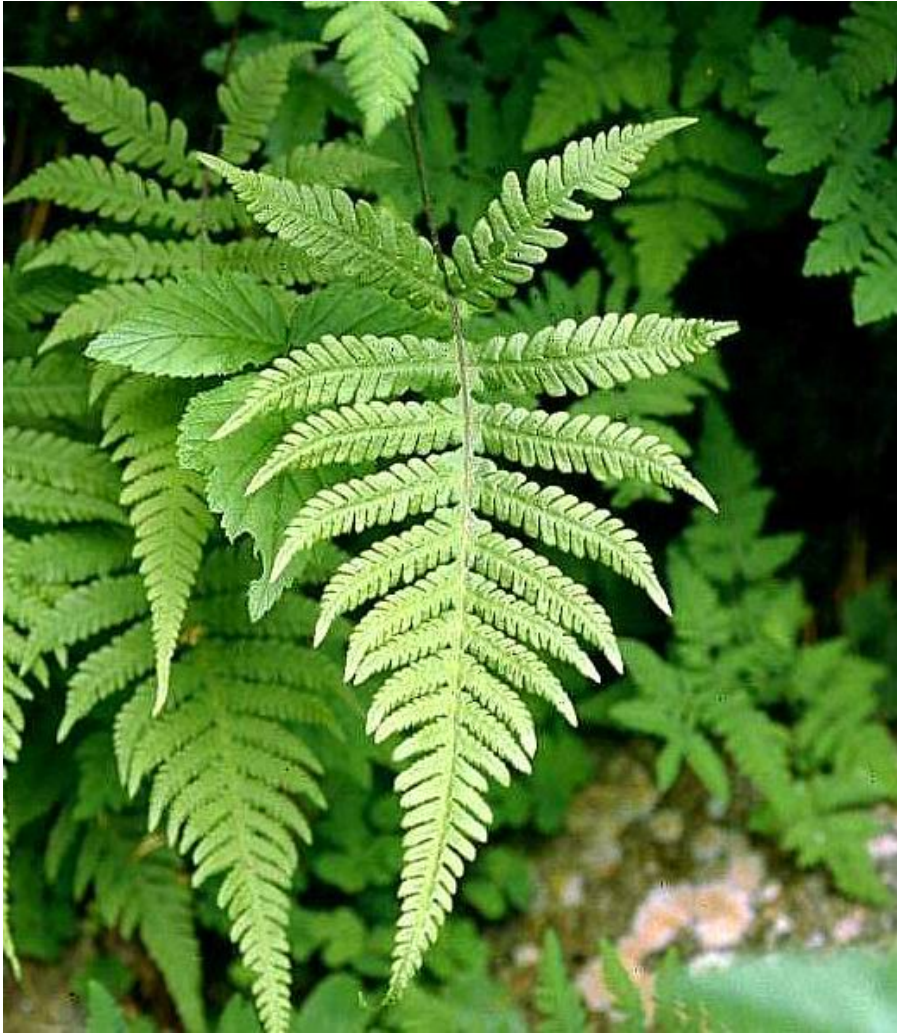


Fig. 5. *Phegopteris connectilis* (Michx.)Watt



Fig. 6. *Polypodium sibiricum* Sipl.



Fig. 7. *Adiantum pedatum* L.

Germination, %

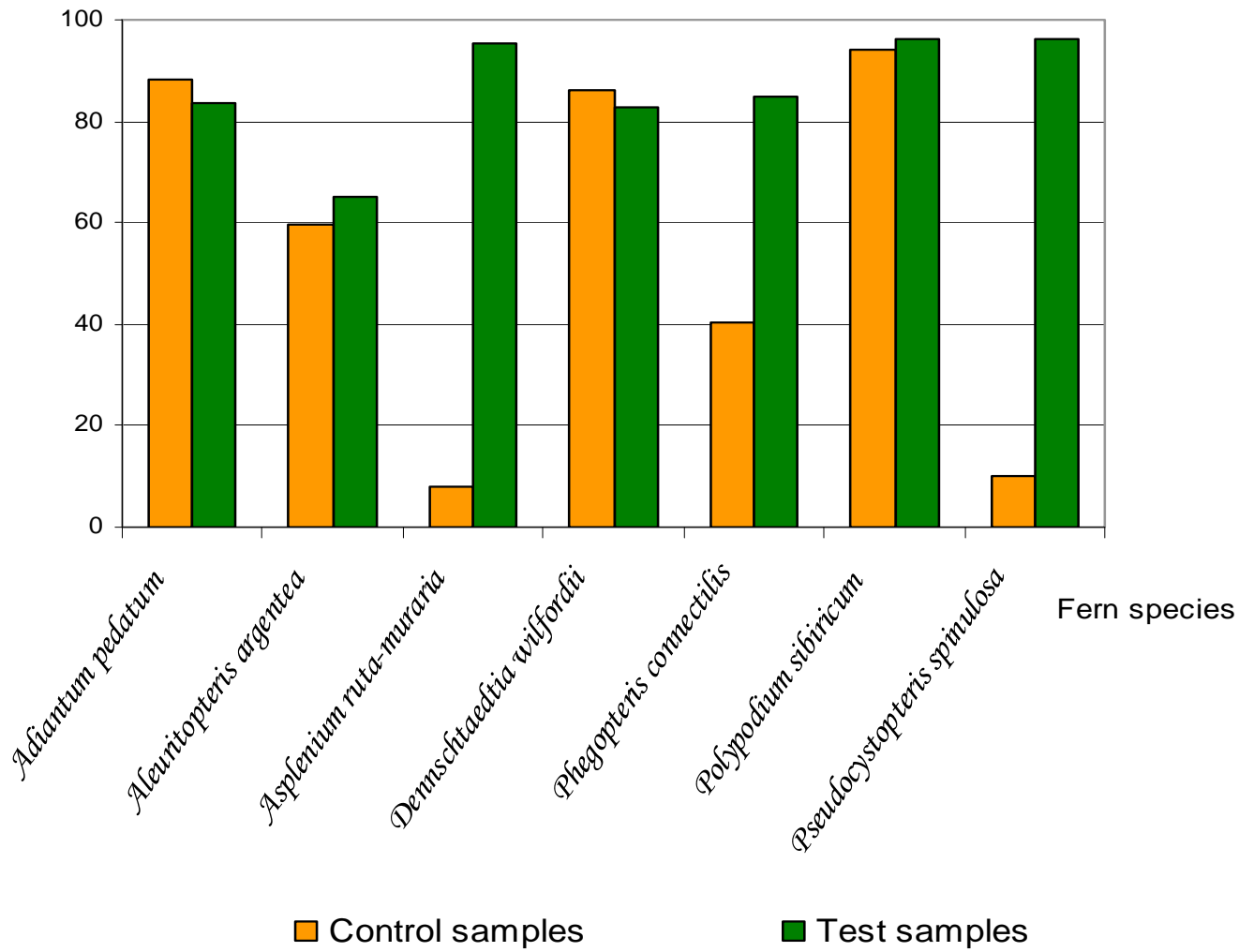


Fig. 8. Germination of Russian Far East fern spores