



In vitro establishment, propagation and conservation of the rare and endangered European endemic moss *Goniomitrium seroi*

Marko Sabovljević^{1*}, Felisa Puche², Aneta Sabovljević¹, José Gabriel Segarra-Moragues³ and Milorad Vujičić¹



¹Institute of Botany and Garden, Faculty of Biology, University of Belgrade, Takovska 43, 11000 Belgrade, Serbia
 *marko@bio.bg.ac.rs
²Facultad de Ciencias Biológicas. Universidad de Valencia, Valencia.
³Centro de Investigaciones sobre Desertificación-CIDE, (CSIC-UV-GV), Carretera Moncada - Náquera, Km. 4,5 Apartado Oficial, 46113 Moncada (Valencia), Spain



Abstract



Goniomitrium seroi

Goniomitrium seroi Casas (Funariaceae) is the only European and Holarctic species of the genus. Its recent distribution includes a few populations in eastern part of Spain (Valencia, Almeria) and some islands of the Canary archipelago. The species is threatened due to its small number of populations and fragmented area and the habitat alternation. In order to achieve efficient *ex situ* conservation of this species, its requirements in *in vitro* cultures were established. Axenic culture of this species was achieved by sterilizing 4 years old capsules from one eastern Spain population voucher in VAL-bryof 7190. The spores germinated and developed protonemata, which under certain condition induced buds and gave fully developed gametophyte plants. *Goniomitrium seroi* produces numerous rhizoidal gemmae in nature, an efficient asexual multiplication mechanism which was not observed in the cultures, so far. This was because of the poor development of rhizoids in *in vitro* cultures. The propagation of this species is easy from the other vegetative parts of the plantlets, which develop small secondary protonema and again pulvinules of green plants. Further optimization of cultivation and massive production is needed prior to experiments of reintroduction and reestablishment to potential nature habitats as a plan for its conservation strategy.



World distribution of *Goniomitrium seroi* (red dots)



Habitat type at Pico de Aguila (Alto de Calderona, Valencia County, Spain); vegetation mainly composed of *Opuntia maxima*, mixed with other Mediterranean shrub plants e.g. *Phyllirea angustifolia*, *Rosmarinus officinalis*, *Cistus salvifolius*, *Ulex parvifolius*.



Goniomitrium seroi is the only Northern hemisphere species of the genus since the other species have an austral distribution. Type locality of Sierra del Cabo de Gata, Almeria, Spain wherefrom Casas recorded and described this species for the first time in 1972, visited afterwards did not retained this species not even in the surrounded suitable localities. Dirckse et al. (1990, 1993) found it Canary Island (Tenerife, Gran Canaria, La Palma, La Gomera and El Hierro) and by Puche (2006) afterwards in Valencia county (Gilet, Sierra Calderona). This is an European endemic and a rare species considered as endangered. It grows in small patches on volcanic or sandy rocks.



In vitro produced plantlets of *Goniomitrium seroi*, developed on the protonemal balls. native plants did not developed so far in

The tubers produced in *in vitro* conditions.



Microhabitat, habitus and the potential place in Valencia county for (re)introduction of plants of *Goniomitrium seroi*