

**Facultative mycorrhizal fern? A close-up to the response of *Struthiopteris spicant* (L.) Weiss and its fungal partners to nutrients and light limitation**

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**Abstract**

The establishment of mycorrhizal relationships between a fungus and a plant usually provides an ecological advantage for the latter while securing a carbon source for the fungus.

However, under a particular set of environmental conditions, the resources invested in the fungi's growth and maintenance surpass the benefits obtained by the host. In cases where mycorrhization has a negative impact, facultative mycorrhizal plants are capable of inactivating the symbiosis and surviving. While this phenomenon has been documented and studied in angiosperms, little is known about its occurrence and dynamic in ancient vascular plants. The present study analyzed the response of a particular fern species (*Struthiopteris spicant* L. Weiss) to light and nutrient limitations in terms of growth, mycorrhizal colonization, and leaf nutrient content. We conducted a greenhouse experiment with 80 specimens of *S. spicant* to test the influence of three factors (light availability, phosphorus, and nitrogen fertilization) in their relationship with arbuscular mycorrhizal fungi. Our results indicated significant differences among treatments regarding the richness and relative abundance of Glomeromycota fungi and the C:N ratio on the leaves. Light seemed to be the most crucial factor determining the establishment and maintenance of mycorrhizal

relationships: uniquely plants receiving the greatest level of illumination developed associations with arbuscular mycorrhizal fungi.

**Keywords:** amplicons; DNA sequencing; ferns; ITS; mycorrhizal fungi;