IMPACT SUMMARY

Sample based on: Guillen-Otero et al. (2024), published in *BMC Plant Biology,* doi: 10.1186/s12870-024-04782-6

Title: Facultative mycorrhization in a fern (Struthiopteris spicant L. Weiss) is bound to light intensity

Intended audience: Intended audience: Academic research funders and grant evaluation panels (SNF, ERC, Horizon Europe)

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Prepared by: Thais Guillen Otero

SCIENTIFIC GAP

Facultative mycorrhizal plants can live with or without mycorrhizae depending on environmental conditions. This phenomenon, described in angiosperms, has not been experimentally demonstrated in ferns. Yet, many ferns act as pioneer species and often establish in nutrient-poor, toxic, or disturbed areas where suitable fungal partners might be absent. It is still unknown whether certain fern species can regulate mycorrhizal associations in response to different habitat factors.

BREAKTHROUGH CONTRIBUTION

This study provides the first experimental evidence of facultative mycorrhization in *Struthiopteris spicant* (deer fern). Under controlled settings, its association with mycorrhizal fungi was driven by light rather than nutrients. High light conditions corresponded with a significant increase in the richness and abundance of arbuscular mycorrhizal fungi. These findings suggest that the development of mycorrhizal symbiosis in this fern species is regulated by the carbon availability (the plant's photosynthetic output).

VALUE CREATED

This new evidence challenges the assumption that fern-fungus relationships are nutrient-dependent, revealing an environmental regulation angle. The variation in the abundance and composition of mycorrhizal communities within a single fern species demonstrates that *S. spicant* can change its interactions with root-associated fungi depending on photosynthetic balance. This conceptual advance

strengthens our ability to interpret fern performance across ecological gradients and disturbance contexts.

NEXT STEPS

Future research will assess whether the abundance and richness of mycorrhizal communities are also linked to light availability in natural populations of *S. spicant*. We will compare the mycorrhizal fungi associated with this species across environmental gradients to analyze the dynamics of facultative mycorrhization in field settings.