



Universität
Basel

Publication

Rate of hyphal spread of arbuscular mycorrhizal fungi from pigeon pea to finger millet and their contribution to plant growth and nutrient uptake in experimental microcosms

JournalArticle (Originalarbeit in einer wissenschaftlichen Zeitschrift)

ID 4647163

Author(s) Schuetz, Lukas; Saharan, Krishna; Maeder, Paul; Boller, Thomas; Mathimaran, Natarajan

Author(s) at UniBasel [Boller, Thomas](#) ; [Schütz, Lukas](#) ; [Natarajan, Mathimaran](#) ; [Saharan, Krishana](#)

;

Year 2022

Title Rate of hyphal spread of arbuscular mycorrhizal fungi from pigeon pea to finger millet and their contribution to plant growth and nutrient uptake in experimental microcosms

Journal APPLIED SOIL ECOLOGY

Volume 169

Pages / Article-Number ARTN 104156

Keywords Biofertilizer; Intercropping; Pigeon pea; Finger millet; Hyphal spread; Arbuscular mycorrhizal fungi

Intercropping is a sustainable agroecological tool known to provide multiple benefits to farmers. Several studies have shown that arbuscular mycorrhizal fungi (AMF) play a key role for the improved grain yields in intercropping systems through facilitative nutrient and water uptake via the common mycorrhizal network (CMN), yet little is known on the rate of hyphal spread. Here we hypothesized that AMF species differ in the rate of extraradical hyphae to spread from one plant to another, thereby affecting the growth of the intercropped plants. To test our hypothesis, we established experimental microcosms in the greenhouse, in which one pigeon pea (*Cajanus cajan*) and two finger millet (*Eleusine coracana*) plantlets were kept in separate pots, connected by soil bridges of 5 or 12 cm length, inaccessible to roots but accessible to fungal hyphae. The pigeon pea plants were pre-inoculated with *Claroideoglomus etunicatum*, *Rhizophagus fasciculatus* or *Rhizophagus irregularis*. All three AMF species led to a strong growth promotion compared to uninoculated control of the short microcosms and more than doubled the biomass of pigeon pea. The biomass as well the phosphorus content of finger millets connected by AMF to the pigeon pea differed with the length of the soil bridge and the species of AMF. By applying ¹⁵N isotopes to the soil of pigeon pea pots we revealed that in both lengths of the microcosms *R. fasciculatus* and *C. etunicatum* transported nitrogen from pigeon pea to finger millet across distances of up to 12 cm but *R. irregularis* did not. Furthermore, by destructive sampling, we estimated a hyphal spread of 4.1 mm d⁻¹ by *C. etunicatum* across a 12 cm soil bridge. We conclude that the row distance between the crops and the choice of AMF species play a crucial role for the application of AMF as biofertilizer.

ISSN/ISBN 0929-1393 ; 1873-0272

edoc-URL <https://edoc.unibas.ch/89425/>

Full Text on edoc No;

Digital Object Identifier DOI 10.1016/j.apsoil.2021.104156

ISI-Number 000701882600003

Document type (ISI) Article