ecobreed
IMPROVING CROPS

Increasing the efficiency and competitiveness of organic crop breeding

PRACTICE ABSTRACT No. 6

Increasing Arbuscular mycorrhizal fungi (AMF) colonisation in wheat

Arbuscular mycorrhizal fungi (AMF) form a symbiotic association with the roots of most crop plants with the potential to contribute to sustainable agricultural production via the reduced use of mineral fertilisers and pesticides.

Benefits of AMF:

- enhanced nutrient acquisition of P, N and Zn
- increased tolerance to biotic and abiotic stresses
- enhanced soil structure through aggregation
- provide a marker for soil health and quality

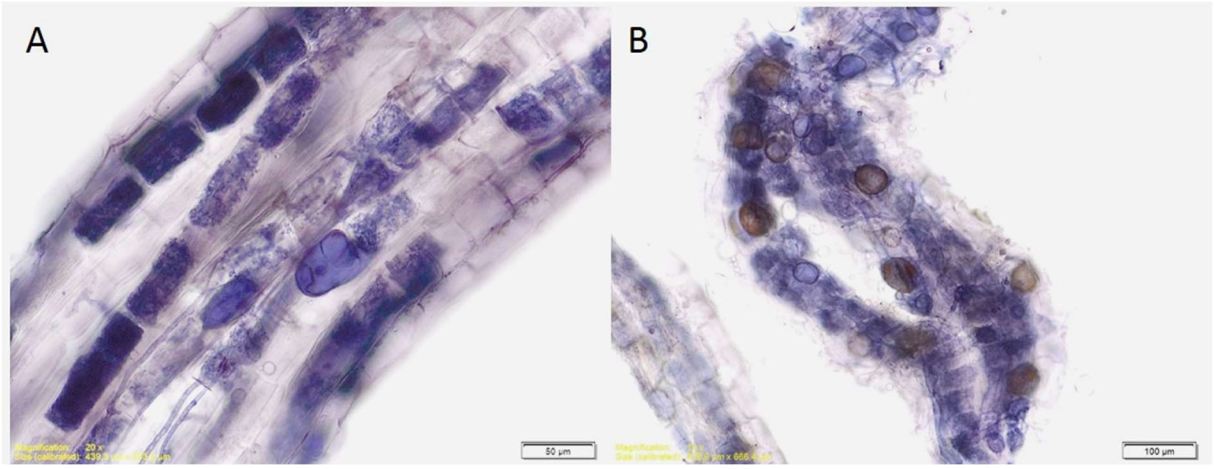

Fig. 1: Arbuscular mycorrhizal structures in wheat roots from field samples stained with ink and vinegar: cvs. 'Aurelius' (A) and 'Arminius' (B).

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SOLUTIONS:

- AMF have been shown to be more abundant in soils with reduced tillage
- AMF have been shown to be more abundant in organic than conventional soils where pesticides and mineral fertilisers are not permitted
- Numerous studies have shown genetic variation in wheat for AMF colonisation (Hetrick et al., 1996; Zhu et al., 2001)
- Wheat varieties with the potential for increased colonisation efficiency are being screened in the ECOBREED project
- Breeding for AMF colonisation offers clear long-term potential for sustainable agricultural production

PRACTICAL RECOMMENDATIONS:

- Promote the use of soil management strategies which support native AMF such as reduced tillage and reduced fertiliser input.
- Biostimulants containing AMF either applied as a seed dressing or directly to crops have the potential to increase colonisation in soils poor in native AMF.
- Promote the use of healthy functional soils through increased organic matter, soil health and soil microbial communities.
- Further research is required for the optimisation of AMF in wheat production to provide an economic return to farmers.

FURTHER INFORMATION

Hetrick, B. A. D., Wilson, G. W. T. and Todd, T. C. (1996). Mycorrhizal response in wheat cultivars: Relationship to phosphorus. Canadian Journal of Botany, 74(1): 19–25. doi.org/10.1139/b96-003

Zhu YG, Smith SE, Barritt AR and Smith FA. (2001). Phosphorous (P) efficiencies and mycorrhizal responsiveness of old and modern wheat cultivars. Plant Soil 237: 249-55. doi.org/10.1023/A:1013343811110

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ECOBREED CONSORTIUM

ABOUT ECOBREED:

ECOBREED is a 5-year (2018-2023) project funded by European Union's Horizon 2020 research and innovation programme that will improve the availability of varieties and seed suitable for organic and low-input production. Activities will focus on four crop species i.e. wheat, potato, soybean and common buckwheat, selected for their potential contribution to increasing the competitiveness of the organic sector.

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