

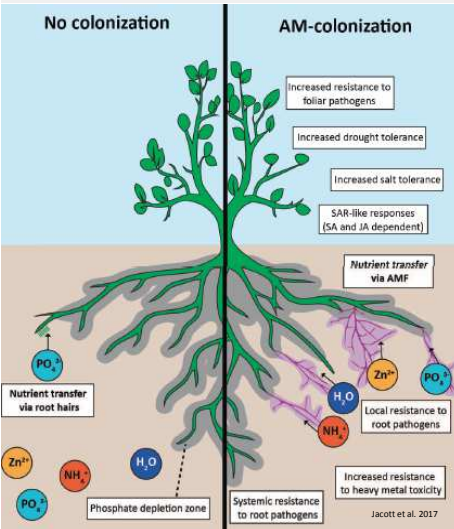
How mycorrhizas alter the metabolic profile of host tree roots. The ectomycorrhizas of cork oak and *Pisolithus tinctorius*

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Mycorrhizas – the interaction of roots and soil fungi- is essential for the life and health of trees in temperate and boreal forests, where it plays a major role in nutrient cycling and in functioning of the forest ecosystem. The fungus delivers soil minerals, particularly phosphorous and nitrogen, to the host roots. The plant, in return, transfers photo assimilates to the fungus.



Benefits to plants

- Increased growth – improved nutritional status
- Increased resistance to pathogens
- Increased resistance to environmental stress (drought, salt stress)
- Increased soil stability and quality – improved soil structure (less erosion)



Cork Oak seedlings in the nursery



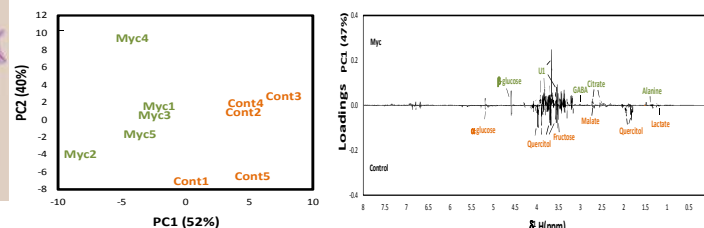
Mycorrhizal fungal inoculum



Pisolithus tinctorius was established *in vitro* and used to produce mycorrhizas in Cork Oak seedlings in the nursery

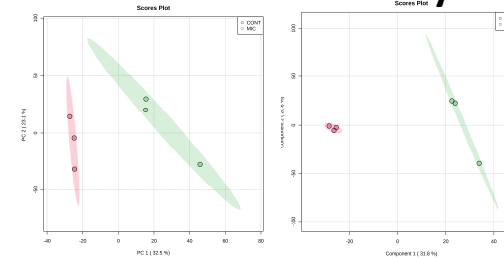
How mycorrhization affects metabolite profiling in roots?

H1NMR Analysis



10 compounds are differentially accumulated in mycorrhizal roots (Myc) compared to non-mycorrhizal roots (Cont)

FTICR-MS Analysis



- Carbon compounds commonly found in root exudates (sugars, polyols, organic acids) are depleted in mycorrhized oak roots – the fungal symbiont metabolizes root exudates
- Mycorrhization is associated to a reduction in root apoplastic protective barriers (less accumulation of suberin lipid compounds) – increase of symbiotic contact points
- Induction of secondary metabolism associated to defense - avoid fungal over-growth in the root apoplast
- Accumulation of non-proteogenic amino acids (GABA, alanine) in mycorrhizal roots – protection against oxidative stress

90 compounds are differentially accumulated in mycorrhizal roots (Myc) compared to non-mycorrhizal roots (Cont)

