

research highlights

FUNGAL INVASION

Eat more fat

Science **356**, 1175–1178 (2017)

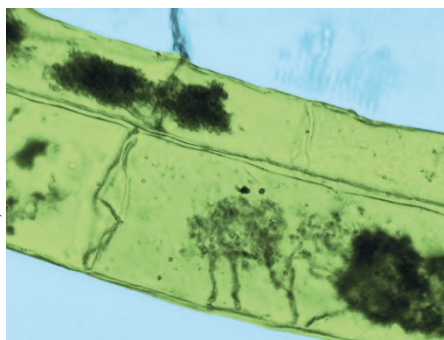
Science **356**, 1172–1175 (2017)

Plant–fungal interactions are diverse, from mutualism to parasitism. The majority of vascular plants live with mutualistic mycorrhizal fungi to ensure efficient nutrient uptake from the soil, whereas mycorrhizal fungi obtain carbon resources from their host plants by direct contact or invasion; for example, arbuscular mycorrhizal fungus penetrates plant root tissue for sufficient nutrient exchange. For many years, it has been believed that sugars are the major form of carbon nutrients from host to mycorrhiza. However, recently, two papers simultaneously published in *Science* redefined that in addition to sugars, lipids represent a major carbon resource supplied by the host plants to sustain the colonization of fungus.

In the first, two groups led by Giles E. D. Oldroyd and Peter J. Eastmond

in the United Kingdom collaboratively uncovered that lipid fatty acids are exported from the host plant *Medicago truncatula* to an arbuscular mycorrhizal fungus, *Rhizophagus irregularis*. It was also found that mycorrhizal invasion activates a lipid biosynthetic pathway in host roots and facilitates lipid export in a RAM2 (REQUIRED FOR ARBUSCULAR MYCORRHIZATION 2)-dependent manner.

HISTORY IMAGES / ALAMY STOCK PHOTO



In the other paper, a Chinese group led by Ertao Wang reported that sugar is not the major carbon source transferred to fungus in the *R. irregularis* carrot root culture system, and that the fatty acid biosynthesis pathway is required for mycorrhizal symbiosis. The lipid export pathway requires RAM2 and ABC (ATP-binding cassette) transporters and is not only restricted for arbuscular mycorrhizal colonization. Using the *Arabidopsis* fungal pathogen *Golovinomyces cichoracearum*, the researchers further demonstrated that fatty acids synthesized by the host are also important for pathogenic fungal infections.

Future studies might help to elucidate whether other plant–fungal interactions are sustained by lipids transferred from host to fungus, and how to use the knowledge to promote beneficial interactions and control infections of fungal pathogens.

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