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Plants and fungi pioneers of free market economy

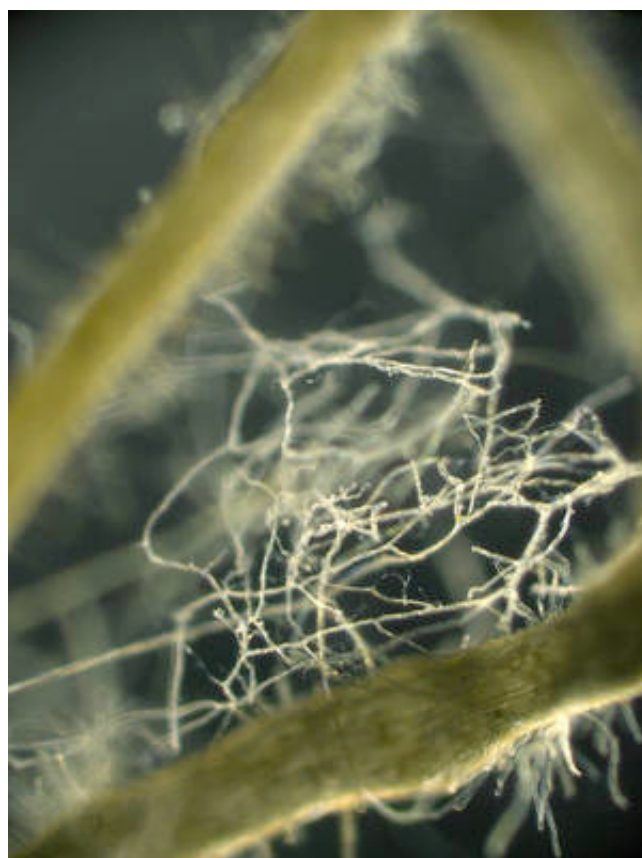
It's not just humans that create market economies, exchanging one set of goods for another - plants and fungi also barter nutrients with deals kept in check by market forces, new research has revealed.

Writing in *Science*, Vrije University researcher Toby Kiers and his colleagues show how the roots of plants feed sugars to soil-dwelling fungi in return for phosphorus and other nutrients they can't make themselves. This means that plants can effectively make use of the extensive, branching subsoil network of fungal hyphae almost as an extension of their own root systems.

But it's not a simple case of give and take: plant roots can discriminate between more or less generous partners and pay higher sugary prices to those fungi that are more generous with their nutrients, and vice-versa. Consequently, cheapskate fungi are priced out of the market by their more generous counterparts.

The team made the discovery by using radioactively-labelled carbon and phosphorus to follow the exchange of materials between a small clover-like plant called *Medicago truncatula* and three closely-related species of fungi, *Glomus interadices*, *Glomus aggregatum* and *Glomus custos*.

In an initial series of experiments, the plant roots were grown in isolation on a Petri dish with each of the different fungi in turn. *Glomus interadices*, the team found, consistently provided the plant with more phosphorus and was consistently rewarded with bigger rations of sugar. *Glomus aggregatum* was less forthcoming with its phosphorus and consequently received low sugar payments, whilst *Glomus custos* was downright selfish and supplied the phosphorus in a form that the plant couldn't use



and so received little reward in return.

But when the three species were grown together with the same set of roots, would the plant be able to tell who was short-changing it and so apply a penalty to the offender? Incredibly, the answer is yes. When all three fungi were co-cultured alongside the same set of roots, the less generous fungal species were consistently less well rewarded than their more generous counterparts, which effectively priced them out of the market, becoming the dominant nutrient supplier within a short time.

This shows that these sorts of mycorrhizal relationships between plants and fungi, which are thought to have existed for more than 470 million years and may even have enabled plants to first colonise the land during the Devonian era, represent a genuine subsoil free-market economy that Barrack Obama would be proud of!

References

- Science 12 August 2011: Vol. 333 no. 6044 pp. 880-882 DOI: 10.1126/science.1208473

Chris Smith 14th Aug 2011

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Your Comments

I will be interested in this one as it has been known for some time that there are symbiotic relationships between plants and fungi...

What is also interesting is the method a plant uses to detect other plants around it, and also how it responds. I would say that was a more recent discovery.

I know also that most trees form relationships with certain fungi and this normally only takes place when the tree matures.

- *Aaron_Thomas* - 14th Aug 11

So if the fungi (government) spends its stipend from the tree (taxpayers) on welfare scams like no-income mortgages, returning only debt to the country, should the tree (taxpayers) cut off funding to the fungi (government)?

- *grizelda* - 15th Aug 11

Are you saying that the house of commons is fungus ridden?! I've certainly heard the phrase rotten to the core being applied!

And I guess, in my view, the answer to your question would be, if we were trees and fungi, "yes".

Chris

- *chris* - 16th Aug 11

Tut tut!

No politics, please! (Unless you want me to give you an earful)

- *Geezer* - 16th Aug 11

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