

■ Intellectual Property and Enterprise

Plant disease control using iron-enriched sheaths naturally produced by bacteria

Bacteria have some extraordinary natural ways of protecting themselves against fungi and attacking microbes. For example, the iron-oxidizing bacteria, *Leptothrix* spp., produces microtubular hollow sheaths in aquatic environments where there is an up-welling of groundwater. The sheath is primarily composed of iron oxides (Fe/Si/P = 75/20/5 in the atomic ratio). Interestingly, a colloidal suspension of these Fe-enriched sheaths in powder form has been found to effectively suppress fungal pathogenesis.

Kazuhiro Toyoda and Jun Takada at the Okayama University, Japan, and co-workers investigated one such naturally-produced sheath (an Fe-enriched sheath) to determine its antifungal activities in vitro against several phytopathogenic fungi. The fungi tested included *Botrytis cinerea*, *Colletotrichum higginsianum*, and *Mycosphaerella pinodes*.

The fungi were inoculated on ethanol-killed onion epidermis. The researchers found that the germ tube (gt) and appressorium (app) were particularly effective at causing penetration failure from appressoria when the powdered suspension was mixed with the spore.

These results indicate that the Fe-enriched sheath from *Leptothrix* spp. could provide a new protectant for plant diseases.

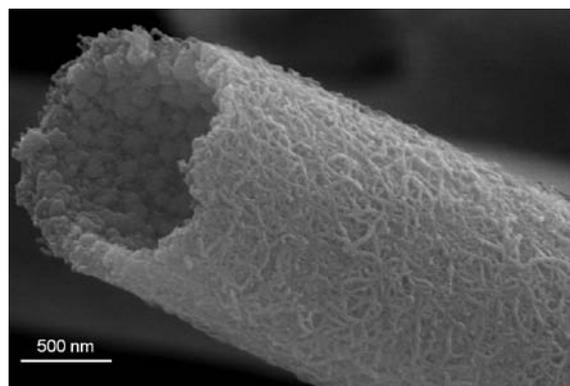
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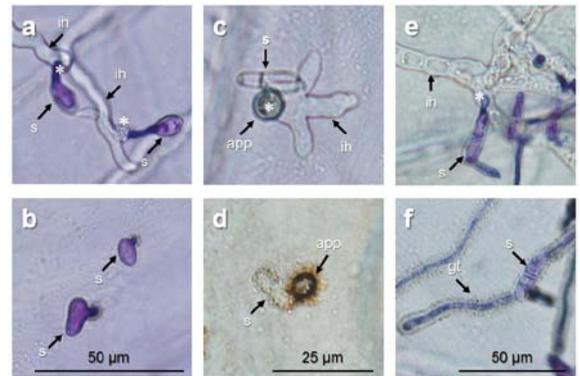
L-BIOX; *Leptothrix* sp.-produced biogenous iron oxide



SEM image for L-BIOX

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L-BIOX effectively suppresses fungal pathogenesis, especially causing penetration failure from appressoria, when mixed with the spore suspension on ethanol-killed onion epidermis.

Botrytis cinerea (a, b);

Colletotrichum higginsianum (c, d);

Mycosphaerella pinodes (e, f).

app: appressorium;

gt: germ tube;

ih: infection hyphae;

s: spore.

Asterisk indicates a site of attempted penetration