Identification of Endohyphal Bacterial Symbionts as Major Determinants of Cellulase and Ligninase Activity in Fungi

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Background:
Plant-associated fungi play important ecological roles as pathogens, mycorrhizae, endophytes, and saprotrophs. As endophytes, Fungi colonize healthy, living plant tissues, providing protection from pathogens, herbivores, and other environmental stressors such as drought. As saprotrophs, Fungi are the primary decomposers of senescent plant materials, breaking down both lignin and cellulose, the major components of plant cell walls. Many Fungi can fill more than one of these roles in their lifecycle. One potential mechanism influencing ecological lifestyle switches of Fungi is the presence of other microbial symbionts, including endohyphal bacteria (EBH). Cellulase activity is thought to be important in the lifecycle of horizontally transmitted endophytes, which must penetrate host plant tissues during the colonization process. Ligninase activity is also thought to be important in the lifecycle of horizontally transmitted endophytes, which must penetrate host plant tissues during the colonization process. Many endophytes also have saprotrophic stages in their life cycles, during which cellulase and ligninase activity is thought to be highly important for nutrient acquisition.

Invention:
This technology discloses a method whereby EHB were shown to markedly influence cellulose and ligninase activity in fungi. It can be applied in industries relevant to biofuel development from plant material, remediation, and other industrial processes.

Advantages:
This technology discloses the only method of influencing cellulose and ligninase activity in fungi using EHB, which can influence lifestyle switches in fungi and which can tailor fungi nutrient acquisition.

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