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Emergence of dark septate endophytic fungi in microbial world

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Dark septate endophytic (DSE) fungi are diverse facultative ascomycetes found inside the root tissues without any pathogenicity to the host. Like arbuscular mycorrhizal fungi, DSE has predominant positive ecological roles in plants. The DSE fungal associations exhibit positive effects on plant growth, water, and nutrient uptake especially, the least available nutrient, phosphorus (P). Phytohormones secretion by the DSE adds up in the crop improvement.

Nevertheless, the presence of melanin in DSE has a wide range of photoprotection and antioxidant properties which could scavenge free radicals under stress condition. Four DSE fungi, *Curvularia geniculata* RSL06, *Phoma multirostrata* RSL03, *P. multirostrata* RSL04 and *Eurotiomyces* sp. RSL05 were isolated from roots of different plants exposed to light stress such as UV and a different wavelength of lights. The pH of the broth, biomass, amylase enzyme and specific activity, and their melanin production were significantly varied among the fungal isolates and light conditions. The FTIR spectroscopic analysis of melanin in all DSE showed distinct variation

in the functional groups. Further, the higher radical scavenging activity of melanin was recorded in *C. geniculata* exhibited 29.65%-51.94% in UV and 10.52%-39.38% in the wavelength of light. Previously, we proved *C. geniculata* improved plant growth through phosphate solubilization and phytohormone production. Hence, this study suggested that fungal melanin acts as a potential agent against various light stress and contains antioxidant activity, which extends our knowledge to analyze the activity of DSE fungi under molecular level. In the future, DSE fungi could replace the usage of chemical fertilizers in agriculture.

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