

学位論文要旨

Potential of dark septate endophytic fungi for promoting plant growth under specific conditions of organic nitrogen, acidic pH, and metal pollutant contamination
(有機窒素、酸性土壌および金属汚染環境下における根部エンドファイトによる宿主植物の生育促進に関する研究)

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As a consequence of the expected increase in the world population combined partly to limited agriculture land expansion, and increasing environmental pressure, a slow growth of global agricultural production is standing out. Subsequently, there is a need to strengthen the potential of agriculture production but within the respect of strict global environmental standards. Recovering abandoned agriculture land or turning non-arable land into fertile arable land can help speed up the agriculture growth and hence move toward satisfying this world food demand in the long term. Basically, four new endophytic fungal species including *Helminthosporium velutinum* isolate 41-1, *Veronaeopsis simplex* isolate Y34, *Pseudosigmoidea ibarakiensis* isolate I.4-2-1 and yet unidentified isolate 312-6, have been tested for their ability to support plant growth under various stress conditions such as poor nitrogen deficiency conditions, low pH conditions, and metal contaminated environment.

The results were variable with the isolates tested and the stress condition considered. Under poor nutrient conditions, *H. velutinum* showed ability to promote sweet sorghum plant growth. It was the same with *P. ibarakiensis* isolate I.4-2-1 which was able to significantly improve host

plants growth under condition where NaNO_3 was replaced by amino acids as nitrogen source, and likewise, in condition of low pH. As for metal contaminated conditions, results showed fungal isolate are able to support Chinese cabbage and tomato growth under both Cesium (Cs) and Cadmium (Cd) contamination conditions. Interestingly, endophyte isolates showed ability to decreased Cs accumulation in host tomato plants as a result of high and negative plant reactions rather than high and positive reactions as it is the case with Chinese cabbage.

These results suggest that tested fungal endophytes have a potential to support plant growth under stressed conditions and may further lower the contaminated of the food chain by radionuclides. They can therefore be recommended as potential candidates to undergo further tests in real life conditions. In a more broad perspective, these results confirm the multi-functionality of the role of fungal endophytes which beyond the nutrient acquisition and positive plant growth response.

Keywords: Dark septate fungal endophytes, stress conditions, metal contaminants, abandoned land, Cesium