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MICROBIAL DIVERSITY IN NITROGEN FIXING NODULES OF CASUARINA EQUISETIFOLIA AND ITS IMPACT ON PLANT GROWTH AND SOIL QUALITY

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Actinorhizal plants can contribute to the rehabilitation of poor and disturbed soils by stabilizing the soil and building up its nitrogen content. In addition, they can withstand under various environmental stresses such as high salinity, heavy metal, etc., *Casuarina equisetifolia* is an actinorhizal plant which is important in agroforestry, land reclamation and natural ecosystems. The aim of this study was to explore microbial diversity in nitrogen fixing nodules of *C. equisetifolia* and to assess its impact on plant growth and soil quality.

Double layered agar plate technique was adopted to isolate microorganisms from surface-sterilized root nodules. Isolated microorganisms were identified based on distinctive morphological characteristics of colonies and mycelia which were observed under light microscope. Ability of isolates to grow with cadmium up to 10 mg/mL was also tested.Two weeks old seedlings of *C. equisetifolia* which were grown in ¼ strength Hoagland's nutrient solution (pH
6.8), were inoculated with different isolates to examine infectivity, nodulation and their effect on shoot and root growth of *C. equisetifolia.* The root, shoot length, lateral root formation, nodulation were recorded. The plant assay was conducted in triplicate in a completely randomized block design.

Three actimomycetes species *;Frankia* sp., *Micromonospora* sp. and *Streptomyces* sp.were identified from nitrogen fixing root nodules. Further, synergistic growth of all three isolates in liquid media with and without any nitrogen supplement was observed. While *Frankia* sp. promoted the shoot and root growth by 87% and 55% respectively with nodulation of *C. equisetifolia,* about 28% increase in shoot and root growth of *C. equisetifolia* by *Micromonospora* sp. without nodulation was observed. In contrast, lateral root formation of *C. equisetifolia* found to be triggered by *Streptomyces* sp. indicating its potential to modulate host developmental pathways. This study provides novel data on isolation of root inhabiting *Streptomyces* sp. which could probably play a vital role in exchanging complex signals between plants and the microorganisms and alleviating cadmium toxicity to the plant by depleting cadmium availability in soil. In conclusion, the plant probiotic role of nodule inhabiting actinomycetes of *C. equisetifolia* would significantly contribute to the plant growth and soil quality.

Keywords: *C. equisetifolia, actinomycetes, nodulation, plant growth, soil quality*