Endophytic Fungal Diversity in Corms of Amorphophallus sylvaticus (Roxb.) Kunth

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Abstract: In present investigation Amorphophallus sylvaticus (Roxb.) Kunth commonly called as Jangali suran is a monsoon perennial cormatus plant species first time studied for endophytic fungal diversity of corm. The different corm sample were collected from two different sites namely Pota and Nageli sites in Nanded district of Maharashtra. The 45 corm samples were screened for colonization of different endophytic fungi on czaepk-do agar medium. The different corm samples show different endophytic fungal genera the isolated and identified genera includes Fusarium, Cladosporium, Alternaria, Helminthosporium, Curvularia, Rhizoctonia and Drechslera.

Keywords: Amorphophallus sylvaticus, corn and endophytic fungi.

1. Introduction

Endophytic fungi are important components of plant micro-ecosystems. They spend their whole life by colonizing intra or inter-cellularly within the healthy tissues of the host plants, without showing any symptoms of disease (Zhang et al., 2006). Endophytes are found in a wide variety of plant tissue types such as roots, stems, leaves, tubers, buds, ovules, seeds, fruits, xylem and bark (Tan and Zou, 2001).

Study revealed that approximately, there are near to 300,000 plant species on the earth having host to one or more endophytes, and many of them may colonize different hosts. (Strobel & Daisy, 2003, Huang et al., 2007).

Plant endophytic fungi are novel and important for production of natural bioactive compounds with their potential use in agriculture, medicine and food industry. The various important bioactive compounds from endophytic fungi isolated which shows antimicrobial, insecticidal, cytotoxic and anticancer activities. An anticancer taxol isolated from Colletotrichum gloeosporioides of concentration from 0.005 – 0.05 μm induced increased cell death against human cancer cell through apoptosis (Gangadevi & Muthumary, 2008). They produces anticancer enzyme L-asparaginase (Ying and Adeline, 2014). The production of bioactive compounds which shows antimicrobial activity against different pathogenic microbes (Jingfeng et al., 2013, Tanmayee et al., 2015). Endophytes having ability to produce different enzymes like amylase, cellulase, protease, lipase, and laccase. Endophytes like Aspergillus terreus produces lovastatin used in treatment of coronary heart diseases, renal diseases, Alzheimer’s disease, bone fractures etc (Praveen et al., 2014). Endophytic fungus Pestalotiopsis microspora from Terminalia morobensis to show antioxidant activity to scavenge superoxide and hydroxyl free radicals (Harper et al., 2003). The endophytic Aspergillus sp., Phoma sp.produces Antidiabetic drug 2, 6-di-tet-butyl-p-cresol and Phenol, 2, 6-bis [1, 1-dimethylthylethyl]-4-methyl which Reduce blood glucose level (Dhanakhar and Yadav 2013).

There are plenty of reports on endophytic fungal diversity of different plants like Cymbopogon citratus, Murraya koenigii, Oldenlandia diffusa and Pereskie bleo (Yiing et al., 2014), Roots of Salvia miltiorrhiza Bunge (Jingfeng et al., 2013), Stem of Rose plant and leaves of Mango tree (Tanmayee, et al., 2015), Urginea indica (Shiva et al., 2015), orchids like Anacamptis pyramidalis (L.), Orchis sancta L., Ophrys fusca Link. and Serapias vomeracea subsps. orientalis (Greuter) from roots and tubers (Yuksel and Rengin,2009), tuber of Solanum tuberosum (M. O’Callaghan et al. (2004). The rhizospheric fungi associated with the corms of Amorphophallus sylvaticus (Roxb.) Kunth were isolated (Mulani and Sayyad, 2015). There is no report on endophytic fungal diversity of Amorphophallus sylvaticus (Roxb.) Kunth, so the present investigation was undertaken.

2. Materials and Methods

2.1. Collection of Corms

Corms of Amorphophallus sylvaticus (Roxb.) Kunth were collected from fields of village Pota, Tq. Himayatnagar and village Nageli, Tq. Mudkhed of Nanded district during winter (November, 2014). These corm samples were collected in sterile polythene bags and brought to the laboratory used for the investigation of endophytic fungi.

2.2. Isolation of Endophytic Fungi

Endophytic fungi were isolated by following methods employed by Hallman et al. (2007) and Selvakumar et al. (2014).

The collected corm samples were washed in running tap water to remove the debris and epiphytic microorganisms and soaked in 0.1 % mercury chloride subsequently surface sterilized by using ethanol. Followed by sterilizing agent, such as 2% Sodium hypochloride solution for 2-4 minutes and then by sterile distilled water. The Sterile corm were then chopped into 3-4 mm x 0.1 cm lengths and inoculated in petridishes containing potato dextrose agar (PDA) medium supplemented with streptomycin. The petridishes
were sealed and incubated at room temperature (28±2˚C) for 15 days. Fungal growths growing out of the corm pieces were sub cultured on separate PDA plates and slants before use for the identification.

The colonization frequency (CF) percentages of Endophytic fungi were calculated using the method (Kumar & Hyde 2004).

2.3. Colonization Frequency

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\text{CF\%} = \frac{\text{No of species isolated}}{\text{No of segments screened}} \times 100
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2.4. Identification of Isolated Fungal Organisms

The identification of endophytic fungi was done by using the culture characteristics like fungal culture shape, color, pattern and microscopic characteristics like arrangement of the mycelium, conidial arrangement, types of spore etc. by consulting relevant literature. The pure cultures of isolated fungal strains were maintained on PDA slants at 28°C during the study.

3. Results & Discussion

In present investigation a total forty five small corm segments were screened for isolation of endophytic fungi on Czapex dox agar medium. The total seven endophytic fungal genera were isolated and identified from corms of Amorphophallus sylvaticus (Roxb.) Kunth. The isolated genera include Fusarium, Alternaria, Helminthosporium, Cladosporium, Curvularia, Rhizoctonia and Drechslera.

The species colonization consist of Fusarium 9.25 %, Alternaria 12.96 %, Helminthosporium 5.55 %, Cladosporium 7.4 %, Curvularia 5.55 %, Rhizoctonia 3.7 %, and Drechslera 5.55 % (Table.1 and Fig.1).

Similarly different researchers have isolated endophytic fungi from different plant parts, mainly Maria et al. (2013) isolated Monilia sp., Aureobasidium sp., Moniliella sp., and Sporothrix sp. from tubers of Dahlia variabilis. Yuksel and Rengin (2009) isolated Rhizoctonia, Fusarium and Papulaspora from roots and tubers of orchids. Chanda et al., (2013) isolated endophytes include Aspergillus sp, Nigrospora sp, Mucor sp., Curvularia sp., Fusarium sp., Alternaria sp., Stemphylium sp and Chetomium sp. O’Callaghan et al., (2004) isolated endophytic fungal genera include Chaetomium, Cladosporium, Fusarium, Gliocladium, Paecilomyces, Phomopsis and Rhizoctonia from tuber of Solanum tuberosum. Tanmayee et al., (2015) isolated Total, 5 fungal isolates of endophytes were obtained from Rose stem. The less endophytic fungal diversity may be due to medicinal property of plant that affect colonization due to secretion of some antifungal compounds (Rajgopal et al., 2010).

4. Conclusion

In present investigation the total seven endophytic fungal genera were isolated and identified from different corms of Amorphophallus sylvaticus (Roxb.) Kunth which will be further used for production of some bioactive compounds which is essentially used in medicine, agriculture and food industry.

Acknowledgement

The acknowledgements are due to the authorities of Swami Ramanand Teerth Marathwada University and The Director, DST-FIST, UGC-SAP sponsored School of Life Sciences, and SRTM University Nanded for providing necessary facilities for carried out present investigation. The author Sayyad Shahim is grateful to the Maulana Azad National Fellowship (MANF), New Delhi for their financial assistance to conduct this research work.

References


