



*Journal of Advances and
Scholarly Researches in
Allied Education*

*Vol. IX, Issue No. XVIII,
April-2015, ISSN 2230-7540*

STUDY OF ENDOPHYTIC FUNGI UTILIZED FOR ANTIFUNGAL ACTIVITY

AN
INTERNATIONALLY
INDEXED PEER
REVIEWED &
REFEREED JOURNAL

Study of Endophytic Fungi Utilized for Antifungal Activity

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Abstract – Endophytes are kept from each plant species inspected to date, so the metabolite coevolution has been impacting the plants' (microbiota) ethno botanic, especially healing, use. Asteraceae fulfill the instinct for plant affirmation to limit endophytes since a huge bit of such this family have a long exhibition of adjusting use, avowed by present day pharmacognosy. The current overview minds diligent references on the endophyte–Asteraceae spp. ventures, zeroing in on the associate metabolites profile as made by the two people from this typical plan. Endophyte improvements related with Asteraceae have been amassed when all is said in done; regardless, winning taxa that produce bioactive blends were express for the plant social classes of different geographic start. Endophytic parasites abundance inside the host plant and the normal movement were sincerely related. Also, the pharmacological advancement was connected with the plant part, so differential kinds of trademark joint undertakings in roots, stem, leaves, and inflorescences were made between endophytic parasites and host plants. The close to appraisal of the Asteraceae has what's more compelling endophyte solid action showed likenesses that need a future explanation on the metabolome level.

Keywords – Composite; Fungi; Herbs; Secondary Metabolites; Symbiosis

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INTRODUCTION

It is obvious from the composing that the helpful plants are well off in antimicrobial properties. An enormous number of provincial people use restorative plants in a personal growth mode. The helpful plants are used in preventive and mending the drugs of various ailments in different plants and animals including people. According to world prosperity affiliation (WHO) report, 80 % of the all-out people uses local medicine for the fundamental clinical benefits. The climb in the failure of chemotherapeutic and against microbial resistance showed by pathogenic microbial experts prompts the screening of a couple of remedial plants and microorganisms for their extraordinary antimicrobial activities. The microorganisms like organisms are perpetually being used for the chase of conceivable medication things, the prescriptions from parasitic sources are growing. The prescriptions of parasitic origin have made an interest in the exposure of new discretionary metabolites. Endophytic living creatures have gotten amazing care in regards to get their host again microorganisms, minuscule organic entities, bugs, bug and herbivores The endophyte infers in the plant (Gr. Endon-inside, phyton-plant). first introduced the term epiphytes for parasites living outwardly of their host plants and endophytes for the organisms living inside the host plant tissue. The term endophyte is used for living things tainting plants inside without showing any appearances .

The most conservative importance of the term endophyte fuses all living creatures that in the long run in the their every day schedule cycle insight inside plant tissue without conveying any signs. Endophytic living things are depended in all classes of vascular plants Endophytes are accessible in greeneries, liverworts and greeneries. Various endophytic parasites are represented from the plants filling in various conditions including tropical, gentle and land and water proficient (Suryanarayanan et al., 2003). The environment accepts a huge part on endophyte assortment which depends on the possibility of the host plant and their organic region. Endophytic organisms are a good wellspring of immunizing agents poisons. Normal things from entophytic organisms have been believed to have a wide variety of damaging contamination causing trained professionals. They are not confined to phytopathogen, similarly as minute living beings, growths, diseases and protozoan that impact individuals and animals. Various customary things related with endophytic organisms have been found to be potential as antifungal, against oxidant, anticancer, quieting and antimicrobial subject matter experts (Verma 2007). Endophytic parasites are the focal wellspring of customary and wide verity of bioactive metabolites which is a mind blowing wellspring of medicine. They have pulled in broad interest of investigators for their wide verity of bioactive metabolites. The endophytes are found in all classes of vascular plants (Zhang et al., 2006).

They are accessible in greeneries, liverworts and plants. Likewise, endophytic growths are represented from plants filling in various conditions, for instance, wilderness, gentle and maritime. The environment thought of the host plant and their natural territory accept a critical part on the assortment of endophytes. The endophytic growths are represented from different social affairs, for instance, Ascomycetes, Deuteromycetes and Basidiomycetes. A critical year in the verifiable setting of endophyte research is 1977, when Charles Bacon and partners found the justification for festucae toxicosis, an issue suffered by steers dealt with in fields of the grass *Festuca arundinacea*. These experts tracked down that, disregarding the way that they showed no indications, most plants of *Festuca arundinacea* from pastures where cows suffered in toxications had their leaves and stems in a general sense colonized by a creature. Sometime later, this parasite was recognized as *Neotyphodium coenophialum*, where it was found that debased plants contained a couple of toxic alkaloids and that *Neotyphodium* species can be significant to their plant has growing their versatility of biotic and abiotic stress factors.

Some grass species are identified with more than 100 one of a kind sorts of infectious endophytes and this number can be much more unmistakable for people from other plant families. The endophytic assortments emit an impression of being more luxurious in tropical than in quiet or cold zones of the world. Plant age similarly has an effect upon endophyte assortment. The more settled plant parts harbor more endophytes than more energetic ones. Secondary metabolites where conveyed by endophytes in plants include a gatekeeper framework against infectious microorganisms. The endophyte produces an antifungal compound or a substance that starts plant watch instruments in the plant. The protection from a microorganism could be the result of direct contention among endophytes successfully present in leaves and the organisms.

Plant assortment is an inconceivable wellspring of medications. The biochemical's present in a lot of the plant species are the unprecedented vaults of new and anticipated meds (Sarin 2003). But, only 1100 of the universes 3,65,000 known sorts of plants have so far been investigated for their remedial properties. The plant resources are the critical wellsprings of the antimicrobial subject matter experts. They can be used for noticing the normal changes. They are the unmistakable benefits for new characteristics and biotechnologically huge combinations. India is affluent in plant assortment and one of the super biodiversity territories of the world. Indian plant assortment, with around 45,000 plant species, addresses 7% of world's greenery. Indian plant assortment, with around 4900 endemic plant kinds of blooming plant (3% of Indian verdure), is affluent in endemism. The striking truth is that the usage of therapeutic plants is a living practice. The common vendors and neighborhood drug men practice the traditional medicine systems like Ayurveda, Siddha, Unani and Tibetan structures

(Retnam and Martin. 2006). The availability of helpful plants is as of now under certifiable risk. The absence about the natural components of the plant bounty is an issue, yet at present data on their utility is another mind blowing issue. At the point when the utility is acknowledged man starts utilizing the thing without thinking about its further implications on supreme overall structure. Over 95% of the therapeutic plants used by the Indian business today are accumulated from the wild and over 70% of the plant grouping remember harming gathering for light of the usage of plant part like roots, stem, bark, wood and whole plant in case of the flavors. According to Dhar (2002) about 70% of perceived restorative plants of India are introduced to hazardous harvesting. In India, the examinations on the plant resources cover low area and are essentially less to help the plant assortment. As so far a little piece of the diverse people of plants is known to us and a lot of design really remains unidentified. To be sure, even about the characteristic plant species the territory and the quantum of available supportive material isn't known. A comprehensive assessment of Indian vegetation has become a basic need, not only because of the monetary and organic meaning of the plants, yet also considering accelerated inherited deterioration occurring as a result of the demolition of woodlands and distinctive living spaces (Manilal., 1998).

In Maharashtra State, particularly in Marathwada area many plant species are incredibly typical and dominating. About 80% people in this region really depends upon the standard prescriptions for their fundamental clinical consideration needs. Around 1,645 plant species have been recorded from this locale and around 350 plant species are used as remedial plants (Naik., 1998). Regardless, people impact, offhand unforeseen development and nonattendance of data about the plants and their utilization, have made a certifiable risk the perseverance of plant assortment. The examination region Nanded is masterminded at 362.42m above address sea level. The examination territory is with Black soil and warm during pre-summer days, the temperature goes up to 42°C while generally negligible during winter.

The typical precipitation is around 900 to 910 mm/year. Endophytes are microorganism. They are accessible in living tissues of various plants (root, natural item, stem, seed and leaf, etc) setting up normal relationship without clearly any signs of diseases. The endophytic microorganism assortment would be a huge resource of medicine. Phytochemical right now are seen as starting move towards the revelation of important prescriptions. The assessment assortment of endophytic microorganism feels to be a most critical need. Pondering these real factors, the point Study on Diversity of Endophytic parasites from some Medicinal Plants is picked for the current work. The work in three segments. Screening of remedial plant for endophytic parasites is the underlying section. These examination total 25 endophytic organisms were recognized from three remedial

plants. The 6 growths were in like manner perceived dependent on nuclear depiction. This part is moreover dedicated for the examinations on state repeat of the endophytic growths. The ensuing part is given for depiction of infectious concentrates of six test endophytic growths recognized on sub-nuclear justification this the parasitic concentrates were screened by High Resolution Liquid Chromatography Mass Spectrometry (HR-LCMS). The infectious concentrates were found to be showed presence of variable number of assistant metabolites. The amount of the helper metabolites changes from 49-79 in the test infectious concentrates. This part is similarly given for IR frightful assessment of the test infectious concentrates.

Asteraceae Ecology and Biochemistry

The family Asteraceae (Compositae) is the greatest and most cosmopolitan get-together of angiosperms covering 32,913 recognized species, collected in 1911 genera and 13 subfamilies [34]. "Asteraceae contain more than 40 monetarily critical yields, including food crops (*Lactuca sativa*, *Cichorium* spp., *Cynara scolymus*, *Smallanthus sonchifolius*, and *Helianthus tuberosus*), oil crops (*Helianthus annuus*, *Carthamus tinctorius*), helpful and sweet-smelling plants (*Matricaria chamomilla*, *Chamaemelum nobile*, *Calendula* spp., *Echinacea* spp., and *Artemisia* spp.), ornamentals (*Chrysanthemum* spp., *Gerbera* spp., *Dendranthema* spp., *Argyranthemum* spp., *Dahlia* spp., *Tagetes* spp., and *Zinnia* spp.), and nectar producers (*Centaurea* spp., *H. annuus*, and *Solidago* spp.) [35]. Sorts of this family address an inconceivable assortment concerning the penchant: yearly, suffering, flavors, shrubs, plants, trees, epiphytes; with the inflorescence made out of one to more than 1,000 florets; and chromosome numbers range from $n = 2$ to $n = 114$. The Asteraceae store energy as inulin they can convey acetylenes, alcohols, alkaloids, normal acids, pentacyclic triterpenes, sesquiterpene lactones, and tannins. They are globally circled though most are nearby to quiet climatic zones, the Mediterranean zone, or higher-stature, cooler spaces of the wildernesses". The uncommon achievement of Asteraceae in generally spread has been credited to various components, including assortment of helper metabolites that improve all around health, a significantly explicit inflorescence that supports treatment, and a morphology progressing out crossing.

Various sorts of the Asteraceae family have been used as restorative plants, yet "the discretionary metabolites liable for the pharmacological adequacy were not by and large described. The substance assortment of bioactive combinations and pathways of their biosynthesis is dependent upon a sweeping scope of biotic and abiotic factors and their associations. At times the benefits of plant-deduced pharmacological things are questionable disregarding standard compound sythesis with the usage of typically recognized pharmacopeia's systems Various papers

have depicted the pharmacological action and substance constituents detached from plants of the Asteraceae, covering polyphenols, sesquiterpenes, normal and unsaturated fats which have been connected with the powerful treatment of cardiovascular disorders, harmful development, microbial and viral pollutions, exacerbation, and various diseases by far most of the Asteraceae taxa, like *Artemisia*, are eminent for their insurance from herbivores, bacterial and parasitic microorganisms [44]. Discretionary metabolites are manufactured mixtures of an amazingly improved plan, not major in the plant assimilation, but instead critical for confirmation against microorganisms and herbivores [45]. With the usage of head part examination, Alvarenga et al. [46] showed the associations between substance construction and plant request of Asteraceae family, considering a colossal get-together of 4000 species and 11 major compound classes of discretionary metabolites. Barnadesieae family revealed an odd position inferable from the vulnerable assortment of its assistant metabolites, particularly flavonoids. Liabeae and Vernoniaceae factions were limited eagerly because of near lactone structure, while Asteridae was disengaged due to monoterpenes, diterpenes, sesquiterpenes content. Additionally, the association organization of Asteraceae discretionary metabolites showed that benzofurans and acetophenones, similarly as diterpenes and phenylpropanoids, were significantly related with each other. The piece of parasitic endophytes in Asteraceae's formative accomplishment has been actually seen by set up analysts, regardless of the way that there is at this point a necessity for complex assessments around here". The assorted metabolome of Asteraceae is a remarkable entwined of engineered compounds coordinated only by the plant, by the microbial curbing the host species, or by the two parts of this characteristic system.

OBJECTIVES

- Isolation of entophytic fungi.
- Study of entophytic fungi utilized for antibacterial activity.

REVIEW OF LITERATURE

In the current assessment oversees assortment of endophytic growths present in restorative plants *Cassia tora* Linn., *Malachra capitata* Linn. additionally, *Andrographis paniculata* Nees. Above work the plants tests were assembled from the Nanded area. The test plants have helpful properties and rich wellspring of manufactured blends use as medicine. Endophytic organisms have worthwhile relationship with have plants. They are living inside the plant tissue. Endophytic living being produces helper metabolites for security framework against plant microorganism. Phytochemical assessment on

Cassia tora Linn., *Malachra capitata* Linn. in addition, *Andrographis paniculata* Nees has been investigated by various workers. Niranjana et al., (2010) uncovered that review on *Andrographis paniculata* plants showed that quieting, antiparasitic, antibacterial, malignant growth counteraction specialist, antiparasitic, antispasmodic, antidiabetic, anticarcinogenic, nematocidal practices *Andrographis paniculata* (kalmegh) remove guarantee lipids, hemoglobin and red platelets from lipid peroxidation. Das et al., (2011) analyzed the diagram of the *Cassia tora* plant show the wide extent of phytochemical constituents detached from plants and it have various activities like skin ailments, eye contaminations, cell support, against plasmodial, antimicrobial and hypoglycemic moreover declared; reports exhibit that zest should be perused even more comprehensively for its helpful benefits. Pawar and D'mello (2011) Overview that *Cassia tora* plant used in standard prescription as laxative and is useful for therapy of messiness, ringworm tainting, ophthalmic, skin infections and liver issues. A couple of manufactured blends Anthraquinone glycosides, Naphthopyrone glycoside, phenolic mixtures, flavonoids, etc have isolated from these plants. Gopi et al., (2012) definite that the watery concentrate of basic establishments of *Malachra capitata* was concentrated against castor oil-provoked detachment of the insides model in rodents. The plants attaches show antagonistic to diarrheal action

Sripriya (2014) declared that the particular common and liquid concentrates of leaves of *Cassia tora* L. show the positive antimicrobial action against human pathogenic microorganisms *P. aeruginosa*, *S. aureus*, *E. coli* and organisms *Aspergillus fumigatus*, *Candida albicans* by plate scattering methodology. Phytochemical assessment of different concentrates the presence of anthraquinones, carbs, glycosides, steroids, flavonoids are accessible Supare and Patil (2015) thought about that the seed remove powder of *Cassia tora* plants presence of blends saponin, protein, tannin and sugars. The seed concentrate of the particular obsession to show the larvicidal action, 0.4% center seed separate gave 80% mortality in the hatchlings of *Anopheles stephensi*. Dubey and sawant (2015) declared that the *Cassia tora* plant shows the pharmacognosy, phytochemical properties. The plants is for the most part used in ringworm pollution; it shows presence of substance compound like Flavonoids, Cyanogenic glycosides, etc Sindhu and Neelamegam (2015) point by point that the methanol concentrates of *Malachra capitata* root, stem and leaf was analyzed for the estimation Flavonoid profile using HPLC, the results show the presence of Flavonoid compounds-Gallic destructive, Caffeic destructive, Rutin, Quercetin and Ferulic destructive in the root, stem and leaf isolates. Bhowal and Yawalikar (2015) inspected that the ethanol concentrate of leaf, stem and base of *Malachra capitata* show the antibacterial action against organisms *Micrococcus* sp, *Bacillus subtilis*, *Escherichia coli*, *Pseudomonas aeruginosa* and *Salmonella typhimurium*. Tandon et al., (2015) thought about that the dissolvable ethanol, chloroform, and methanolic leaves concentrates of *Andrographis*

paniculata of showed the antibacterial action. The phytochemicals 3-o- β D-glucosyl-14-deoxyandrographolide and 14-deoxyandrographolide show the antibacterial movement against microorganisms *Escherichia coli*, *Staphylococcus* and *Bacillus subtilis*. Joselin and Jeeva (2014) reported that the plant *Andrographis paniculata* is a standard answer for fever, cold and various pollutions plant is useful in treating cardiovascular disease and in thwarting liver destructiveness, it is moreover use in stomach issue, body harms, respiratory issues, snake eat, ominously helpless reaction, central tactile framework and working of frontal cortex. Endophytes are microorganisms that are living inside in various organs of plants and set up regular relationship without showing any indications of diseases. They are huge wellspring of biochemical complex having antimicrobial properties and the composing audit moreover reveals about various pieces of endophytes. Romero et al., (2001), Suryanarayanan and Vijaykrishna (2001), Strobel and Daisy, (2003), Strobel (2003) Suryanarayanan and Vijaykrishna (2001) point by point that parasitic endophytes isolated from leaf, petiole and raised fundamental establishments of *Ficus benghalensis*. The endophytic organisms found to be even more thickly colonized in the petiole territory. Romero et al., (2001) disengaged endophytic growths from leaves of the *Parthenium hysterophorus*. They have disengaged *Alternaria zinniae*, *A. helianthi*, *Cylindrocarpon* sp., *Curvularia brachyspora*, *Fusarium* sp., *Nigrospora oryzae*, *Penicillium funiculosum* and *Periconia* sp. Rezwana Khan et al., (2007) thought about that the assortment of endophytic growths from stem and leaves of *Calotropis procera* (Ait.) R. Br., Gangadevi and Muthumary (2008) isolated *Colletotrichum ziropori* a novel taxol making parasite from leaves of *Justicia gendarussa*. The life form was perceived dependent on morphological and spore characters, the taxol made was assessed by using HPLC (High-execution liquid chromatography). Wang et al. (2000) they itemized that 40 endophytic infectious confines from leaf of *Taxus mairei* trees. Rezwana Khan et al., (2010) analyzed endophytic parasites isolated from helpful plant *Withania somnifera* (L.). 33 infectious strains of 24 species have been isolated. Tran et al., (2010) isolated endophytic growths from phyllodes of *Acacia* species from Australia. They confined and perceived bioactive properties like antibacterial and antifungal, even amylase movement have been concentrated by them.

RESEARCH METHODOLOGY

During the current assessments an investigation to all the floristic districts of Nanded area was finished for the assurance of remedial plants for the detachment of endophytic growths from them. The therapeutic plants like *Cassia tora* Linn, *Malachra capitata* Linn, *Andrographis paniculata* Nees. Were found to be astoundingly ordinary and winning in during turbulent season all the floristic district of Nanded region. As such undertakings were made to pick the said plants for the examination of endophytic parasites. The plants

were accumulated from the Sitakhandi forest region 50km away from Nanded city. (Latitude 19°14'23.21"N, Longitude 77°03'2.36"E) The plants were recognized and depicted by using, greenery, unmistakable evidence keys flexible android applications like picture this and relative works. The vegetation of Marathwada was broadly used. Naik (1998). The results are recorded as portrayal and plate-1.

RESULTS AND DISCUSSION

1. SCREENING OF MEDICINAL PLANTS FOR ENDOPHYTIC FUNGI:

Helpful plants like *Cassia tora* Linn. *Malachra capitata* Linn. *Andrographis paniculata* Nees. were found to be typical and dominating during turbulent season in all the floristic regions of the Nanded region. The plants recognized and depicted by using, greenery, conspicuous evidence keys and relative composed works. The vegetation of Marathwada was extensively used. The results were recorded as portrayal and in plate-1.

Description of the medicinal plants:

Cassia tora Linn.- Tarota (Family-Caesalpiniaceae): Habit: A little flavor., Root: Taproot, extended, outside surface yellowish-gritty hued., Stem: Aerial, erect, broadened, tube molded. Leaves: Unipinnate, paripinnate, compound, substitute, petiolate, flyers three sets, Inflorescence: Racemose, Flower: Bracteate, pentamerous, actinomorphic, subsessile, complete, explicitly impartial, and yellow. hypogynous, Fruit: Pod, long, thin, Seed: Brown to dull.

Remedial utilizations: *Cassia tora* used in an Ayurvedic preparation Dadhughnavati. It is used for ringworm, leucoderma. Seed oil is valuable in dermatitis and other skin ailments Manjusha Choudhary et al., (2011). The instance of *Cassia tora* is used for treatment of fever. It is throughout seen standard medicine for the treatment of liver issues and illness Pawar and Dmello (2011). Phytochemicals of the plant found to be used in skin diseases, eye contaminations and besides found to quiet, cell support, antibacterial, antifungal, antidiabetic, hypotensive and against plasmodial Das Chandan et al., (2011).

Malachra capitata Linn.- Ran bhendi (Family-Malvaceae): Habit: A little zest, Root: Tap root, fanned Stem: Erect, herbaceous, bristly. Leaves: Broadly hail, glabrous, petiole 3-5cm long, indicate, substitute. Bloom: Yellow, subsessile, pentamerous, bracteate, hypogynous, Fruit: case, Seeds: Smooth, gritty hued to dull.

Remedial utilizations: The *M. capitata* is used in ordinary anguish, disturbance, detachment of the entrails, seizure, dementia, pyrexia, ulcer and patching

of wounds. Gopi et al., (2012), Pratyusha et al., (2012), Sripriya (2014). It shows antimicrobial movement Bhowal and Yawalikar (2015).



***Cassia tora* L.**



***Malachra capitata* L.**



***Andrographis paniculata* Nees.**

Plate-1: Selected medicinal plants for the isolation of endophytic Results fungi

CONCLUSION

During the current assessments an outline to all the floristic districts of Nanded area was accomplished for the assurance of helpful plants for the unit of endophytic organisms from them. The remedial plants like *Cassia tora* Linn., *Malachra capitata* Linn., *Andrographis paniculata* Nees. were found to be incredibly ordinary and winning during turbulent season in all the floristic spaces of the Nanded district. Subsequently tries were made to pick the said plants for the examination of endophytic growths. The plants were accumulated from Sitakhandi woodlands. The plants were recognized and portrayed by using, vegetation, conspicuous confirmation keys, adaptable android applications like

Picture this and relative scholarly works. The vegetation of Marathwada was generally used.

The stem cuts of *Cassia tora* Linn. (10) stem cuts of *Malchra capitata* Linn. (7) and *Andrographis paniculata* Nees. (8) 25 endophytic parasitic species were isolated from remedial plants.

Endophytic organisms were recognized from the test remedial plants. It is in like manner clear that the organisms *Penicillium herquei* and *Aspergillus aculeatus* were found to be overwhelming on the stem cuts of *Cassia tora* Linn. The organisms *Aspergillus flavus* and *Cladosporium uredinicola* found to be transcendent on the stem cuts of *Andrographis paniculata* Nees. The organisms *Fusarium equiseti* and *Penicillium citrinum* found to be persuading the stem cuts of *Malachra capitata* Linn.

The EFI-An and EFI-C of *Cassia tora* Linn. perceived as *Penicillium herquei* and *Aspergillus aculeatus* being increment No. MF143438 and MF143440 independently. EFIB and EFI-D of *Andrographis paniculata* Nees. perceived as *Aspergillus flavus* and *Cladosporium uredinicola* being advancement No. MF143439 and MF143441. EFI-E and EFI-F of *Malachra capitata* Linn. perceived as *Fusarium equiseti* and *Penicillium citrinum* being increment No. MF143442 and MF143443 independently.

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