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Isolation and Antimicrobial Activity of Soil Fungi from Magway University Campus

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Abstract:- In this present research, soil samples were collected from three different places from Magway University, during January to July 2018. Ten different soil fungi were isolated from three different soil samples. Isolation of soil fungi were undertaken by the serial dilution method. A total of 10 fungal cultures were isolated from the collected soil samples. Antimicrobial activities of isolated fungal strains were evaluated by the agar well diffusion assay with five test organisms. There are *Bacillus subtilis, Escherichia coli, Pseudomonas fluorescences, Agrobacterium tumefaciens and Staphylococcus aureus.* These isolated fungal strains were tested by 4 days culture within fermentation period. Clear zones (inhibitory zones) surrounding the agar well indicate the presence of bioactive metabolites which inhibit the growth of test organisms. Four strains showed the antimicrobial activity on *Escherichia coli*. Among them *Bacillus subtilis* fungal strains showed that the maximum antimicrobial activities (30.33 mm) and *Pseudomonas fluorescences* showed a few antimicrobial activity (9.77 mm). According to the present studied that soil fungi are ubiquitous and different morphologies among different soil area and this soil fungi were possess with potential antimicrobial activities.

Keywords:- *Soil Fungi, Antimicrobial Activity.*

I. INTRODUCTION

Fungi are an important component of the soil microbiota typically constituting more of the soil biomass than bacteria, depending on soil depth and nutrient condition. The shapes of fungal colonies exhibit salient diversity depending on the substrate conditions as well as on the fungal species. A wide range of media are used for isolation of different groups of fungi that influence the vegetative growth and colony morphology, pigmentation and sporulation, depending upon the composition of specific culture medium, pH, temperature, light, water availability and surrounding atmospheric gas mixture (Kumara and Rawal, 2008).

Soil microbes are among the most abundant and diverse organisms on earth. Although microbial decomposers, particularly fungi are important mediators of global carbon and nutrient cycling, the functional role of specific taxa within natural environments remain unclear (Christer, *et al*, 2008). Fungi are one of the dominant groups present in soil, which strongly influence ecosystem structure and functioning and thus play a key role in many ecological services (Orgiazzi, *et al* ., 2012) . In general the majority of microbial population is found in the upper six to twelve inches of soil (Cattle, *et al*., 2002). There are many sources where antibiotic can be discovered, however, soil is the most important source for the discovery of novel antibiotics. The aim of present paper, the isolation of fungi from soil samples and antimicrobial activity of soil fungi that collect from Magway University Campus.

II. MATERIALS AND METHODS

A. Collection of Soil Samples

Soil samples were collected from Magway University Campus. The soil samples were taken from 6 inches after removing the surface soil. Three different soil samples were utilized for the isolation of microorganisms. Soil samples were suspended in definite amount of sterile water. These soil suspensions were vigorously agitated. The supernatant were diluted by the physical dilution method. Samples from the dilution series were cultured on soil fungi culture media and incubated at 27ºC for 7 days.

Soil Samples No.	Samples Collected areas	pH	Location
1	South of Library Hall	6.5	N 20.8º 96.8′ E 94º 56.407′
2	West of University Research Center	6.5	N 20.8º 321.8′ E 94º 56.264′
3	In Front of Shwe Gangaw-1	6.0	N 20.8º 76.8′ E 95º 56.182′

Table 1:- Three different soil samples collected from Magway University

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B. Preparation Isolated fungi from the soil samples

Firstly, soil samples were collected and their locations were also recorded by GPS. The collected soil was dried in the air. After drying, soil sample was grinded into powder and then made to dilute and culture on the culture medium.

C. Serial Dilution Methods (Dubey , 2002)

Soil fungi are isolated by serial dilution methods. One gram of sieved soil sample and 99 ml of distilled water were added in a conical flask. Serial dilution was made by transferring 1ml of suspension to 9ml of distilled water in a sterilize test tube. This process is repeated until 10^{-7} dilution. After serial dilution fungi were incubated with Petridish at room temperature. Chloramphenicol was added to the sterilized medium for preventing bacterial growth before pouring into petridish. This experiment were carried out at the Department of Botany in Magway University, during January to July 2018.

D. Preparation media for isolated fungi

After that soil fungi in preserved media.

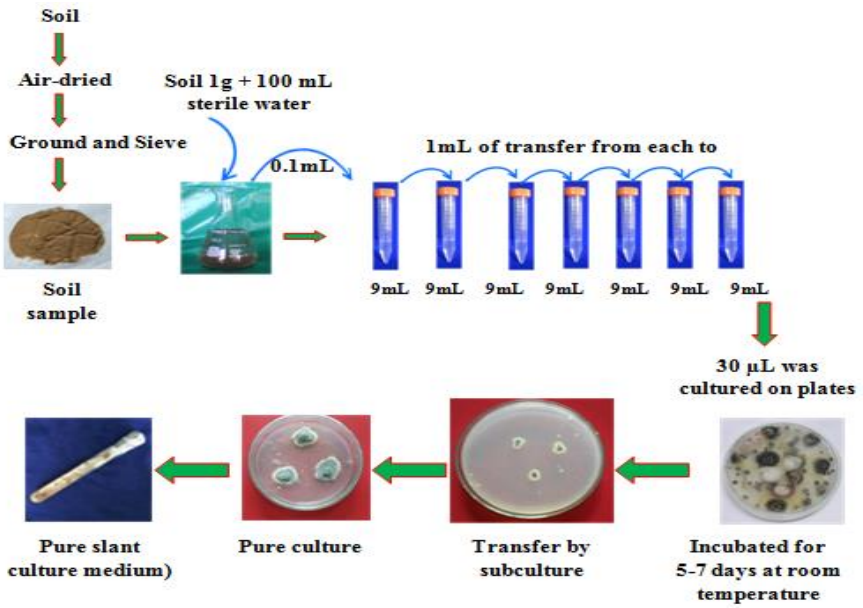

Fig 1:- Procedure of Serial Dilution Method (Dubey , 2002)

E. Antimicbial Activity Test (Agar well method, Collins, 1965)

Isolated strains were subjected with antimicrobial activities by agar well method. Cork borer was used to make the wells (8 mm in diameter) in the autoclaved basal antimicrobial test medium. Wells impregnated with 3-5 days old culture fermented broth (20µl) were incubated at room temperature for 24-48 hours. After incubation, the clear zones were measured. Therefore, the diameter of clear zones has observed as potent activity shown by respective strain. Clear zones surrounding the test wells indicated the presence of antimicrobial activities which inhibit the growth of the test organisms selectively.

No.	Test organisms	Infection
1	*Escherichia coli* AHU 5436	Cholera , Diarrhea and vomiting, urinary tract infections
2	*Pseudomonas fluorescens* IFO 94307	Rice disease
3	*Agrobacterium tumefaciens* NITE 09678	Plant disease
4	*Staphylococcus aureus* AHU 8465	Skin disease, food poison
5	*Bacillus subtilis* IFO 90571	Fever

Table 2:- Test Organisms used in Antimicrobial Activities

NTTE –National Institute of technology
PRD-Pharmaceutical Research Development

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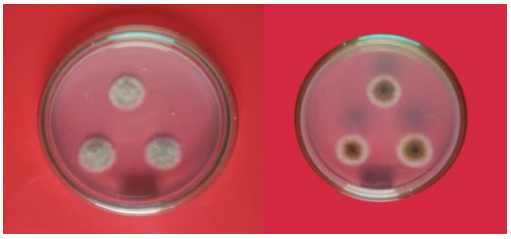
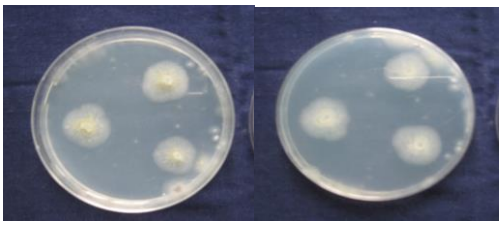
III. RESULTS

❖ *Isolation of Fungi from Soil Samples*

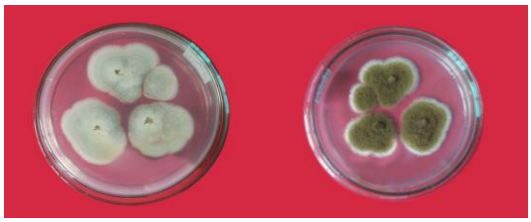
In the present investigation, 10 fungi were isolated from three different soil samples. Isolated fungi MU-1 to MU-4 were collected from soil sample I, MU-5 to MU-7 from soil sample II and MU-8 to MU-10 from soil sample III. The surface and the reverse colors morphology of isolated soil fungi were showed in Figures.



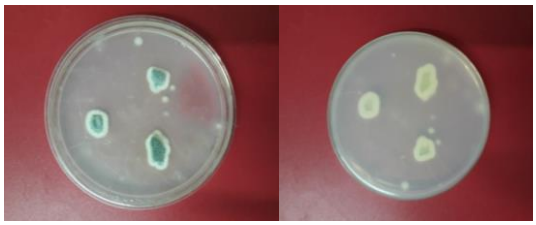
Surface view Reverse view
Morphology of Soil fungi MU - 1



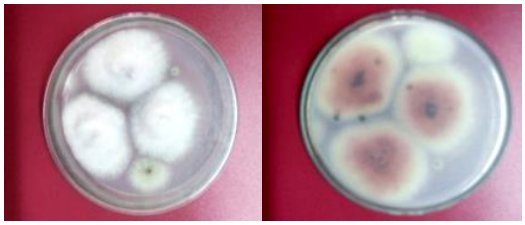
Surface view Reverse view
Morphology of Soil fungi MU - 2



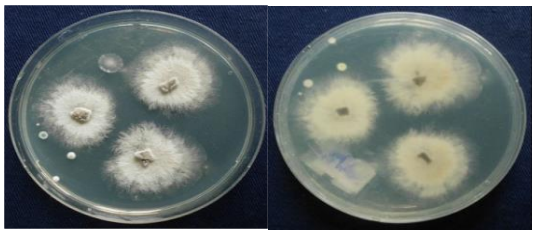
Surface view Reverse view
Morphology of Soil fungi MU – 3



Surface view Reverse view
Morphology of Soil fungi MU – 4

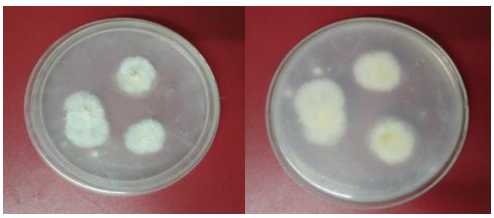


Surface view Reverse view
Morphology of Soil fungi MU – 5

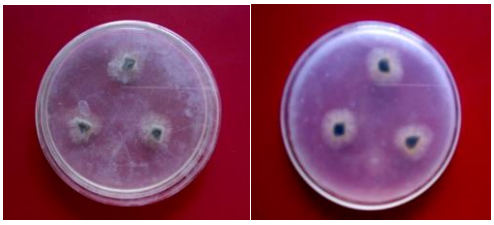


Surface view Reverse view
Morphology of Soil fungi MU – 6

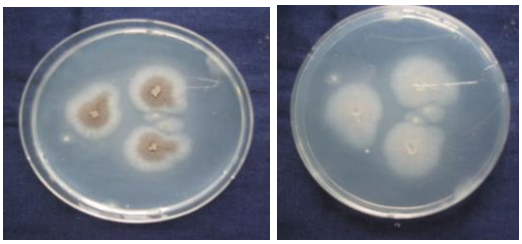
Surface view Reverse view
Morphology of Soil fungi MU – 7



Surface view Reverse view
Morphology of Soil fungi MU – 8



Surface view Reverse view
Morphology of Soil fungi MU – 9



Surface view Reverse view
Morphology of Soil fungi MU – 10
Fig 2

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No	Soil fungi	*Escherichia coli*	*Pseudomonas fluorescens*	*Agrobacterium tumefaciens*	*Staphylococcus aureus*	*Bacillus subtilis*
1	MU-1	-	-	-	13.44	-
2	MU-2	-	-	23.22	-	-
3	MU-3	24.00	-	30.70	-	30.33
4	MU-4	16.45	10.333	-	-	-
5	MU-5	15.80	-	-	-	12.11
6	MU-6	-	-	-	-	-
7	MU-7	-	-	15.66	-	-
8	MU-8	22.00	-	-	-	-
9	MU-9	-	9.77	-	-	-
10	MU-10	-	-	-	-	-

Table 3:- Antimicrobial Activity of ten isolated soil fungi

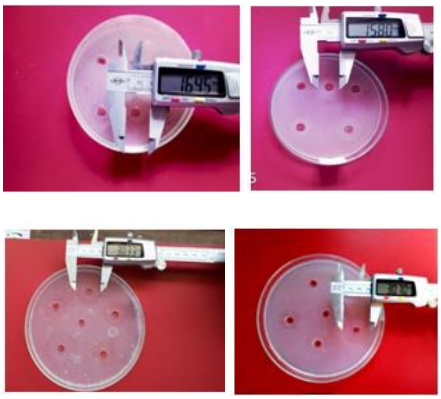

Fig 3:- Measurement of antimicrobial activity against on test organisms

IV. DISCUSSION AND CONCLUSION

In the present investigation, 10 fungi were isolated from three different soil samples. A total of 10 fungal cultures were isolated from the collected soil samples. Isolated fungi MU-1 to MU-4 were collected from soil sample I, MU-5 to MU-7 from soil sample II and MU-8 to MU-10 from soil sample III. The surface and the reverse colors morphology of isolated soil fungi were showed in Figures. Antimicrobial activity of isolated fungal strains were evaluated by the agar well diffusion assay with five test organisms that are four strains showed the antimicrobial activity on *Escherichia coli* . Moreover, *Bacillus subtilis* fungal strains showed the maximum antimicrobial activity (30.33 mm) and *Pseudomonas fluorescences* showed a few antimicrobial activity (9.77 mm) as shown in table. Cattle, *et al.*, 2002 reported that, in general the majority of microbial population is found in the upper six to twelve inches of soil. In the present study, fifteen different soil fungi were isolated from the upper six inches depth of three different soil samples. This result was agreed to the statement of Cattle, *et al.*, 2002.

According to the present studied that soil fungi are ubiquitous and various morphology in different soil area and this soil fungi were possess with potential antimicrobial activities.

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