ISOLATION OF PATHOGENIC FUNGI FROM THE LEAVES OF SOME EDIBLE PLANTS

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ABSTRACT

In this study, plant specimens (especially infected plant parts) were collected from Meiktila Township. The infected plant parts were collected from June 2017 to October 2017. Totally seven kinds of pathogenic fungi were isolated in this research. The pathogenic fungi *Flagellospora* was isolated from the leaves of *Vitis vinifera* L. (Sa-pyit), *Fusarium* fungi was isolated from the leaves of *Solanum melongena* L. (Kha-yan), *Alternaria* fungi was isolated from the leaves of *Lycopersicum esculentum* Miller. (Khayan-gyin) and *Capsicum frutescens* L. (Nga-yok), *Paecilomyces* fungi was isolated from the leaves of *Ocimum sanctum* L. (Pin-sein), *Curvularia* fungi was isolated from the leaves of *Momordica charantia* L. (Kyet-hinga) and *Mangifera indica* L. (Tha-yet), *Aspergillus* fungi was isolated from the leaves of *Carica papaya* L. (Thin-baw) and *Helminthosporium* fungi was isolated from the leaves of *Oroxylum indicum* Vent. (Kyaung-sha). The morphological and microscopical characters of pathogenic fungi have been undertaken.

INTRODUCTION

Every gardener has put in plants with hopes for wonderful flowers, fruits or vegetables, only to have those hopes dashed as the plants get sick and die. These plants are considered diseased. Many things can cause plants to become diseased, including *biotic* (living) agents, *abiotic* (nonliving) factors or a combination of the two.

A plant disease is any abnormal condition that alters the appearance or function of a plant. It is a physiological process that affects some or all plant functions. Disease may also reduce yield and quality of harvested product.

Visible effects of disease on plants are called symptoms. Any detectable changes in color, shape, and/or functions of the plant in response to a pathogen or disease-causing agent is a symptom. Leaf spots or blights, discoloration of plant tissue, stunting, and wilting are symptoms that may be evidence of disease. Symptoms can occur throughout the plant or they can be confined to localized areas. Although certain symptoms are characteristic of a particular disease, a number of pathogens may produce the same or similar symptoms. Furthermore, symptoms often change over time and their expression is influenced by environmental conditions and corn and soybean varieties.

Plant diseases are caused by living organisms, called *pathogens*. The main groups of pathogens are fungi, bacteria, viruses, and nematodes. Because the organisms in these groups are so small, they are often called “micro-organisms”. The study of plant disease is covered under the science of phytopathology which more commonly called plant pathology, plant pathologist study plant diseases caused by fungi, bacteria, viruses and similar very small microbes. With the invention of microscope in the seventeenth century fungi and bacteria associated with plant were investigated. In 1665, Robert Hooke published the first illustration of rust on rose leaf (David Clement, 1993).

Diseases are an important part of crop protection, but they usually are difficult to understand in the field. One reason is because the organisms that cause disease are very small; farmers cannot see them and study them as easily as insects. Farmers usually recognize diseases by their symptoms, which are very diverse. Disease symptoms can include dwarfing of the plant; color changes; leaves that are spotted, wilted, or dead; roots that are deformed or dead; and other symptoms.

Vegetables constitute the most important and inexpensive component of a balanced diet, which people now realize due to their high nutritive values indispensable for the body. There are reports about the increasing demand of brassicaceous vegetables in market. India is the second largest vegetable producer in the world, next only to China with an annual production of 81 million tonnes from 5.1 million hectares of land.

Fungal leaf disease of Mango (*Mangifera indica* L.) caused by fungal pathogens, has been reported to reduce the quality of mango fruit. Three pathogenic fungi, *Penicillium* sp., *Mucor* sp. and *Aspergillus* sp. which are well known saprophytes of dead plant materials were isolated from diseased leaves and were thereafter confirmed to be the causal agents by pathogenicity test after symptoms developed 3-5 weeks after inoculation of healthy leaves. The attention of mycologist is presently focused on control measures of mango disease (Verma, *et al.,* 1991).

Diseases are a major limiting factor for tomato production. Diseases can be classified into two groups. The first are those caused by infectious microorganisms that include fungi, bacteria, viruses and nematodes. These diseases are contagious and can spread from plant to plant in a field, often very rapidly when environmental conditions are favorable. The second group includes those caused by non-infectious physical or chemical factors, such as adverse environmental factors, nutritional or physiological disorders and herbicide injury. Non-infectious diseases cannot spread from plant to plant; however, the distribution of the disease may be quite uniform and extensive if an entire planting was exposed to the adverse factor.

Momordica charantia, known as bitter melon, bitter gourd, bitter squash or balsam-pear is a tropical and subtropical vine of the family Cucurbitaceae. Bitter gourd are available in a variety of shapes and sizes. The cultivar common to China is 20– 30 cm long, oblong with bluntly tapering ends and pale green in color, with a gently undulating, warty surface. The bitter melon more typical of India has a narrower shape with pointed ends, and a surface covered with jagged, triangular "teeth" and ridges. It is green to white in color. These miniature fruit are popular in Bangladesh, India (common name 'Korolla'), Pakistan, Nepal and other countries in South Asia.

The aim of the present study is to understand the fundamental facts and principles necessary in Microbiology, to inform the isolation of Pathogenic fungi from infected plant parts, to know the importance factors of physical and chemical requirement for the growth of pathogenic fungi.

LITERATURE REVIEW

More than 10,000 species of fungi, can cause disease in plants (Agrios, 2005). Classes of fungi that commonly cause diseases in agricultural crops are Plasmodiophoromycetes (cause clubroot of crucifers, root disease of cereals, and powdery scab of potato), Oomycetes (cause seedling damping-off, late blight, downy mildews, and white rust disease), Zygomycetes (cause soft rot of fruit), Ascomycetes and Deuteromycetes (cause leaf spots, blights, cankers, fruit spots, fruit rots, anthracnoses, stem rots, root rots, vascular wilts, soft rot), and Basidomycetes (cause rust and smut diseases (Agrios, 2005).

Fungi form a large and heterogeneous eukaryotic group of living organisms characterized by their lack of photosynthetic pigment and their chitinous cell wall. Fungal kingdom contains more than 1.5 million species, but only around 100,000 have so far been described, with yeast, mold, and mushroom being the most familiar. Although the majority of fungal species are saprophytes, a number of them are parasitics, in order to complete their biological cycle, animals or plants, with around 15,000 of them causing disease in plants, the majority belonging to the Ascomycetes and Basidiomycetes (Vrinda S. Thaker *et al,*2012).

A number of workers reported different species of *Alternaria* and respective symptoms on the members of families cucurbitaceae, brassicaceae and solanaceae from different places and found that *Alternaria* affects all the aerial parts of the plants i.e. stem, leaves, fruits, pods and heads. The disease starts from lower leaves and slowly progresses towards the upper shoots, leaves, petioles, pods/fruits and heads. A comprehensive, comparative account of morphological differentiation of different *Alternaria* species occurring on cucurbitaceous, brassicaceous and solanaceous crops are described by Narain et.al. (2002).

The *Alternaria* fungus can cause the disease on all parts of the plant (leaf blight, stem collar rot, and fruit lesions) and result in severe damage during all stages of plant development (Abada *et al.* 2008).

The fungal pathogen *Fusarium oxysporum* affects a wide variety of hosts of any age. Tomato, Eggplant, tobacco, legumes, cucurbits, sweet potatoes and banana are a few of the most susceptible plants, but it will also infect other herbaceous plants (Mishra and Kumar 2012).

Fusarium oxysporum generally produces symptoms such as wilting, chlorosis, necrosis, premature leaf drop, browning of the vascular system, stunting, and damping-off. The most important of these is vascular wilt. Fusarium wilt starts out looking like vein clearing on the younger leaves and drooping of the older lower leaves, followed by stunting of the plant, yellowing of the lower leaves, defoliation, marginal necrosis and death of the plant. On older plants, symptoms are more distinct between the blossoming and fruit maturation stages (Nelson, *et al*; 1994).

Tomato (*Solanum lycopersicum*) is one of the world's most cultivated vegetable crop, and amongst many, *Fusarium* wilt caused by *F. oxysporum* f. sp. *Lycopersici* is one of the important disease responsible for serious economic losses. Generally it occurs in midsummer when air and soil temperatures are high. Diseased plants develop yellowing of the older leaves (those near the ground). Often the yellowing is restricted to one side of the plant or to leaflets on one side of the petiole. At the nursery stage, plants infected by *F. oxysporum* may wilt and die soon after symptoms appear (Kennelly, 2007).

Many people in urban and rural areas fully depend on vegetable cultivation and selling in the markets. But it is the matter of deep concern that a remarkable portion of harvested vegetables are being lost due to mismanagement of the vegetables during transit and storage, as a result fungal infection occurs and consequently vegetables are spoiled. The major diseases of *M. charantia* are Alternaria rot (*Alternaria alternata*), Belly rot (*Rhizoctonia solani*), Cottony leak (*Pythium* sp.), Rhizopus soft rot (*Rhizopus stolonifer*), Botryodiplodia rot (*Botryodiplodia theobromae*) (Wikipedia 1016) etc. reported fungal association of five vegetables in Bangladesh. So far there is no report regarding the association of fungi with fresh fruit of *M. charantia* in storage. Present investigation was undertaken to find out the association of fungi with M. *charantia* and their pathogenic potentiality.

There are about 200 illness identified in the red tomato, of which 30 are economically important, e.g. canker, leaf spot, wilts, blights and root rots caused by fungi and bacteria. Studies carried out by Mehmood et al. (2014) show the pathogenic potential of the fungus *Alternaria alternata,* onearly blight of tomato, stem canker, black mold rot, leaf spot, and black shoulder.

Six species of fungi were recorded on *Capsicum frutescens* after the survey of different fields and markets in Shahjahanpur. These were viz. *Alternaria alternata, Alternaria solani, Curvularia lunata, Choanephora cucurbitarum, Cladosporium oxysporum* and *Drechslera tetramera* (Adarsh Pandey,2010).

Chilli is among the world's most popular vegetable crop belonging to the family Solanaceae. Several abiotic and biotic stresses often affect the productivity of chilli crop worldwide. In addition to fungal, bacterial, nematodes and viral diseases are also responsible for significant production constraints affecting both yield and quality and are often difficult to control. The pathogens attack roots, stems, leaves and fruits of the pepper plant and cause 70% to 100% yield loss.

Fungi comprise one of the largest groups of organisms causing diseases among chilles. The most important fungal diseases are: Anthracnose (*Colletotrichum* spp.); Early blight (*Alternaria solani*); Cercospora leaf spot (*Cercospora capsici*); Damping-off (*Pythium, Rhizoctonia* and *Fusarium*); Gray mould (*Botrytis cineria*); Phytophthora rot (*Phytophthora capsici*); Southern blight (*Sclerotium rolfsii*); Verticillium wilt (*Verticillium dahliae*); and White mould (*Sclerotinia sclerotiorum*). The following fungal disease pathogens are known to be seed-borne and seed transmitted; *Colletotrichum spp., Alternaria solani, Fusarium, Cercospora capsici, Botrytis cineria*, and *Sclerotinia sclerotiorum* (Neergaard, 1979).

Nigeria is listed among the top five countries cultivating *Carica papaya* L. though majority of its fruit is consumed locally. The absence of pawpaw (papaya) processing industry in Nigeria does not justify the large scale farming in the crop. The fruit is consumed fresh and this has not translated into economic gains for farmers who on several occasions suffer losses due to microbial attack, poor handling of fruits and lack of adequate storage facility. Fungi are predominantly associated with *C. papaya* diseases and their effect may be so devastating that an entire orchard may be affected. Koffi et al. (2010) reported significant losses in papaya due to *Pythium aphanidermatum*. This fungus which was the primary pathogen predisposed the plants to secondary infections with *Fusarium* and *Rhizoctonia* species.

The isolation of these pathogens confirmed the studies of Kuthe and Spoerhase (1974) that *R. nigricans, A. niger* and *A. flavus* found associated with rotten pawpaw are highly pathogenic causing appreciable losses in pawpaw fruits at

post harvest. Baiyewu (2007) also isolated *Fusarium* spp., *A. flavus* and *Rhizopus* spp. among other pathogens from *Carica papaya* L. pawpaw fruit.

The major diseases of *Momordica charantia* L. are Alternaria rot (*Alternaria alternata*), Belly rot (*Rhizoctonia solani*), Cottony leak (*Pythium* sp.), Rhizopus soft rot (*Rhizopus stolonifer*), Botryodiplodia rot (*Botryodiplodia theobromae*) (Wikipedia 1016) etc. reported fungal association of five vegetables in Bangladesh.

Momordica charantia L. (Bitter gourd) is one of the popular vegetable in Bangladesh as well as in the world. Nine species of fungi namely, *Aspergillus flavus* Link, *A. fumigatus* Fresenius, *A. niger* van Tiegh, *Curvularia brchyspora* Boedijn, *Fusarium* Link, *Mucor* Fresen, *Penicillium* Link, *Rhizopus stolonifer* (Ehrenb.:Fr.) Vuill and *Trichoderma viride* Pers. were found to be associated with the selected vegetable by Dulal Miya and Shamim Shamsi (2016).

MATERIALS AND METHODS

Plant collection

In this study, plant specimens (especially infected plant parts) were collected from cultivated field near the Meiktila Township. Plant specimens were collected from from June 2017 to October 2017. Totally, nine plants such as *Vitis vinifera* L. (Sa-pyit), *Solanum melongena* L. (Kha-yan), *Lycopersicum esculentum* Miller. (Khayan-gyin), *Capsicum frutescens* L. (Nga-yok), *Ocimum sanctum* L. (Pin-sein), *Momordica charantia* L. (Kyet-hinga), *Carica papaya* L. (Thin-baw), *Mangifera indica* L. (Tha-yet) and *Oroxylum indicum* Vent. (Kyaung-sha) were included in this research.

Isolation of plant pathogenic fungi

Isolation of the fungal pathogens from diseased material is made by surface sterilizing agents, removing a small portion of the infected tissue (leaves, stems, fruits etc.) with a sterile scalpel, and plating it in a plate containing a nutrient medium.

Materials required

Infected young leaves, sterile Petri-dishes, PDA slants, sodium hypochlorite solution (1 %), sterile water, razor blade, forceps, inoculation needle, burner/spirit lamp, spirit, incubator, PDA medium and autoclave (pressure steam sterilizer).

Isolation procedure (Dr.m.johnson 2012 method)

1. Select infected host tissue from the advancing margin of the lesions.
2. Cut into small pieces (2-5 mm) containing both the diseased and healthy tissue and keep in sterile Petri dishes
3. Dip the pieces into 1 % sodium hypochlorite solution for about one minute.
4. Transfer the pieces to Petri - dishes containing sterile distilled water and wash thoroughly in two changes of sterile water to free them from the chemicals if any.
5. Wash hands with rectified spirit and wipe the table top of inoculation chamber-' with rectified spirit.
6. Lit the burner

7. Hold the flask containing sterile Luke warm PDA in the right hand and remove plug near the flame. Lift the lid of Petri dish gently with left hand and pour about 20 ml of medium. Close the mouth of the flask with plug near the flame.
8. After solidification of the medium, place three sterilized pieces at different distance in a single PDA plate.
9. Incubate the Petri dishes in an inverted position at 30° C and examine for 3-5 days.

Preparation of Basic Solid Medium

Liquid broth media containing nutrients are usually solidified by the addition of agar. Eg. Potato Dextrose Agar (PDA) medium, Nutrient agar medium.

Preparation of Potato Dextrose Agar (PDA) Medium (pH – 6.5)

Potato - 250g
Dextrose - 15g
Agar - 18g
Distilled water - 1000ml

The potato tubers were peeled off and weighed for about 250g tubers were chopped in to small pieces in to the sterile conical flask. After boiling the supernatant were collected and dextrose (15g) with agar (18g) to dissolve the ingredients. The medium was mentioned and adjusted to 6.5 pH. Finally the medium was sterilized by autoclaving at 121°C for 20 minutes.

Isolation and identification of the pathogen

The pathogen from the blighted leaf was isolated on potato dextrose agar (PDA) medium at a temperature of 30°C and pure culture was obtained by hyphal tip culture. According to Barnett 1956, the identification of the pathogen were made on the basis of its morphology, growth characteristics and shape of conidia.

RESULTS

In this study, plant specimens (especially infected plant parts) were collected from Meiktila Township. The infected plant parts were collected from June 2017 to October 2017. Totally seven kinds of pathogenic fungi were isolated in this research.

The pathogenic fungi *Flagellospora* was isolated from the leaves of *Vitis vinifera* L. (Sa-pyit),

Macroscopical characters of *Flagellospora* sp.

Colonies on PDA were white, growing (2.5 cm to 3.0 cm in diameter at 3 day old culture) and had well developed aerial mycelia. (Fig.1 B)

Microscopical characters of *Flagellospora* sp.

Conidiophores long, slender, septate, branched above, ending in phialides which bear single conidia; conidia hyaline, 1- or more-celled, flagelliform, slender, curved. (Fig.1 C)

The pathogenic fungi *Fusarium* fungi was isolated from the leaves of *Solanum melongena* L. (Kha-yan)

Macroscopical characters of *Fusarium* sp.

Colonies on PDA were pale white to yellow, growing (2.5 cm to 3.0 cm in diameter at 3 day old culture) and had well developed aerial mycelia. (Fig. 2 B)

Microscopical characters of *Fusarium* sp.

Mycelium extensive and cottony in culture, often with some tinge of pink or yellow, in the mycelium or medium; conidophores variable, **siender** and simple, or stout, short, branched irrecularly or bearing a whorld of phialides, single or grouped; conidia hyaline, variable, principally of two kinds; macroconida several-celled slightly curved or bent at the pointed ends, typically canoe-shpaed; microconidia 1-celled, ovoid or oblong, borne singly curved. (Fig. 2 C)

The pathogenic fungi *Alternaria* fungi was isolated from the leaves of *Lycopersicum esculentum* Miller. (Khayan-gyin) and *Capsicum frutescens* L. (Nga-yok)

Macroscopical characters of *Alternaria* sp.

Colonies on PDA were pale green to brown, growing (2.5 cm to 3.0 cm in diameter at 3 day old culture) and had well developed aerial mycelia. (Fig.3B and 4B)

Microscopical characters of *Alternaria* sp.

The fungus produced profusely branched, brownish, septate mycelia. Conidiophores arose singly. Conidia formed in long chains (often branched), oval to ellipsoidal, with 2-7 transverse and 1-4 longitudinal or oblique septa, tapering gradually to form a short swollen beak at the apex. (Fig.3C and 4C)

The pathogenic fungi *Paecilomyces* fungi was isolated from the leaves of *Ocimum sanctum* L. (Pin-sein)

Macroscopical characters of *Paecilomyces* sp.

Colonies on PDA were white initially, later turning to pale yellow, fast growing (2.5 cm to 3.5 cm diameter at 3 day old culture) and had well developed aerial mycelia. (Fig. 5 B)

Microscopical characters of *Paecilomyces* sp.

The fungus produced profusely branched, septate mycelia. Conidiophores mostly arising from aerial hyphae, basal portion of phialide nearly cylindrical, tapering gradually or abruptly to a long slender tube; conidia produced successively (basipetally) and held together in chains, or in irregular masses under moist condition. The conidia is 1-celled and hyaline. (Fig. 5 C)

The pathogenic fungi *Curvularia* fungi was isolated from the leaves of *Momordica charantia* L. (Kyet-hinga) and *Mangifera indica* L. (Tha-yet)

Macroscopical characters of *Curvularia* sp.

Colonies on PDA were pale green brown, fast growing (colonies reach 2.0 to 2.5 cm diameter at 3 days old culture) and had well developed aerial mycelia. (Fig. 6B and 7B)

Microscopical characters of *Curvularia* sp.

The fungus produced profusely branched, brownish, septate mycelia. Conidiophores brown, simple or sometimes branched; conidia dark, end cells lighter, 3 to 5 celled, more or less fusiform, typically bent or curved, with one or two of the central cells enlarged. (Fig. 6C and 7C)

The pathogenic fungi *Aspergillus* fungi was isolated from the leaves of *Carica papaya* L. (Thin-baw)

Macroscopical characters of *Aspergillus* sp.

Colonies on PDA were pale borwn initially, later turning to brown, fast growing (2.0 cm to 3.5 cm diameter at 3 day old culture) and had well developed aerial mycelia. (Fig. 8 B)

Microscopical characters of *Aspergillus* sp.

Conidiophores upright, simple, terminating in a globose or calvate swelling, bearing phialides at the apex or radiating from the entire surface; conidia 1-celled, globose, often variously colored in mass, produced basipetally. (Fig. 8 C)

The pathogenic fungi *Helminthosporium* fungi was isolated from the leaves of *Oroxylum indicum* Vent. (Kyaung-sha).

Macroscopical characters of *Helminthosporium* sp.

Colonies on PDA were pale green, to white, fast growing (2.0 cm to 2.5 cm diameter at 3 days old culture) and had well developed aerial mycelia. (Fig. 9B)

Microscopical characters of *Helminthosporium* sp.

Mycelium light to dark in culture, extensive; conidiophores short or long, septate, simple or branched, more or less irregular or bent, bearing conidia successively on new growing tips; conidia dark, typically containing more than 3 cells, cylindrical or ellipsoid, sometimes slightly curved or bent, ends rounded. (Fig. 9C)

(A) Infected leaf of *Vitis vinifera* L.

(B) Morphology of *Flagellospora* sp., 3-days old culture on PDA

(C) Photomicrographs of *Flagellospora* sp.

Figure 1. Pathogenic fungi isolated from *Vitis vinifera* L. on PDA

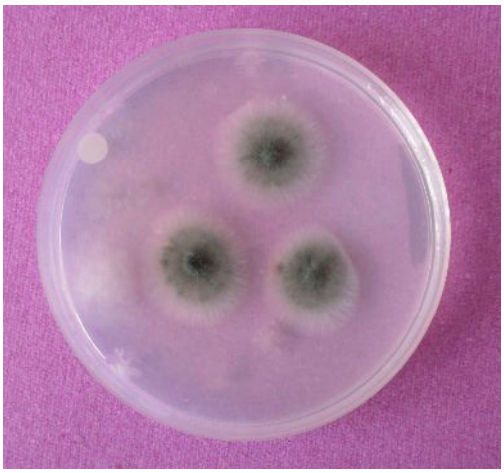
(A) Infected leaf of *Solanum melongena* L.

(B) Morphology of *Fusarium* sp., 3-days old culture on PDA

(C) Photomicrographs of *Fusarium* sp.

Figure 2. Pathogenic fungi isolated from *Solanum melongena* L. on PDA

(A) Infected leaf of *Lycopersicum esculentum* Mill.



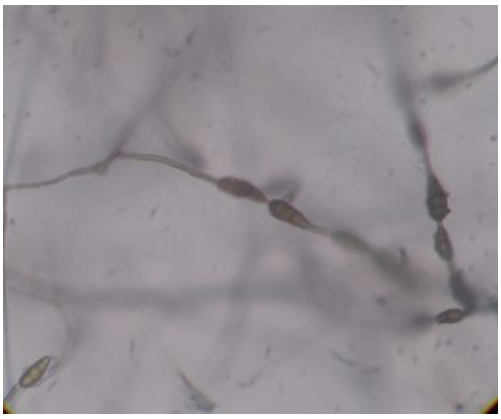
(B) Morphology of *Alternaria* sp., 3-days old culture on PDA

(C) Photomicrographs of *Alternaria* sp.

Figure 3. Pathogenic fungi isolated from *Lycopersicum esculentum* Mill. on PDA

(A) Infected leaf of *Capsicum frutescens* L.

(B) Morphology of *Alternaria* sp., 3-days old culture on PDA



(C) Photomicrographs of *Alternaria* sp.

Figure 4. Pathogenic fungi isolated from *Capsicum frutescens* L. on PDA

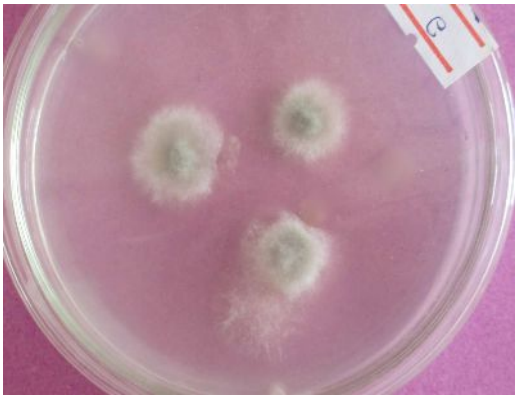
(A) Infected leaf of *Ocimum sanctum* L.

(B) Morphology of *Paecilomyces* sp., 3-days old culture on PDA

(C) Photomicrographs of *Paecilomyces* sp.

Figure 5. Pathogenic fungi isolated from *Ocimum sanctum* L.,on PDA

(A) Infected leaf of *Momordica charantia* L.

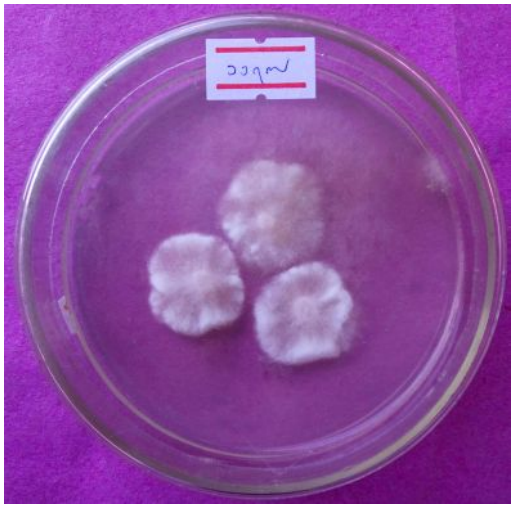


(B) Morphology of *Curvularia* sp., 3-days old culture on PDA

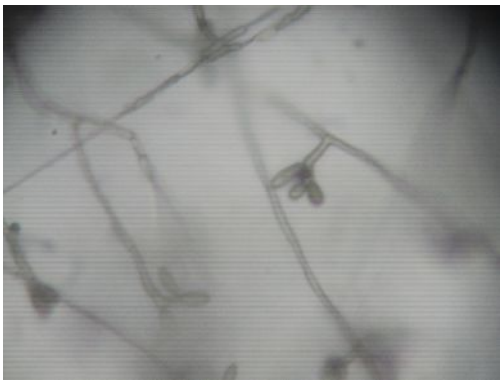
(C) Photomicrographs of *Curvularia* sp.

Figure 6. Pathogenic fungi isolated from *Momordica charantia* L. on PDA

(A) Infected leaf of *Mangifera indica* L.



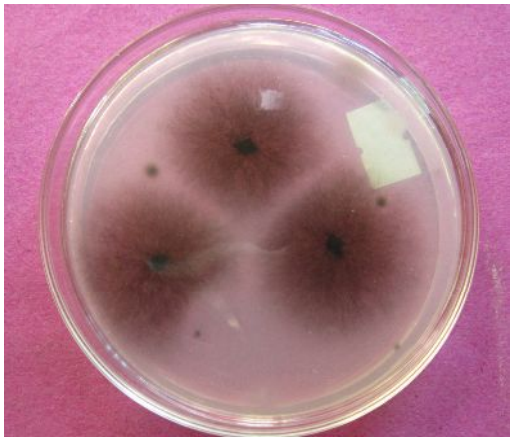
(B)Morphology of *Curvularia* sp., 3-days old culture on PDA



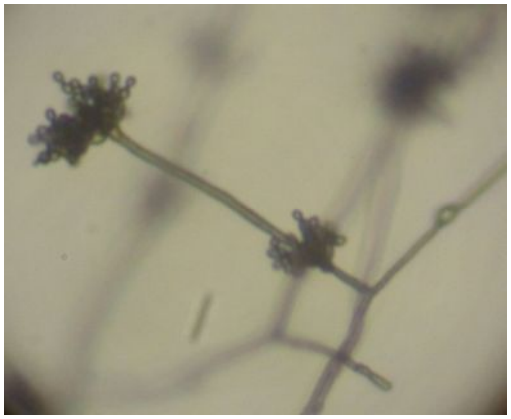
(C) Photomicrographs of *Curvularia* sp.

Figure 7. Pathogenic fungi isolated from *Mangifera indica* L. on PDA

(A) Infected leaf of *Carica papaya* L.



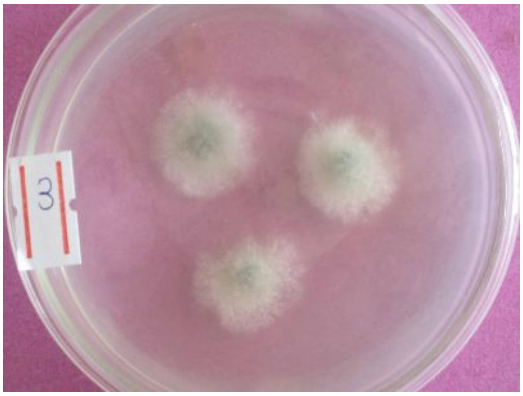
(B)Morphology of *Aspergillus* sp., 3-days old culture on PDA



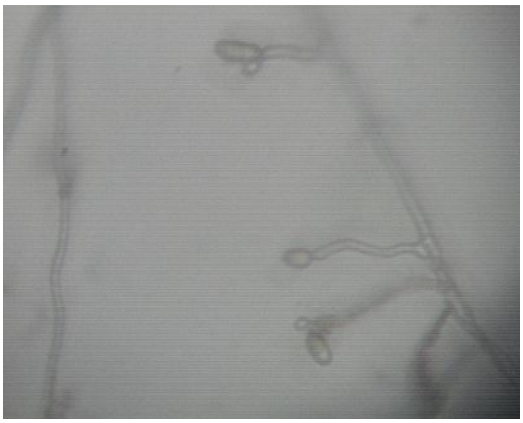
(C)Photomicrographs of *Aspergillus* sp.

Figure 8. Pathogenic fungi isolated from *Carica papaya* L. on PDA

(A)Infected leaf of *Oroxylum indicum* Vent.



(B)Morphology of *Helminthosporium* sp., 3-days old culture on PDA



(C) Photomicrographs of *Helminthosporium* sp.

Figure 9. Pathogenic fungi isolated from *Oroxylum indicum* Vent. on PDA

DISCUSSION AND CONCLUSION

A total of seven species of pathogenic fungi namely *Flagellospora* sp., *Fusarium* sp., *Alternaria* sp., *Paecilomyces* sp., *Curvularia* sp., *Aspergillus* sp. and *Helminthosporium* sp. were isolated from the the infected leaves of *Vitis vinifera* L. (Sa-pyit), *Solanum melongena* L. (Kha-yan), *Lycopersicum esculentum* Miller. (Khayan-gyin), *Capsicum frutescens* L. (Nga-yok), *Ocimum sanctum* L. (Pin-sein), *Momordica charantia* L. (Kyet-hinga), *Mangifera indica* L. (Tha-yet), *Carica papaya* L. (Thin-baw) and *Oroxylum indicum* Vent. (Kyaung-sha).

Table 1 and 2 shows morphological and microscopical characters of seven species of pathogenic fungi namely *Flagellospora* sp., *Fusarium* sp., *Alternaria* sp., *Paecilomyces* sp., *Curvularia* sp., *Aspergillus* sp. and *Helminthosporium* sp.

Table 1. The macroscopical and microscopical characters of four pathogenic fungi

Endophytic fungi	Source Plant	Mycelium	Media	Conidiophores	Conidia
Flagellospora sp	*Vitis vinifera* L. (Sa-pyit)	Colonies white, 2.5 cm to 3.0 cm in diameter	PDA	long, slender, septate, branched above, ending in phialides which bear single conidia;	hyaline, 1- or more-celled, flagelliform, slender, curved.
Fusarium sp	*Solanum melongena* L. (Kha-yan)	pale white to yellow, 2.5 cm to 3.0 cm in diameter	PDA	siender and simple, or stout, short, branched irrecularly or	hyaline, variable, principally of two kinds; macroconida, microconidia
Alternaria.	*Lycopersicum esculentum* Miller. (Khayan-gyin), *Capsicum frutescens* L. (Nga-yok),	pale green to brown, growing (2.5 cm to 3.0 cm in diameter	PDA	dark, simple, rather short or elongate typically bearing a simple or branched chain or conidia	conidia dark, typically with both transverse and longitudinal septa
Paecilomyces sp	*Ocimum sanctum* L. (Pin-sein)	white initially, later turning to pale yellow, fast growing (2.5 cm to 3.5 cm diameter	PDA	mostly arising from aerial hyphae, basal portion of phialide nearly cylindrical, tapering or abruptly to a long slender tube	produced successively (basipetally) and held together in chains

Table 2. The macroscopical and microscopical characters of three pathogenic fungi

Endophytic fungi	Source Plant	Mycelium	Media	Conidiophores	Conidia
Curvularia.	*Momordica charantia* L. (Kyet-hinga), *Mangifera indica* L. (Tha-yet),	pale green brown, 2.0 to 2.5 cm diameter	PDA	pale brown, simple or sometimes branched	dark, end cells lighter, 3 to 5 celled, more or less fusiform, typically bent or curved, central cells enlarged.
Aspergillus sp.	*Carica papaya* L. (Thin-baw)	pale borwn to brown, 2.0 cm to 3.5 cm diameter	PDA	upright, simple, terminating in a globose or calvate swelling	1-celled, globose, often variously colored in mass
Helminthosporium sp.	*Oroxylum indicum* Vent. (Kyaung-sha).	pale green, to white, fast growing (2.0 cm to 2.5 cm diameter	PDA	short or long, septate, simple or branched, more or less irregular or bent,	dark, containing more than 3 cells, cylindrical or ellipsoid,

The isolated fungal pathogens *Curvularia* species from *Momordica charantia* L. (Bitter gourd) were reported by Dulal Miya and Shamim Shamsi (2016), Department of Botany, University of Dhaka, Dhaka-1000, Bangladesh which are same as reported in the present investigation.

From Nelson, *et al*; (1994) Jodhpur National University, India, *Fusarium oxysporum* is a common pathogen of garden egg (*Solanum melongena*) plants which are same as reported in the present investigation.

Mehmood et al. (2014) from Published by American Research Institute for Policy Development show the pathogenic potential of the fungus *Alternaria alternata,* onearly blight of tomato, stem canker, black mold rot, leaf spot, and black shoulder which are same as reported in the present investigation.

Neergaard, 1979 state that fungal disease pathogens from many chilli pepper (*Capsicum frutescens*) plants are known to be seed-borne and seed transmitted; *Colletotrichum spp., Alternaria solani, Fusarium, Cercospora capsici, Botrytis cineria*, and *Sclerotinia sclerotiorum.* Among them *Alteraria* fungi are same as reported in the present investigation.

Baiyewu (2007), state the most common fungi *Aspergillus flavus*, *A. niger*, *Fusarium sp*., *Mucor sp*. and *Rhizopus nigricans* were found in *Carica papaya* L. pawpaw. Among them *Aspergillus* fungi are same as reported in the present investigation.

In the present investigation seven pathogenic fungi were associated with nine varieties of plants. Among them *Curvularia* species, *Fusarium* species, *Alternaria* species and *Aspergillus* species were same result with other research papers. In conclusion, the results from the present research are very applicable in the agriculture especially protection of plant diseases and better production of quality crops. The investigation of plant pathogenic fungi is one of the advantages for the agriculture sector.

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