

DISEASE SYMPTOMS ON RICE PLANTS AND IDENTIFICATION OF THE PATHOGENS CAUSING DISEASES

Nway Nandar Aung¹, Kathy Myint², Bay Dar³

Abstract

The sample of diseased rice plants were collected from Tamartakaw village, Twan-tay Township. The pathogenic fungi were identified by their pure colony morphology and spores formation. In the present work, two different types of disease symptoms and two different kinds of pathogenic fungi such as *Fusarium* sp. (1) which causes Narrow Brown Leaf Spot and *Mucor* sp. (1) which causes Blight were studied on *Oryzasativa* L. (That-gyi Saba). In *Oryzasativa* L. Thatt-lat Saba, *Gloeosporium* sp. (1) that caused White Spot, *Mucor* sp. (2) that caused Blight, *Gloeosporium* sp. (2) that caused Brown Spot, *Rhizoctonia* sp. (1) that caused Leaf Scald, *Rhizoctonia* sp. (2) that caused Sheath Blight and *Fusarium* sp. (2) that caused Grain Discoloration. In the case of *Oryza sativa* var. *glutinosa* (Kaung-nyin, That-Nge Saba), 4 different types of disease symptoms and 4 different kinds of pathogenic fungi were investigated these include Leaf Stripe caused by *Rhizoctonia* sp. (3), Leaf Streak caused by *Rhizoctonia* sp. (4), Blight caused by *Mucor* sp. (3) and Black Kernel caused by *Gloeosporium* sp. (3), respectively.

Keywords: Rice plant, *Oryza sativa*, *Mucor* sp., *Fusarium* sp., *Gloeosporium* sp., *Rhizoctonia* sp.

Introduction

Rice is the important staple food for Myanmar 48 million peoples of which 75% directly depend on farming (Soe Soe Thein *et al.*, 2002). On the average each person in Myanmar eats 195 kg of rice annually (Soe Soe Thein *et al.*, 2002).

From East Asia, rice was spread to Southeast and South Asia. Rice (*Oryzasativa*) is a major staple food for approximately two-third of the world's population. More than 90% of the world's rice is both grown and consumed in developing countries. Rice cultivation can be grown practically anywhere and is well-suited to countries and regions (Vauhn and Stich, 1991).

More than 27 diseases caused by microbes are common in rice plants. Widespread diseases, which cause severe yield losses, include Blight (caused by *Xanthomonasoryzae* or *Rhizoctoniasolani*), Blast (caused by *Magnaportheigrise*) and Sheath Blight (caused by *Rhizoctoniasolani*) (web 1).

Most damaging pests are rice stink bug (*Oebaluspugnax*), flea beetle and aphids. Other important diseases (Miscellaneous diseases) are alkalinity or salt damage (caused by excessive salt concentration in soil or water), bronzing (Zinc deficiency) and cold injury (low temperature) (web 1).

Methods

Collection of disease symptoms from rice plants

The fungal pathogens were collected from diseased rice plants from the field of Tamartakaw village, Twan-Tay Township.

¹ PhD Candidate, Department of Botany, University of Yangon

² Lecturer, Department of Botany, University of Yangon

³ Professor, Department of Botany, University of Yangon



Figure 1 The study site of Tamartakaw village, Twan-Tay Township

Isolation of fungal pathogen

Pathogens were isolated and cultured from diseased specimens before they can be identified. For surface lesions on leaves and stems small pieces of diseased tissue of a few cubic millimeters excised from the lesion margin were sterilized in 70% alcohol for 3 mins. And then it was placed on to the agar growth medium in sterile petridishes. When fungi were growing on the surface of the agar medium a pure culture can be obtained by direct transfer to a growth medium.

The developing fungal colony was examined after 5-7 days growing and then isolated into slant test tube with Potatoes Dextrose Agar medium. Subcultures of fungal isolates were carried out several times successfully with Potatoes Dextrose Agar slants medium until the pure culture was obtained. Pure culture was maintained at room temperature and subculture was prepared every twice a month. Pure colonies were cultured in the petridishes with Potatoes Dextrose Agar medium to examine color of colony and spore formation.

Identification and classification of disease symptoms

The disease symptoms were classified and identified according to Roberts (1984).

Identification and classification of fungal pathogens

Isolated medium

It was cultured on PDA medium according to Atlas, 1993.

PDA medium

Mash Potato	- 200 g
Peptone	- 3 g
Dextrose	- 20 g
Agar	- 20 g
Distilled water	- 1000ml

(Add Chloramphenicol (0.001/1) for antibacterial activity)

Preparation of PDA medium

The potato was peel off and weigh 200g and cut into small pieces and put in beaker with 1000 ml distilled water. It was boiled the contents for about 30 minutes and collected the extract. Transfer dextrose 20g and agar 20 g were added into extract and gently heat and shake to dissolve the ingredients and adjusted to 1000 ml with distilled water pour the medium was

poured into two or more Elenmyer flasks, put cotton plug, covered with aluminum foil and autoclave at 121°C for 20 minutes.

Culture and stock medium

It was cultured on Czapek (Dox) Agar medium according to Ronald, 1993.

Czapek (Dox) Agar medium

NaNO ₃	- 0.2 g
K ₂ HPO ₄	- 0.1 g
MgSO ₄	- 0.05 g
KCl	- 0.05 g
FeSO ₄ ·7H ₂ O	- 0.001 g
Sucrose	- 3.0 g
Agar	- 2.0 g
Distilled water-	100 ml
pH 7.3 at 25°C	

Identification and classification of pathogens

The pathogens were identified and classified according to Barnett (1960) and Dube (1983).

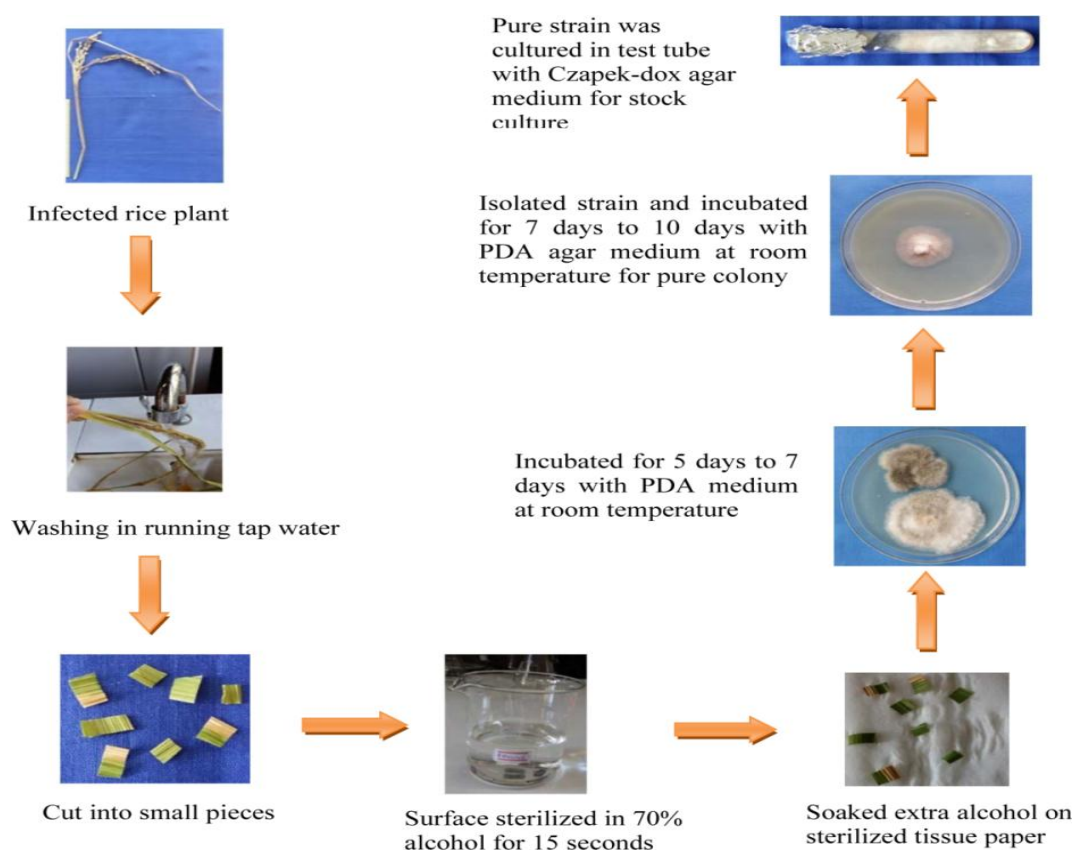


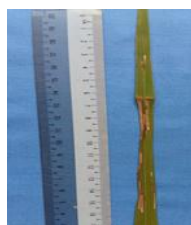
Figure 2 Isolation procedure of fungal pathogen from disease symptom (George, 1978)

Results

In this study, total disease symptoms are seven in two different varieties of rice. Two different types of disease symptoms and two different kinds of pathogenic fungi were occurred in *Oryzasativa* L. (That-gyi Saba) such as Narrow Brown Leaf Spot caused by *Fusarium* sp. (1) and Blight caused by *Mucor* sp. (1). Five different types of disease symptoms and 5 different kinds of pathogenic fungi such as Blight caused by *Mucor* sp. (2), Brown Spot caused by *Gloeosporium* sp., Leaf Scald caused by *Rhizoctonia* sp. (1), Sheath Blight caused by *Rhizoctonia* sp. (2) and Grain Discoloration caused by *Fusarium* sp. (2) were examined from diseased rice plants *Oryzasativa* L. (That-latt Saba).

Table 1 Characters of pathogenic fungi on diseased rice plants from cultivated field of Tarmartakaw village, Twan-Tay Township

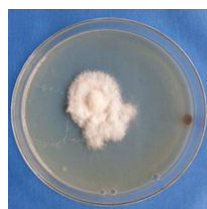
No	Variety of Rice	Disease Symptoms	Species
1.	<i>Oryza sativa</i> L. (ThatGyi Saba)	Narrow Brown Leaf Spot	<i>Fusarium</i> sp.(1)
		Leaf Blight	<i>Mucor</i> sp. (1)
2.	<i>Oryza sativa</i> L. (That-latt Saba)	Leaf Blight	<i>Mucor</i> sp.(2)
		Brown Spot	<i>Gleosporium</i> sp.
		Leaf Scald	<i>Rhizoctonia</i> sp.(1)
		Sheath Blight	<i>Rhizoctonia</i> sp.(2)
		Grain Discoloration	<i>Fusarium</i> sp.(2)
3.	<i>Oryza sativa</i> ver. <i>glutinosa</i> . (Kaung Nyin Saba) (Thet Nge Saba)	Leaf Streak	<i>Rhizoctonia</i> sp. (3)
		Leaf Stripe	<i>Rhizoctonia</i> sp. (4)
		Blight	<i>Mucor</i> sp.(3)
		Black Kernel	<i>Gleosporium</i> sp.(3)



a



b



c



d

Figure 3 Narrow Brown Leaf Spot on *Oryza sativa* L. (TaungPyanGyi); a. Disease symptom of Narrow Brown Leaf Spot, b. Fungal isolated from Narrow Brown Leaf Spot (5-7 days old culture) on PDA, c. Pure fungal colony from Narrow Brown Leaf Spot disease (white color) (5-7 days old culture) on CzapekDox, d. Micrograph of *Fusarium* sp. (1)

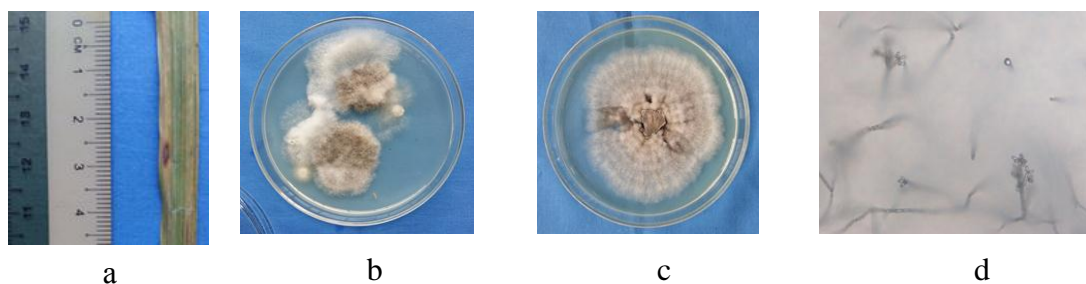


Figure 4 Brown Leaf Spot on *Oryza sativa* L. (TaungPyan yin); a. Disease symptom of Brown Leaf Spot, b. Fungal isolated from Brown Leaf Spot (5-7 days old culture) on PDA, c. Pure fungal colony from Brown Leaf Spot disease white color (5-7 days old culture) on CzapekDox, d. Micrograph of *Gloeosporium* sp.

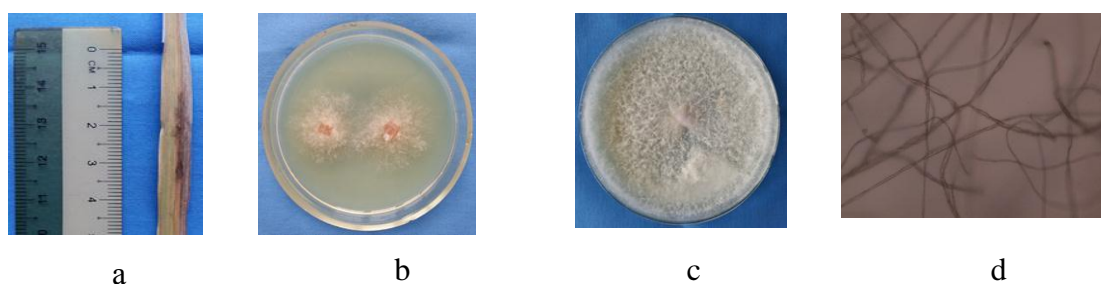


Figure 5 Leaf Scald on *Oryza sativa* L. (Taung Pyan yin); a. Disease symptom of Leaf scald, b. Fungal isolated from Narrow Brown Leaf Spot (5-7 days old culture) on PDA, c. Pure fungal colony from Narrow Brown Leaf Spot disease (white color) (5-7 days old culture) on CzapekDox, d. Micrograph of *Gloeosporium* sp.

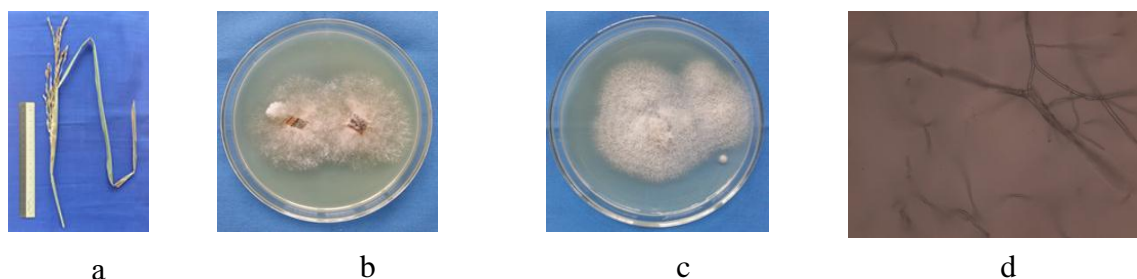


Figure 6 Sheath Blight on *Oryza sativa* L. (Taung Pyan yin); a. Disease symptom of Sheath Blight b. Fungal isolated from Sheath Blight (5-7 days old culture) on PDA, c. Pure fungal colony from Sheath Blight disease (white color) (5-7 days old culture) on CzapekDox, d. Micrograph of *Gloeosporium* sp.

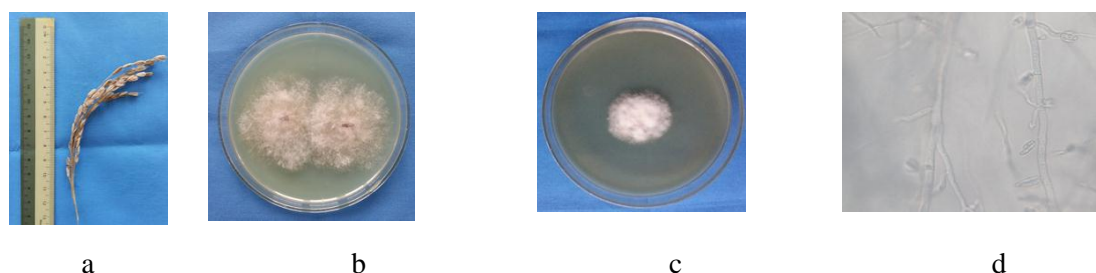


Figure 7 Grain Discoloration on *Oryza sativa* L. (TaungPyan yin); a. Disease symptom of Grain Discoloration, b. Fungal isolated from Grain Discoloration (5-7 days old culture) on PDA, c. Pure fungal colony from Grain Discoloration disease (white color) (5-7 days old culture) on CzapekDox, d. Micrograph of *Fusarium* sp. (2)

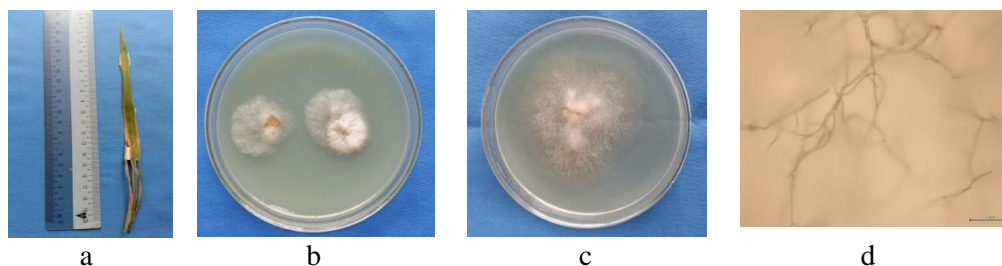


Figure 8 Leaf streak on *Oryza sativa* ver. *glutinosa* (Kaung nyin); a. Disease symptom of Leaf streak, b. Fungal isolated from Leaf streak (5-7 days old culture) on PDA, c. Pure fungal colony from Leaf streak disease (white color) (5-7 days old culture) on CzapekDox, d. Micrograph of *Rhizotonia* sp. (3)

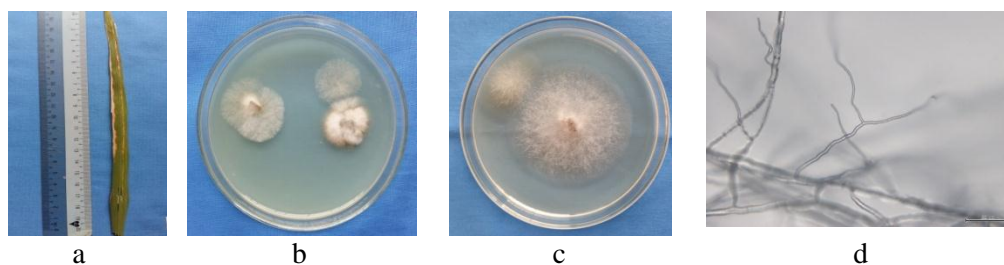


Figure 9 Leaf stripe on *Oryza sativa* ver. *glutinosa* (Kaung nyin); a. Disease symptom of Leaf stripe, b. Fungal isolated from Leaf stripe (5-7 days old culture) on PDA, c. Pure fungal colony from Leaf stripe disease (white color) (5-7 days old culture) on CzapekDox, d. Micrograph of *Rhizotonia* sp. (4)

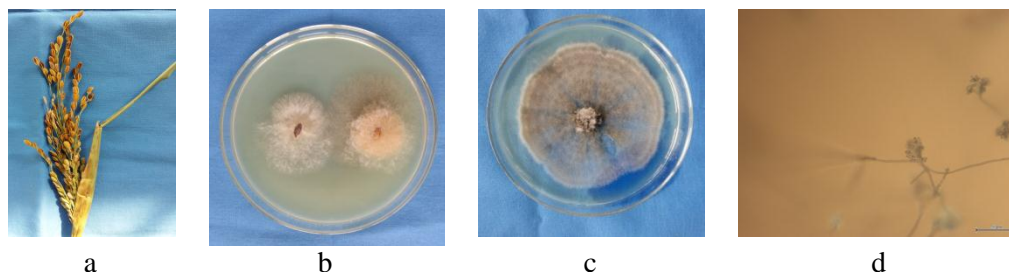


Figure 10 Black kernel on *Oryza sativa* ver. *glutinosa* (Kaung nyin); a. Disease symptom of Black kernel, b. Fungal isolated from Black kernel (5-7 days old culture) on PDA, c. Pure fungal colony from Black kernel disease (white color) (5-7 days old culture) on CzapekDox, d. Micrograph of *Gleosporium* sp. (2)

According to the result the disease symptoms of Leaf Blight caused by *Mucor* sp. was isolated from three varieties of rice.

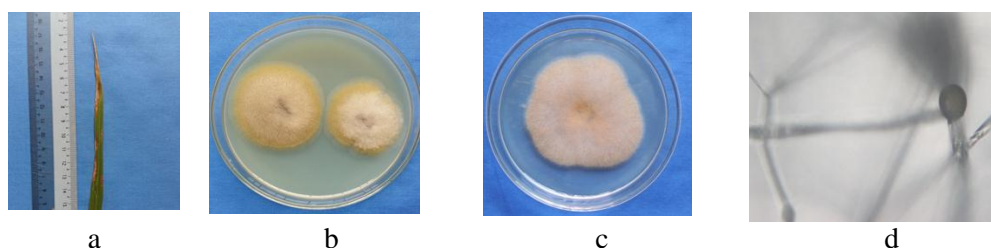


Figure 11 Leaf Blight on *Oryza sativa* L. (TaungPyanGyi); a. Disease symptom of Leaf Blight, b. Fungal isolated from Leaf Blight (5-7 days old culture) on PDA, c. Pure fungal colony from Leaf Blight disease (white color) (5-7 days old culture) on CzapekDox, d. Micrograph of *Mucor* sp. (1)

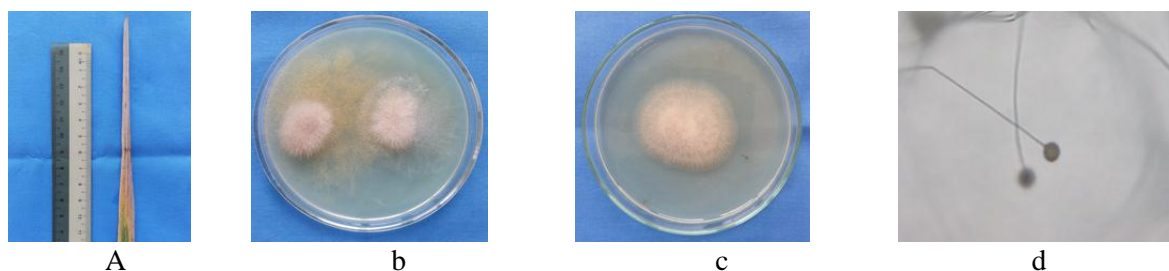


Figure 12 Leaf Blight on *Oryza sativa* L. (Taung Pyan yin); a. Disease symptom of Leaf Blight, b. Fungal isolated from Leaf Blight (5-7 days old culture) on PDA, c. Pure fungal colony from Leaf Blight disease (white color) (5-7 days old culture) on CzapekDox, d. Micrograph of *Mucor*sp. (2)

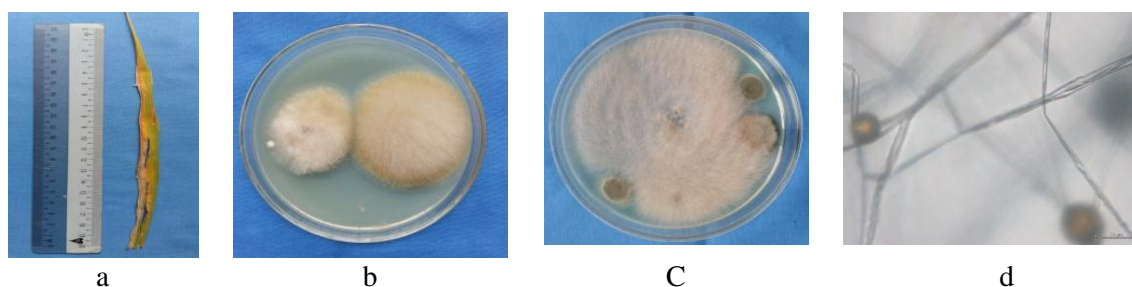


Figure 13 Leaf Blight on *Oryza sativa ver glutinosa*. (Kaug nyin); a. Disease symptom of Leaf Blight, b. Fungal isolated from Leaf Blight (5-7 days old culture) on PDA, c. Pure fungal colony from Leaf Blight disease (white color) (5-7 days old culture) on CzapekDox, d. Micrograph of *Mucor*sp. (3)

Discussion and Conclusions

In this study, the diseased rice plants were examined according to the disease symptoms which were found in field of Tamartakaw village, Twan-Tay Township, Yangon Region, in Myanmar. The disease symptoms rice plants were identified according to Roberts, 1984.

The fungi were isolated and cultured on potato dextrose agar (PDA) medium and CzapekDox agar medium for pure and stock culture. And then the pathogens were classified and identified by morphological characters of pure colony and spore formation by Barnett, 1960.

In the present study, two different types of disease symptoms and two different kinds of pathogenic fungi such as Narrow Brown Leaf Spot caused by *Fusarium* sp. (1) and Blight caused by *Mucor* sp. (2) on *Oryza Sativa* L. (Thet-gyi). Six different types of disease symptoms and 6 different kinds of pathogenic fungi such as, disease symptom of Blight caused by *Mucor*sp. (2), Brown Spot caused by *Gloeosporium* sp., Leaf Scald caused by *Rhizoctonia* sp. (1), Sheath Blight caused by *Rhizoctonia* sp. (2) and Grain Discoloration caused by *Fusarium* sp. (2), respectively, were examined from diseased rice plants (*Oryzasativa* L., That-latt Saba, Four different kinds of disease symptoms and 4 different kinds of pathogenic fungi such as Leaf Stripe caused by *Rhizoctonia* sp. (3), Leaf Streak caused by *Rhizoctonia* sp. (4), Blight caused by *Mucor* sp. (3) and Black Kernal caused by *Gloeosporium* sp. (3), respectively, were examined from diseased rice plants (*Oryza sativa ver glutinosa*), respectively.

The fungal disease symptoms may be occurred about 25-35 days after planting of rice seedling. Leaf Blight disease was most important diseases that produce heavy losses to the farmer.

Acknowledgements

I am greatly indebted to Dr. Aye Pe, Professor and Head, Department of Botany, University of Yangon, for his guidance and suggestion to carry out this research. I also wish to thank Dr. Thanda Aye, Professor, Department of Botany, University of Yangon for her valuable suggestions. I also indebted to supervisor Dr. Bay Dar, Professor, Department of Botany, University of Yangon for her kind guidance and supervision. And I also wish to thank to Dr. Yay Chan, Professor and Head, Universities' Research Center, University of Yangon for his valuable advice.

References

- Atlas, R.M. (1993) **Handbook of Microbiological Media** CRC Press, London.
- Barneth, H. L (1960) **Illustrated Genera of Imperfect Fungi. Second Edition. Department of Plant Pathology, Bacteriology and Entomology.** West Virginia University Morgantown, West Virginia.
- Bonman, J. M, B. A. Estrada, J. M. Banding (1989) **Leaf and neck Blast resistance in tropical lowland rice cultivars.** *Plant Dis.*, 73:388-390
- George, N. A. 1978. **Plant Pathology, Second Edition.** Academic press. INC. Printed in the United States of America. Page_ 186.
- Jia Y, S. A. M. Adams, G. T. Bryan, H.P. Hershay and B. Valent, 2000. **Direct interaction of resistance genes products confers rice blast resistance.** *Embo. J.*, 19: 4004-4014.
- Roberts, D. A and Boothryd, C. W. 1984. **Fundamentals of Plant Pathology.** Second Edition, Printed in the United States of America.
- Ronald, M. (1993) **Handbook of Microbiological Media.** International Standard Book Number 0-8493-2944-2, United States of America.
- SoeSoeThein, Tin Aye AyeNaing, M. Finckh and A. Bnerkert, 2002. Effects of Increasing Cropping Intensity on Rice Production in Myanmar-International Symposium.
- Tessa, R.S. (2002) **Piony rice savants win int'l agriprize.** *Inquirer News Service.*
- Tirmali, A. M, S. B. Latake, N. J. Bendra (2001) **Evaluation of new fungicides for control of Blast disease of rice.** *J. Maharashtra Agri. Univ.*, 26: 197-198
- Vaughn, D.A and L. A. stitch (1991) **Gene flow from the jungle to farmers.** *Bio.Science* 41:22-28