



## DISEASES AND INSECT PESTS PROBLEMS IN NURSERIES STAGE ON SOME FOREST TREE SPECIES OF MYANMAR REFORESTATIONS AND REHABILITATION PROGRAMMEE (MRRP)

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### ARTICLE INFORMATION

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WWL designed the study, YHNC and MYINT collected the data and performed the experiment, RSMS wrote the paper.

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### ABSTRACT

This study was carried out to assess some diseases and insect pests nurseries problems; incidence and severity of diseases and insect pests in four nurseries under the Myanmar Reforestation and Rehabilitation Programmee (MRRP). In this study, three kinds of fungal diseases; seedling blight, teak leaf rust and pine needle blight were found and also three kinds of insect pests: sap sucking, leaf defoliator and shoot borer were collected respectively in seedling *Tectona grandis* L.f., *Pinus kesiya* Royal ex Gordon, *Xylia xylocarpa* Taub., *Hopea odorata* Roxb., *Bruguiera hainesii* C.G.Rogers, *Xylocarpus moluccensis* (Lam.) M.Roem. and *Avicennia officinalis* L.. In laboratory examinations, an obligate parasite *Olivea tectonae* and five facultative parasites *Rhizoctonia solani*, *Fusarium solani*, *Aspergillus* sp., *Colletotrichum* sp., and *Mycosphaerella* sp. were identified. The insect pests species, *Callitarea* sp., *Cenopis* sp., *Hyblaea pueria*, *Hypsipyla robusta* and unidentified species (Thripidae) were recorded. According to the results, teak leaf rust, teak blight, pine needle blight and sap sucking insects were high percentage of incidence and severity rate. It can be concluded that the diseases mortality rate were higher than the insect pests except the sap sucking insects. This result showed that nurseries are less resistance than plantations and can spread disease more quickly and increase losses of seedling in the event of fungal infestations. Therefore, nurseries should be more cared according to the nurseries management procedures. This results to be provide the nurseries management information to the MRRP Project as well as other forest nurseries.

### 1. INTRODUCTION

The diseases and insect pests are invading forests plantations and nurseries of Myanmar in a variety of ways (Mead, 2001). Some micro-organisms are very virulent and can attack and invade healthy plants and some diseases spread and develop quickly within a plant (Cynthia, 2006). Abiotic casual organisms can cause a large number of rapidly growing seedlings to fungal attack and young seedlings are an important first step in establishing a plantation (Landis 1984, 1989).

Therefore, there is a need to assess the diseases and insect pests' infestations in nurseries. If preventive measures are not taken in nursery, unforeseen losses can occur. This study is the first step to list the spread of diseases and insect pests for these purposes and to record incidence and severity of diseases and insect pests in each nursery within six zones in MRRP Project.

### 2. MATERIALS AND METHODS

**Study Sites and Study Periods**

The experiment was carried out in the four nurseries within the six zones under the ten-year Master plan of

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Myanmar Reforestation and Rehabilitation Programme (MRRP). The survey was conducted intensively, the number of diseases and insect pests were recorded within two years from 2018 to 2020.

#### **Photography**

To study the symptoms of the diseases and insect pests, photographs were taken as far as possible of fresh diseased specimens.

#### **Specimens Collection**

Diseases and insect pests specimens were collected in the field using paper bags and plastic bottles for laboratory diagnoses.

#### **Sterilization of Lab Apparatus and Media**

Potato, Dextrose Agar (PDA) boiled for the nutrient media about 15 minutes. PDA media and lab instruments were sterilized in the autoclave Pressure 120 lb, for 20 minutes. Then all of cleaning Petri dishes were sterilized in the oven temperature 60 °C for 4 hours.

#### **Isolation and Identification**

To avoid any saprophytic growth on the specimens, isolations were made within one week after the collection. Only under unavoidable situations the specimens were stored in a refrigerator. Using the Koch's Postulate, the infected parts of seedlings were washed under the tap water, again sterilized by mercuric chloride (HgCl<sub>2</sub>) (1.1) g for 1 minute and then washed by double distilled water (DDW) for 1 minute. Then those were isolated on the media at the laminar flow chamber.

Isolated Petri dishes were first examined under a dissecting microscope. To study the detailed structure of fructifications of various pathogenic fungi (conidia, conidiophore, pycnidia, perithecia, rust sori, etc.) were slide preparation stained with Lactophenol Cotton Blue and also the covered glass was sealed with colorless nail polish. Photomicrographs of fungal species were taken using a Nikon Cool Pix B700 digital camera. Fungi were identified to genus level according to various mycological references;

#### **Insect Pests Identification**

Rearing the insect pests larvae was done under the laboratory conditions (room temperature about 25 ± 1° C and R.H. (65 ± 5 %) at the Entomology Section of FRI. Collected insect larvae were individually placed in separate glass bottle with specific leaves as food. Fresh leaves were provided every day until the pupate and adults. The adult emerged within fifteen days and then identification were carried out.

#### **Survey Design and Data Formulation**

Five nursery plots were selected in each nurseries using the Systematic Sampling Method, 100 sample

seedlings were collected from each five selected nursery plots using the Random Sampling Method, to calculate the percentage incidence (PI) of diseases and insect pests. Moreover, 25 sample seedlings were collected again from each of 100 seedling using the Random Sampling Method, to calculate the severity index (SI). Used of the formulas are as follow:

- $PI = Nd \times 100 / N$ , where Nd for number of affected and N the total number of trees,
- $SI = nL \times 1 + nM \times 2 + nS \times 3 / N$ , where nL, nM, nS represent total number of plants with Low 1-25%, Medium 26-50% and Severe 51-75 or > 25% seedlings dead; 1, 2, 3 severity index (SI) for Low, Medium and Severe and N the total number of trees (Sharma *et al.* 1985).

### **3. RESULTS AND DISCUSSION**

#### **Recorded Diseases and Insect Pests of Individual Tree Species**

In this experiment, three kinds of fungal disease symptoms and three kinds of insects pest symptoms were observed from seven kinds of tree species (Table-1). In this experiment, in insect identification, unidentified species (Thripidae), *Calliteara* sp. (Lymantridae), *Hyplaea puera* (Hyblaeidae), *Cenopic* sp. (Tortricidae) and *Hypsipyla robusta* (Pyralidae) were observed. In fungal diseases, *Collectrichum* sp., *Rhizoctonia solani*, *Fusarium solani*, *Aspergillus* sp., *Olivea tectonae*, and *Mycosphaerella* sp. were identified respectively. In this table show that the sap sucking insect, teak blight, teak leaf rust and pine needle blight were serious among all infestations. However, some other diseases and insect pests were potential serious in nursery. The percentage of incidence and severity rate of disease and insect pest infestations are showed as following graphs (Fig.1,2). This figure showed that the sap sucking insect pests on *Xylia xylocarpa* seedling were most serious among those insect infestations. The incidence and severity rate of this insect was (61%,33%). Moreover, insect pest infestations were more observed than the diseases in mangrove species in this experiment.

This figure showed that teak blight, teak leaf rust and pine needle blight were serious diseases in nursery. Their incidence and severity rate were (61%,33%), (64%,25%) and (65%,61%) respectively. The

seedling blight of seedling *Avicennia officinalis* was potential serious in this experiment.

#### 4. CONCLUSION

In this study, the incidence and severity rate of diseases were higher than the insect pests in nursery except the sap sucking insect pests. This result showed that nurseries are less resistances than plantations and can spread the disease more quickly and increase losses of seedling in the event of fungal infestations. Therefore, nursery in charges needs to care the nurseries according to the nurseries management procedures.

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#### 6. CONFLICT OF INTEREST

All authors have declared that there is no conflict of interests regarding the publication of this article.

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**Table 1. Recorded Tree Species, Diseases/Insect Pests and their Nature of Damage**

Sl. No.	Tree species/ Common Name	Disease Symptom	Insect Pest Damage Symptom	Nature of Damage
1.	<i>Xylia xylocarpa</i> (Pyinkado)	-	Sap Sucking Insect	Leaf
2.	<i>Hopea odorata</i> (Thingan)	-	Leaf Defoliator	Leaf
3.	<i>Avicennia officinalis</i> (Thamegyi)	Seedling Blight	Leaf Defoliator	Leaf /Stem
4.	<i>Bruguiera hainesii</i> (Myinggyi)	-	Leaf Defoliator	Leaf
5.	<i>Xylocarpus moluccensis</i> (Kyana)	-	Shoot Borer	Shoot
6.	<i>Tectona grandis</i> (Teak)	1. Teak Blight 2. Teak Leaf Rust	-	1. Leaf/Stem 2. Leaf
7.	<i>Pinus kesiya</i> (Pine)	Pine Needle Blight		Needle

**Table 2. Recorded Fungal Pathogens, Insect Pests, their Incidence, Severity and Status**

Sl. No.	Tree Species and Disease & Insect Pest Name	Fungal Pathogens (Species)	Insect Pests (Species & Family)	PI %	SI %	Disease & Insect Pest (Status)
1.	<i>Xylia xylocarpa</i> (Sap Sucking Insect)	-	Unidentified Species (Thripidae)	75	31	Serious
2.	<i>Hopea odorata</i> (Leaf Defoliator)	-	<i>Calliteara</i> sp. (Lymantridae)	4.8	10.13	Potential Serious
3.	<i>Avicennia officinalis</i> (Leaf Defoliator)	-	<i>Hyplaea puera</i> (Hyblaeidae)	10.5	16.2	Potential Serious
4.	<i>Bruguiera hainesii</i> (Leaf Defoliator)	-	<i>Cenopic</i> sp. (Tortricidae)	14.6	27.2	Potential Serious
5.	<i>Xylocarpus moluccensis</i> (Shoot Borer)	-	<i>Hypsipyla robusta</i> (Pyralidae)	5	12.10	Potential Serious
6.	<i>Avicennia officinalis</i> (Seedling Blight)	<i>Collectrichum</i> sp. <i>Rhizoctonia solani</i>	-	4	8.15	Potential Serious
7.	<i>Tectona grandis</i> (Teak Blight)	<i>Fusarium solani</i> <i>Aspergillus</i> sp.	-	61	33	Serious
8.	<i>Tectona grandis</i> (Teak Leaf Rust)	<i>Olivea tectonae</i>	-	64	23	Serious
9.	<i>Pinus kesiya</i> (Pine Needle Blight)	<i>Mycosphaerella</i> sp.	-	65	61	Serious

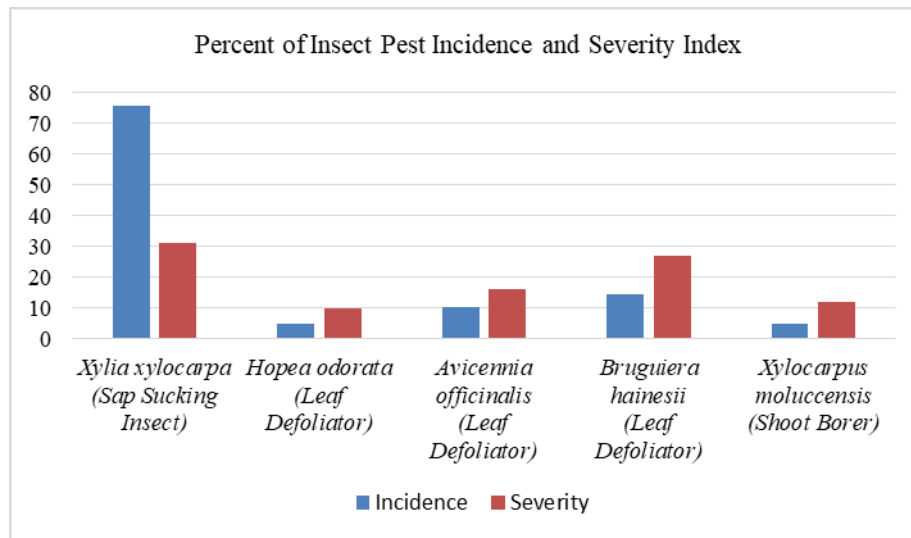


Fig. 1. Incidence and Severity rate of Insect Pests in Different Species of Seedlings

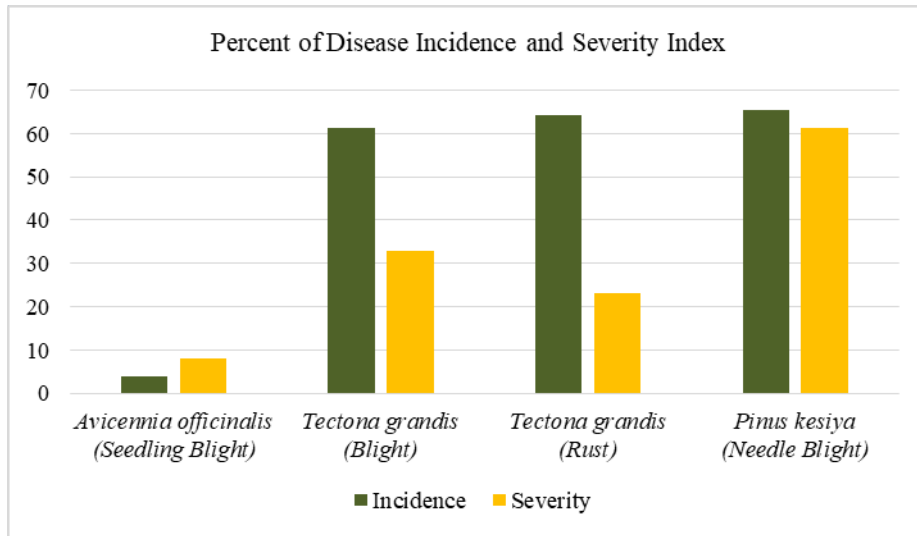


Fig. 2. Incidence and Severity rate of Diseases in Different Species of Seedlings