

Survey on diseases of commercial Agroforest nurseries

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Abstract: The experiment was conducted in eight nurseries at different locations of Mymensingh including Bangladesh Agricultural University (BAU), Mymensingh in 2004 to record the incidence of different seedling diseases and its cause (s). A total of thirteen diseases were identified. The highest average incidence 19.56% was recorded in case of Guava die-back and the lowest average incidence (3.965%) was recorded in case of Powdery mildew of Bakul. Disease incidences differed significantly from nursery to nursery. Seedling infection of die back for Jack fruit ranged from 11.32% to 22.38%. The highest seedling infection was observed in Liton nursery (22.38%) and the lowest 11.32% Jack fruit seedling infection was recorded in Anondopuri nursery followed by the nursery Satota (11.49%). The maximum 18.25% seedling infection of Jack fruit leaf spot was observed in Forest Extension (Ext.) centre nursery and the minimum 10.38% infection was recorded in Mukta nursery that was followed by the Liton nursery having the value of 10.43%. The maximum leaf spot of Jalpai (22.22%) was recorded at Lija nursery and the minimum 16.13% infection was recorded in the Forest Ext. Centre nursery. The highest percent seedling infection (leaf spot) of Mahogoni 16.38% was recorded in the Haque nursery and the lowest 10.63% was at the Bhaibhai nursery. The Die back of Guava seedling infection ranged from 16.13% to 23.85%. The highest seedling infection (Die back) of Guava was 23.85% which was observed in Satota nursery. The highest leaf blight of Kanchan (27.13%), powdery mildew of Bakul (10.25%), leaf blight and die back of Sissoo (18.43%) and (23.84%), leaf blight of shegun (26.23%), leaf spot of Ata (21.44%) and Bel (26.25%) and the highest die back of Citrus (22.58%) were recorded in Liton nursery, the Forest Ext. Centre nursery, Mukta nursery, Haque nursery, Liton nursery, Haque nursery, Bhaibhai nursery and Liton nursery respectively.

Key words: Incidence, nursery disease, seedling infection, damping off

Introduction

Bangladesh is an agrarian country. Its economy is mainly dependent on agriculture including forestry. But, the forest land area is minimal. It is generally suggested that to maintain ecological balance of a country, it needs at least 25% of its area under forest tree cover. Only 6417.92 thousand acres are engaged in forestry purposes. (BBS, 2007). These areas are also gradually decreasing day by day. Nursery diseases of forest and fruit trees are important and serious problem in raising healthy seedlings (Naeem *et al.*, 2002, Mridha and Fakir, 1976). For social/agroforestry plantations, seedlings are required in millions. Thus, the seedlings are raised in temporary nurseries. There is considerable loss of nursery stock due to diseases, many of which are either seed borne or soil borne or both, which often disrupts the scheduled plantation programs (Sen Sarma, 1986).

Most of these seedling diseases not only reduce the viability of seedling but also cause systemic infection, which continue over the time and affect the mature plants. Ultimately, trees die. So, it is very important to investigate the seedling diseases and to re-visit and evaluate the management techniques with an aim of raising healthy seedling in the nursery. In view of the above facts, a detailed and systemic investigation on seedling diseases in the agroforest nursery was undertaken for keeping the disease record of nursery diseases.

Materials and Methods

The experiment was conducted at different locations of Mymensingh including Bangladesh Agricultural University (BAU), Mymensingh in 2004 to record the incidence of different seedling diseases and identify the pathogens associated with the seedling diseases. Eight nurseries viz. Haque Nursery, Maijbari, Mymensingh; Anandopuri Nursery, Anandopur, Mymensingh; Bhai Bhai Nursery, Shamvuganj, Mymensingh; Liton Nursery, Boira, Mymensingh; Liza Nursery, Charharipur, Mymensingh; Forestry Extension Center, at the Bangladesh Agricultural University, Mymensingh; Satota Nursery, Parulitola,

Mymensingh; Mukta Nursery, Shahpur, Mymensingh were selected for this purpose. Thirteen diseases viz. die back of Jackfruit (*Artocarpus heterophyllus*) caused by *Batrachodiplodia theobromae*; leaf spot of Jackfruit (*Artocarpus heterophyllus*) caused by *Pestalotia quepini*; leaf spot of Jalpi (*Elaeocarpus floribundus*) caused by *Pestalotia quepini*; leaf spot of Mahogoni (*Swietenia macrophylla*) caused by *Pestalotia quepini*; die back of Guava (*Psidium guajava*) caused by *Batrachodiplodia theobromae*; leaf blight of Kanchan (*Bauhinia acuminata*) caused by *Colletotrichum gloeosporioides*; powdery mildew of Bakul (*Mimosops elengi*) caused by *Oidium sp.*; die-back of sissoo (*Dalbergia sissoo*) caused by *Curvularia pallesuns*; leaf blight of sissoo (*Dalbergia sissoo*) caused by *Pestalotia quepini*; leaf blight of Shegun (*Tectona grandis*) caused by *Colletotrichum gloeosporioides*; leaf spot of Ata (*Annona reticulata*) caused by *Pestalotia quepini*; leaf blight of Bel (*Aegle marmelose*) caused by *Pestalotia quepini*; and die-back of Citrus (*Citrus aruratifolia*) caused by *Batrachodiplodia theobromae* were identified. Pathogenicity test of all the thirteen causal fungi were confirmed through infectivity tests to satisfy Koch's postulate.

Collection of diseased specimen: From the above listed nurseries diseased leaves and twigs were collected and each specimen were taken in a separate polythene bag, properly tagged, and carried to the laboratory for identifying the pathogen against the particular diseases.

Slide preparation: Slide was prepared from purified fungal colony and observed under microscope. Typical slides of fungus were made permanent by sealing the cover glasses with good quality nail polish at the edges.

Identification: Observing colony characters, linear growth, color and sporulation, the fungi were identified with the help of published literatures (Arx, 1970; Barnett, 1965; Sutton, 1980; Hanlin, 1990).

Data recording and analysis: The percent of disease incidence for leaves and seedlings were recorded properly at different locations. 25 seedlings for each plant from each nursery were evaluated for keeping the data records.

After confirming the diseases, incidence was expressed in Percent value. The data were statistically analyzed using analysis of variance to find out the variation resulting from surveyed data. Data means were compared by DMRT (Duncan's Multiple Range Test) at 5% level of probability.

Results and Discussion

Average per cent incidences of different seedling diseases at different locations: The average per cent incidence of seedling diseases at the different nurseries under the present survey was given in the Table 1. Significant differences were found among the seedlings being infected with different diseases. The highest average was recorded in case of Guava die-back disease which was 19.56% whereas the lowest average incidence (3.965%) was recorded in case of Powdery mildew of Bakul. On the other hand, the die-back & leaf spot of Jackfruit, leaf blight of Bel, leaf spot of Ata, leaf spot of Sissoo, die-back of Sissoo, leaf spot of Jalpai, leaf blight of Kanchan and die-back of Citrus were statistically similar having the values 13.96, 12.83, 15.70, 14.84, 13.32, 18.64, 19.21, 14.55 and 16.99% respectively. The tabulated data revealed that the die-back of Guava had the highest per cent of occurrence followed by leaf spot of Segun and Jalpai. Gupta *et al.* (1999) reported that soil-borne pathogens viz. *Botryodiplodia theobromae*, *Fusarium solani*, *Phoma mororum* caused serious disease like die-back. In the study, die-back was found to attack the seedlings seriously. The leaf spot of Mahogoni is significantly lower than the above diseases. The powdery mildew of Bakul had the least incidence which is caused by the pathogen *Oidium sp.* Banerjee *et al.* (1991) described the symptoms of a powdery mildew disease of *Acacia auriculiformis* (1-15 year old) at Kalyani, Nadia, West Bengal.

Per cent incidence of seedling diseases of different Plant species seedling in the selected eight nurseries:

The incidences (percent seedling infected) of different plant species seedlings with different diseases differed significantly among the nurseries (Table 2). In case of die back of Jack fruit, per cent seedling infection (incidence) ranged from 11.32% to 22.38%. The highest seedling infection was observed in Liton nursery which was 22.38%, whereas the lowest was recorded in Anondopuri nursery having only 11.32% Jack fruit seedling infection followed by the nursery Satota having 11.49%. There was no statistical difference between the nursery Bhai Bhai, Liza and Mukta. On the other hand, the Haque nursery and the Forest Ext. centre had statistically similar seedling infection (15.13 and 14.51%) respectively. In the case of leaf spot of Jackfruit, significant differences were found in terms of the per cent plant infection among the selected nurseries. The maximum 18.25% seedling infection of Jack fruit leaf spot was observed in Forest Ext. nursery, whereas the minimum 10.38% infection was recorded in Mukta nursery that was followed by the Liton nursery having the value of 10.43%. In leaf spot of Jalpai, the minimum 16.13% infection was recorded in the Forest Ext. Centre nursery which was followed by the Mukta nursery where seedling infection was 16.42% and there were no significant differences between them. The maximum

22.22% infection was found in Liza nursery followed by Satota nursery having the value 21.77%. In case of Mahogoni leaf spot disease, the per cent seedling infection was significantly different among the different nurseries. The highest per cent seedling infection was recorded in the Haque nursery (16.38%) and the lowest 10.63% was at the Bhai Bhai nursery followed by the Liza nursery having a value of 10.9% seedling infection. The die-back of Guava seedling infection ranged from 16.13% to 23.85%. The highest seedling infection (23.85%) was observed in Satota nursery and the lowest (16.13%) was recorded in the Forest Ext. Centre nursery. The second highest per cent infected seedling was recorded in Haque nursery having a value of 20.03%. In case of leaf blight of Kanchan, significant differences were found in terms of percent seedling infection among the different selected nurseries. The maximum 27.13% seedling infection was observed in Liton nursery whereas at the nursery Bhai Bhai and Liza Liza nurseries were no infection. In the powdery mildew of Bakul, the highest seedling infection 10.25% was found the Forest Ext. Centre nursery, whereas the nurseries Anondopuri, Liton, Satota and Mukta had no infection of powdery mildew of Bakul. The maximum leaf blight of Sissoo, was recorded in Mukta nursery having the value of 18.43% and the minimum 9.2% in the Satota nursery followed by the Anondopuri nursery having a value of 9.37% seedling infection. In case of die back of Sissoo, significant difference was found regarding the percent seedling infection among the selected nurseries. The highest 23.84% seedling infection was observed in Haque nursery whereas the lowest 15.21% was recorded in Anondopuri nursery which was followed by the Liza and Satota nurseries having the values of 15.48 and 15.48% seedling infections respectively. In case of leaf blight of Segun, the maximum 26.23% seedling infection was recorded in Liton nursery which was followed by the Forest Ext. Centre nursery having a value 26.24% infection. The highest 21.67% seedling infection was observed due to the leaf spot disease of Ata in Bhai Bhai nursery which was followed by the Haque nursery having a value of 22.44%. There was no disease infection found in the Liton and the Forest Ext. Centre nurseries. The maximum leaf blight of Bel seedling infection was observed in Bhai Bhai nursery having a value of 26.25% whereas at the Liza and the Forest Ext. Centre nursery there was no such infection in the seedlings. In case of die back of Citrus, the highest 22.58% seedling infection was found in Liton nursery and the lowest 13.28% was found in Haque nursery. It revealed from the results shown in Table 2 that the nurseries varied in term of seedling infection, among themselves. Highest incidence of leaf spot of Mahogoni, die back of guava and die back of Sissoo were observed in this firm. It may also be noted that some of the diseases did not occur in certain nurseries. For example, leaf blight of Kanchan was not detected in the Bhaibhai nursery and Liza nursery, leaf spot of Ata did not occur in the Liton nursery and Forest Extension Center nursery and leaf blight of Bel did not occur at Forest Extension Center nursery and Liza nursery. But the causal genera of the respective diseases, i.e. *Colletotrichum sp.* and *Pestalotia sp.* were found to have caused diseases to

the seedlings of the other tree species. The possible reason may be that those plant species were not within the host range of the particular species of organism which caused disease to the other seedlings of the same nursery. The other reason may be that the respective firms have been raising seedlings of selected resistant varieties. The causal organism of powdery mildew of Bakul, the *Oidium sp.* seemed to have very limited host range as it was not detected to cause disease to any of the other ten species of plants under consideration of this work. Rahman *et al.* (1987) first reported about die-back disease and its

symptoms on Jackfruit. The percentage of twigs affected by die-back determined on the basis of selected trees under observation. They reported that 32% trees were infected with only die-back which is about similar to the findings of the present study.

In fine, it is concluded that the information on disease will be helpful for nursery management in the respective location of the country. Similar information is necessary to obtain from other locations which were not included in this study.

Table 1. Average per cent of incidences of seedling diseases at the different nurseries at different locations

Name of seedling	Name of the disease	% infected seedling								Average Mean
		Haque nursery	Anandopuri nursery	Bhai Bhai nursery	Liton nursery	Liza nursery	Forest Extn. nursery	Satota nursery	Mukta nursery	
Jackfruit	Die-back of Jackfruit	15.00	11.50	11.87	22.50	12.50	14.16	11.87	12.25	13.96 ab
	Leaf spot of Jackfruit	13.33	12.25	13.75	10.62	11.60	18.00	12.81	10.25	12.83 ab
Jalpai	Leaf spot of Jalpai	21.25	17.00	18.75	21.00	22.00	16.00	21.66	16.00	19.21 ab
Makogoni	Leaf spot of Mahogoni	16.50	12.99	10.41	13.60	10.87	12.40	11.50	11.50	12.47 b
Guava	Die-back of Guava	20.80	20.00	19.16	19.33	18.66	16.00	23.75	18.75	19.56 a
Kanchan	Leaf blight of Kanchan	20.83	14.00	-	27.00	-	18.75	17.50	18.33	14.55 ab
Bakul	Powdery mildew of Bakul	6.40	-	8.66	-	6.66	10.00	-	-	3.965 c
Sissoo	Leaf spot of Sissoo	16.50	9.50	11.75	14.66	12.60	14.25	9.00	18.33	13.32 ab
	Die-back of Sissoo	23.73	15.00	18.12	20.83	15.50	21.25	15.50	19.16	18.64 ab
shegun	Leaf spot of Shegun	12.50	25.00	22.50	26.00	18.00	26.00	-	22.50	19.06 ab
Ata	Leaf spot of Ata	21.33	16.25	21.50	-	19.00	-	20.66	20.00	14.84 ab
Bel	Leaf blight of Bel	23.00	17.60	26.00	21.25	-	-	19.37	18.40	15.70ab
Citrus	Die-back of Citrus	13.00	16.67	15.33	22.50	15.00	18.00	15.75	19.00	16.91 ab

Put DMRT at 5% level

Table 2. Percent incidences of seedling diseases of different plant species seedling in the selected eight nurseries.

Name of the nursery	% of infected seedlings												
	Jackfruit		Jalpai	Mahogoni	Guava	Kanchan	Bakul	Sissoo		Shegun	Ata	Bel	Citrus
	Die back	Leaf spot	Leaf spot	Leaf spot	Die back	Leaf blight	Powdery mildew	Leaf blight	Die back	Leaf blight	Leaf spot	Leaf blight	Die back
Haque nurseries	15.13 b	13.49 b	21.38 b	16.38 a	20.63 b	20.89b	6.62 c	16.38 b	23.84 a	12.49 e	21.44 a	23.28 b	13.28 f
Anandopuri Nursery	11.32 d	12.57 c	17.25 d	12.77 bc	20.08 c	14.13e	0	9.37 f	15.21 f	25.25 b	16.36 d	17.73 f	16.58 c
Bhaibhai nursery	11.93 c	13.85 b	18.50 c	10.63 e	19.31 d	0	8.51 b	11.85 e	18.28 e	22.33 c	21.67 a	26.25 a	15.40 de
Liton Nursery	22.38 a	10.43 e	21.30 b	13.38 b	19.21d	27.13 a	0	14.61 c	20.65 c	26.23 a	0	21.31 c	22.58 a
Lija Nursery	12.48 c	11.77 d	22.22 a	10.90 e	18.49e	0	6.77 c	12.52 d	15.48 f	18.48 d	19.44 c	0	15.13 e
Forest Ext. nursery	14.51 b	18.25 a	16.13 e	12.65 c	16.13f	18.85 c	10.25 a	14.39 c	21.44 b	26.24 a	0	0	18.38 b
Satota Nursery	11.49 d	12.53 c	21.77ab	11.70 d	23.85a	18.38 d	0	9.25 f	15.48 f	0	20.52 b	19.61d	15.84 d
Mukta Nursery	12.38 c	10.38 e	16.42 e	11.64 d	18.85e	18.34 d	0	18.43 a	19.32 d	22.42 c	20.23 b	18.68e	19.74 b
LSD (P=0.05)	0.7365	0.6934	0.6604	0.6646	0.4360	0.2798	0.4424	0.4610	0.4548	0.7133	0.5888	0.4096	0.5982

Put DMRT at 5% level

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