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MAJOR WEEDS FLORA OF THE TERRESTRIAL FORESTS ORCHARDS IN BANGLADESH

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Abstract

Weeds are the main problems in the planted forest orchards of Bangladesh. Weeds are fast-growing and their viability and survival capacity are higher than planted trees species. Weeds uptake nutrients from the soil and cover the canopy of the planted trees. Weeds are uprooted from the forests orchards for protection of planted trees. The main aim of the study was to determine the weed flora of forests orchards in Bangladesh. The study was conducted through field data collection and laboratory investigation. Data were collected from only planted forests orchards in the pre-monsoon, monsoon and late monsoon period. The random quadrat method was followed for sampling and in this respect, 2m × 2m sized quadrats were applied. A total of 169 weed species belonging to 60 families were recorded as terrestrial flora from forests areas of Bangladesh. A total of 8 families were monocotyledons (13.33%) and 52 families were dicotyledons (86.67%). Among the plant families, Acanthaceae shared the maximum (7.69%) followed by Fabaceae (7.10%), Asteraceae (5.92%), Euphorbiaceae (5.33%), Caesalpiniaceae (4.14%), Vitaceae (3.55%) and other families contributed less than 3%. The study focused that all kinds of weeds are the major obstacle in the growth of the artificial or natural forests trees species. The findings of the present study will be contributed to the protection and sustainable management of planted forests orchards in the whole of Bangladesh.

Key words: Weed, terrestrial flora, parasite, protection, planted forests, orchards.

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Introduction

Forests are the most important part of the global ecosystem. A forest does not mean only trees cover in a land rather it is a complex of plants and animals in, on and above soil (Haque and Rahman, 2013). Trees are the dominant vegetation in a forest and other green plants, shrubs and vines constitute their important components in the forest. Undergrowth (herbs and shrubs) vegetation not only protects soil but also absorbs carbon dioxide from the atmosphere (Islam, 1979). Herbs and shrubs are treated as a weed in the planted forests orchard in Bangladesh. For this reason, the aerial parts of the herbs and shrubs were cut frequently in planted forests to enhance the growth of planted tree species. According to scientists reported that weed is a plant that grows spontaneously in a habit that has been greatly modified by human action (Harper, 1944; Venkataramany, 1968a).

A plant grows in a place where it is not desired and it is a weed (Shaw, 1956). Weed is an honest, independent competitor for food materials in the struggle for existence (Troup 1983; Tewari *et al*., 2003). Weeds mainly share nutrients, water and air with planted tree species. Generally, weed is a fast-growing species and their existing capacity is higher than desired plants. Weeds are absorbed the maximum nutrients and show an adverse effect on reaching the sunlight in the planted trees. Modern silvicultural management does not support any weed in the planted forests orchards (Troup, 1983). So, weeds should be removed from the forests orchards for taking sustainable development and harvesting the highest yield of the forest resources. But there is insufficient information on the effect of weeds in forests orchards. So keeping this point in mind an attempt has been taken to determine the weeds of the forest orchard in Bangladesh.

Material and Methods

The study was conducted through field data collection and laboratory investigation from January 2015 to 2019 December. Data were collected from only planted forest orchards and thrice in a year, pre-monsoon (January-April), monsoon (May-August) and late monsoon (September-December). The random quadrat method was followed for sampling and in this respect, 2m × 2m sized quadrats were applied. Weak plants such as; Cynodon dactylon L. and other small herbs were excluded from the study. All collected plant materials were possessed and herbarium sheets were prepared for identification and preservation. Finally, the specimen was identified by following relevant literature including Khan and Halim (1987), Sharma (1994), Hooker (1855), Shaw (1956) and Huq (1986). All the collected and identified plant samples were preserved in the Bangladesh Forest Research Institute.

Data analysis

Microsoft Excel program was used to process all collected data and preparing table, figure and graphs. SPSS (statistical package for Social Science) software version 2.00 was used for the estimation of the statistical data.

Results and Discussion

The present study was carried out on the established forests orchards in different parts of Bangladesh. The study revealed that a total of 169 plant species belonging to 60 families were found in different terrestrial forests orchard areas (Table 1). Naturally, weed is grown in the planted forests orchards and acts as a competitor to the planted trees. A selected place is cleared before sowing seedlings. Normally, weeding is done in the first year at three times after sowing seedlings in the field levels. Only aerial parts of weeds are removed from the forests orchards by firing or cutting methods. Rhizomatous and other parts of the weeds easily stay on the ground level and development in the favourable environmental conditions which is created adverse effects on the planting materials mainly seedlings and saplings. *Saccharum spontaneum* L. and *Imperata cylindrica* L. are fast-growing species and their growth rate also higher than planted species in the forests areas.

Table 1 : List of recorded weed species and their types and habit

Sl. No	Scientific name	Family	Plant types	Habit
1	*Abrus precatorius* L.	Fabaceae	H	P
2	*Abutilon indicum* L.	Malvaceae	H	An
3	*Acalypha indica* L.	Euphorbiaceae	H	An
4	*Achyranthes aspera* L.	Amaranthaceae	H	An
5	*Ageratum conyzoides* L.	Asteraceae	H	An
6	*Alpinia allughas* (Retz.) Roscoe	Zingiberaceae	H	An
7	*Alpinia calcarata (*Haw.) Roscoe	Zingiberaceae	H	An
8	*Alpinia conchigera* Griff.	Zingiberaceae	H	An
9	*Alpinia galangal* (L.)Willd.	Zingiberaceae	H	An
10	*Alpinia malaccensis* (Burm. f.) Roscoe	Zingiberaceae	H	An
11	*Alternanthera sessilis* (L.) D C.	Amaranthaceae	H	An
12	*Amaranthus spinosus* L.	Amaranthaceae	H	An
13	*Amaranthus viridis* L.	Amaranthaceae	H	An
14	*Ampelocissus barbata* (Wallich)	Vitaceae	C	P
15	*Ampelocissus Latifolia* Roxb.	Vitaceae	C	P
16	*Andrographis paniculata* Burm. f. Wall	Acanthaceae	H	An
17	*Ardisia colorata* Roxb.	Myrsinaceae	S	P
18	*Ardisia icara* Buch.-Ham.	Myrsinaceae	S	P
19	*Ardisia solanacea* (Poir.) Roxb.	Myrsinaceae	S	P
20	*Argemone maxicana* L.	Papaveraceae	H	An
21	*Argyreia argentea* Roxb.	Convolvulaceae	C	An
22	*Aristolochia indica* L.	Aristolochiaceae	S	P
23	*Asparagus racemosus* Willd.	Liliaceae	H	An
24	*Bauhinia acuminate* L	Caesalpiniaceae	S	P
25	*Boehmeria scabrella* Gaud.	Urticaceae	S	P
26	*Boerhavia repens* L.	Nyctanginaceae	H	P
27	*Bridelia stipularis* L	Euphorbiaceae	SC	P
28	*Buddleja asiatica* Lour.	Buddlejaceae	S	P
29	*Byttneria pilosa* Roxb.	Sterculiaceae	C	P
30	*Caesalpinia digyna* Rottler	Caesalpiniaceae	S	P
31	*Calotropis gigantea* (L.) Ait. f.	Asclepiaceae	S	P
32	*Calotropis procera* (Ait.) R. Br.	Asclepiaceae	S	P
33	*Calyopteris floribunda* Roxb.	Combretaceae	H	An
34	*Canavalia gladiata* (Jacq.) DC.	Fabaceae	C	P
35	*Capparis zeylanica* L.	Capparaceae	S	P
36	*Casearia tomentosa* Roxb.	Flacourtiaceae	S	P
37	*Cassia occidentalis* L.	Caesalpiniaceae	H	An
38	*Cassia sophera* L.	Caesalpiniaceae	H	An
39	*Cissus adnata* Roxb.	Vitaceae	C	P
40	*Cissus elongata* Roxb.	Vitaceae	C	P
41	*Cissus japonica* (Thunb.)	Vitaceae	C	P
42	*Clausena heptaphylla* Wt.	Rutaceae	S	P
43	*Cleome gynandra* L.	Cleomeaceae	H	An
44	*Cleome vicosa* L.	Cleomeaceae	H	An
45	*Clerodendrum indicum* (L.) Kurtze	Verbenaceae	S	P
46	*Clerodendrum Japonicum* (Thunb.) Sweet.	Verbenaceae	S	P
47	*Clerodendrum viscosum* Vent.	Verbenaceae	S	P
48	*Coccinia grandis* L.Voigt.	Cucurbitaceae	H	An

Sl. No	Scientific name	Family	Plant types	Habit
49	*Colocasia esculenta* (L.) Schott.	Araceae	H	An
50	*Combretum decandrum* Roxb.	Combretaceae	C	P
51	*Combretum squamosus* Roxb.	Combretaceae	C	P
52	*Commelina benghalensis* L.	Commelinaceae	C	P
53	*Commelina diffusa* Burm. f.	Commelinaceae	H	An
54	*Crotolaria alata* Buch.-Ham. *ex*. DC.	Fabaceae	S	P
55	*Crotolaria bractata* Roxb.	Fabaceae	S	P
56	*Crotolaria calycina*	Fabaceae	S	P
57	*Croton lobetus* L.	Euphorbiaceae	H	An
58	*Cuscuta reflexa* Roxb.	Convolvulaceae	H	An
59	*Cyanotis cristata* (L.) D. Don.	Commelinaceae	H	An
60	*Cyperus brevifolius* (Rott.)	Cyperaceae	H	An
61	*Cyprus compressus* L.	Cyperaceae	H	An
62	*Dalbergia motorium* (Houtt) Merr.	Fabaceae	S	P
63	*Dalbergia scandens* L.DC.	Fabaceae	S	P
64	*Dalbergia stipulacea* Roxb.	Fabaceae	SC	P
65	*Dalbergia triquetrum* (L) DC.	Fabaceae	S	P
66	*Dalbergia volublis* Roxb.	Fabaceae	SC	P
67	*Delima sarmentosa* L.	Dilleniaceae	C	P
68	*Dendrophthoe falcata* L. f.	Loranthaceae	H	P
69	*Derris cuneifolia* Benth.	Fabaceae	SC	P
70	*Desmodium heterophyllum* DC.	Caesalpiniaceae	H	An
71	*Desmodium pulchellum* Benth.	Caesalpiniaceae	H	An
72	*Diclipthera roxburghiana* Nees.	Acanthaceae	H	An
73	*Dipterocanthus prostatus* (Poir) Nees.	Acanthaceae	H	An
74	*Dipterocanthus roxburghiana* Nees.	Acanthaceae	H	An
75	*Discorea bulbifera* L.	Discoreaceae	H	An
76	*Discorea hispida* Dennst.	Discoreaceae	H	An
77	*Drosera burmannia* Vahl.	Droseraceae	H	An
78	*Eclipta alba* L.	Asteraceae	H	An
79	*Eichhornia crassipes*(Mart.) Solms.	Pontederiaceae	H	An
80	*Enhydra flactuans* Lour.	Asteraceae	H	An
81	Eriocaulon truncatum Ham.	Erioculaceae	H	An
82	*Eupatorium odoratum* L.	Asteraceae	H	An
83	*Euphorbia hirta* L.	Euphorbiaceae	H	An
84	*Euphorbia thymifolia* Burm.	Euphorbiaceae	H	An
85	*Evolvulus nummularis* L.	Convolvulaceae	H	An
86	*Flacourtia indica* Burm. f.) Merr.	Flacourtiaceae	S	P
87	*Flemingia involucrata* Benth.	Fabaceae	S	P
88	*Glycosmis pentraphylla* (Retz.)Corr.	Rutaceae	S	P
89	*Goaunia tiliaefolia* Lamk.	Rhamnaceae	SC	P
90	*Grewia excelsa* Vahl.	Tiliaceae	S	P
91	*Grewia pilosa* Lamk.	Tiliaceae	S	P
92	*Hedyotis scandens* Roxb.	Acanthaceae	SC	P
93	*Helotropium indicum* L.	Boraginaceae	H	An
94	*Hemidesmus indicus* Br.	Asclepiaceae	C	P
95	*Hibiscus vitifolius* L.	Malvaceae	H	P
96	*Hiptage benghalensis* (L.) Kurtz.	Malphigiaceae	S	An
97	*Holarrhena antidysenterica* (L.) Wall.	Apocynaceae	S	P
98	*Hydrolea zeylanica* Vahl.	Hydrophyllaceae	H	An
99	*Hygrophila polysperma* T. Anders.	Acanthaceae	H	An
100	*Hyptis suaveolens* (L.) Poir.	Lamiaceae	H	An
101	*Ichnocarpus frutescence* (L.) R. Br.	Apocynaceae	S	P
102	*Imperata cylindrica* L	Poaceae	H	An
103	*Ipomoea cocciniea* L.	Convolvulaceae	H	An
104	*Ixora cuneifolia* Roxb.	Rubiaceae	S	P
105	J*asminum sambac* (L.)Ait.	Oleaceae	S	P
106	*Jasminum scandens* Vahl.	Oleaceae	S	P
107	*Jatropha gossypifolia* L.	Euphorbiaceae	S	An
108	*Laportea erecnulata* Roxb.	Urticaceae	S	P
109	*Leea alata* Edgew.	Leeaceae	S	P
110	*Leea aquata* L.	Leeaceae	S	P

Sl. No	Scientific name	Family	Plant types	Habit
111	*Leea asiatica* L.	Leeaceae	S	P
112	*Leea indica* (Burm. f.) Merr.	Leeaceae	S	P
113	*Ludiwgia hyssopifolia* G. Don.	Onagraceae	H	An
114	*Mecrosolen cochinchinensis* Lour.	Loranthaceae	H	P
115	*Melastoma melabathricum* L.	Melastomaceae	H	An
116	*Merrimia umbellata* L.	Convolvulaceae	H	An
117	*Mezonevroncucullatum Roxb.*	Caesalpiniaceae	S	P
118	*Mikania scandens* (L.)Willd.	Asteraceae	H	An
119	*Mimosa pudica* L.	Mimosaceae	H	An
120	*Mimosa rubricaulis* Lamk.	Mimosaceae	H	An
121	*Mocrocos paniculata* L.	Tiliaceae	S	P
122	*Monochoria vaginalis* Burm. f.	Pontederiaceae	H	An
123	*Morinda angustifolia* Roxb.	Acanthaceae	SC	P
124	*Murraya koenigii* (L.) Spreng.	Rutaceae	S	P
125	*Mussaenda corymbosa* Roxb.	Acanthaceae	SC	P
126	*Naravelia zeylanica* (L.)DC.	Rananculaceae	WC	P
127	*Nnesmone javanica* Bl.	Euphorbiaceae	S	P
128	*Ochna pumilla* Buch.-Ham	Ochnaceae	S	P
129	*Ocimum americanum* L.	Lamiaceae	H	An
130	*Olax scandens* Roxb.	Olacaceae	C	P
131	*Oxalis europea* L.	Oxalidaceae	H	An
132	*Passiflora foetida* L.	Passifloraceae	H	An
133	*Phyllanthus neruri* L.	Euphorbiaceae	H	An
134	*Phyllanthus reticulatus* Poir.	Euphorbiaceae	H	An
135	*Pouzolzia indica* L.	Urticaceae	H	P
136	*Randia longifolia* Lamk.	Acanthaceae	SC	P
137	*Rauwolfia serpentina* L.	Apocynaceae	S	P
138	*Rauwolfia tetraphylla* L.	Apocynaceae	S	P
139	*Saccharum spontaneum* L.	Poaceae	H	An
140	*Salmonia oblongifolia* DC	Polygalaceae	H	An
141	*Sarcochlamys pulcherrima* Gaud.	Urticaceae	S	P
142	*Scoparia dulcis* L.	Scrophulariaceae	H	An
143	*Scurrula gracilifolia* Roxb.	Loranthaceae	H	P
144	*Scurrula parasitiica* L.	Loranthaceae	H	P
145	*Scurrula pulverulenta* (Wallich *ex* Roxb.)	Loranthaceae	S	P
146	*Sida aculata* Burm. f.	Malvaceae	S	P
147	*Solanum indicum* L	Solanaceae	S	An
148	*Solanum lasiocarpum* Dunal	Solanaceae	S	An
149	*Syndrella nudiflora* (L.) Geartn.	Asteraceae	H	An
150	*Tabernaemontana divaricata* (L.) R. Br.	Apocynaceae	S	P
151	*Tetrastigma bractolatum* (Wallich.)	Vitaceae	C	P
152	*Thespesia lamps* Cava.	Malvaceae	S	P
153	*Thunbergia alata* Bojer *ex*. Sims.	Acanthaceae	H	An
154	*Thunbergia erecta* Benth.	Acanthaceae	H	An
155	*Thunbergia fragrans* Roxb.	Acanthaceae	H	An
156	*Thunbergia grandiflora* Roxb.	Acanthaceae	H	An
157	*Tinospora cordifolia* (Willd.) Miers.	Menispermaceae	HC	P
158	*Tinospora Crispa* L.Hook. f. & Thomson	Menispermaceae	HC	P
159	*Tinospora tomentosa Miers.*	Menispermaceae	HC	P
160	*Tridax procumbens* L.	Asteraceae	H	An
161	*Triumfetta rhomboids* Jacq.	Tiliaceae	H	P
162	*Urena lobeta* L.	Malvaceae	S	P
163	*Uvaria ferruginea* Buch.-Ham.	Annonaceae	S	P
164	*Ventilago maderaspatna* Gaertn.	Rhamnaceae	C	P
165	*Vernonia cinerera* (L.) Nees.	Asteraceae	H	An
166	*Vernonia eclipta* DC	Asteraceae	H	An
167	*Vernonia salinga* DC.	Asteraceae	H	An
168	*Wikstroemia indica* L.	Thymeliaceae	S	P
169	*Ziziphus oenoplia* (L.) Mill.	Rhamnaceae	S	P

*H = Herb, C= Climber, S= Shrub, An= Annual, P = Perennial

A study was conducted by Shukla *et al.* (1993) and they observed that huge amount of problems were created in the planted orchards due to weeds and hampered the growth of forests trees. Another study was conducted by Sheng-Cheng

(1983) and suggested that planted tree species fully abolished by the effect of forests weeds in the initial stages within one-two years. Singh (1982) mentioned that weeds were the main problems for forests planted trees. The present results were focused on the basis of species number, family and their percentage (Table 2). The Acanthaceae shared maximum (7.69%) followed by Fabaceae (7.10%), Asteraceae (5.92%), Euphorbiaceae (5.33%), Caesalpiniaceae (4.14%),Vitaceae (3.55%), Apocynaceae, Convolvulaceae, Loranthaceae, Malvaceae, Zingiberaceae (2.96%), Leeaceae (2.40%), Amaranthaceae, Tiliaceae, Urticaceae (2.37%), Asclepiaceae, Combretaceae, Commelinaceae, Menispermaceae, Myrsinaceae, Rhamnaceae, Rutaceae, Verbenaceae (1.78%), Pontederiaceae (1.20%), Cleomeaceae, Cyperaceae, Discoreaceae, Flacourtiaceae, Lamiaceae, Mimosaceae, Oleaceae, Poaceae, Solanaceae (1.18 %), Annonaceae, Araceae, Aristolochiaceae, Boraginaceae, Buddlejaceae, Capparaceae, Cucurbitaceae, Dilleniaceae Droseraceae, Erioculaceae, Hydrophyllaceae, Liliaceae, Melastomaceae, Malphigiaceae, Nyctanginaceae, Ochnaceae, Olacaceae, Onagraceae, Oxalidaceae, Papaveraceae, Passifloraceae, Polygalaceae, Rananculaceae, Rubiaceae, Scrophulariaceae, Sterculiaceae and Thymeliaceae (0.59 %) respectively.

Table 2: List of recorded families and their species numbers

Sl. No.	Family	No. of species	%	Sl. No.	Family	No. of species	%
1	Araceae*	1	0.59	31	Leeaceae	4	2.37
2	Commelinaceae*	3	1.78	32	Liliaceae	1	0.59
3	Cyperaceae*	2	1.18	33	Loranthaceae	5	2.96
4	Discoreaceae*	2	1.18	34	Malphigiaceae	1	0.59
5	Erioculaceae*	1	0.59	35	Malvaceae	5	2.96
6	Zingiberaceae*	5	2.96	36	Melastomaceae	1	0.59
7	Pontederiaceae*	2	1.18	37	Menispermaceae	3	1.78
8	Poaceae*	2	1.18	38	Mimosaceae	2	1.18
9	Acanthaceae	13	7.69	39	Myrsinaceae	3	1.78
10	Amaranthaceae	4	2.37	40	Nyctanginaceae	1	0.59
11	Annonaceae	1	0.59	41	Ochnaceae	1	0.59
12	Apocynaceae	5	2.96	42	Olacaceae	1	0.59
13	Aristolochiaceae	1	0.59	43	Oleaceae	2	1.18
14	Asclepiaceae	3	1.78	44	Onagraceae	1	0.59
15	Asteraceae	9	5.33	45	Oxalidaceae	1	0.59
16	Boraginaceae	1	0.59	46	Papaveraceae	1	0.59
17	Buddlejaceae	1	0.59	47	Passifloraceae	1	0.59
18	Capparaceae	1	0.59	48	Polygalaceae	1	0.59
19	Caesalpiniaceae	6	3.55	49	Rananculaceae	1	0.59
20	Cleomeaceae	2	1.18	50	Rhamnaceae	3	1.78
21	Combretaceae	3	1.78	51	Rubiaceae	1	0.59
22	Convolvulaceae	5	2.96	52	Rutaceae	3	1.78
23	Cucurbitaceae	1	0.59	53	Scrophulariaceae	1	0.59
24	Dilleniaceae	1	0.59	54	Solanaceae	2	1.18
25	Droseraceae	1	0.59	55	Sterculiaceae	1	0.59
26	Euphorbiaceae	9	5.33	56	Thymeliaceae	1	0.59
27	Fabaceae	12	7.1	57	Tiliaceae	4	2.37
28	Flacourtiaceae	2	1.18	58	Urticaceae	4	2.37
29	Hydrophyllaceae	1	0.59	59	Verbenaceae	3	1.78
30	Lamiaceae	2	1.18	60	Vitaceae	6	3.55
					Total	169	

*Monocotyledons.

A total of 8 families were monocotyledons (13.33 %) and 52 families were dicotyledons (86.67 %). The representation of monocotyledons species numbers were 18 (10.65 %) and dicotyledons species number were 151 (89.35 %) which were very low than dicotyledons (Table 2). Many scientists (Mian, 1970; Mamun, 1989; Mamun *et al*., 1986 and Sarkar *et al*., 2008) suggested that dicotyledons were more harmful in the forests orchards than monocotyledons. Planting year, three times year^{-1} weeding is most essential in the forests orchard for the development of planted trees. But firing is not applicable for removing the weed in the forests orchards. After establishing the forests orchards weeding is done two times in a year still three years. After three years all kinds of forest tree species are affected by many types of herbaceous parasitic species such as; *Coccinia grandis* L. Voigt., Eupatorium odoratum L. Mikania scandens (L.)Willd., *Dendrophthoe falcata* L. f., *Scurrula gracilifolia* Roxb., *Macrosolen cochinchinensis* Lour, *Scurrula parasitiica* L. and S*curula pulverulenta* (Wallich ex Roxb.). Many types of studies have been conducted (2015-2019) by the scientists of the Bangladesh Forest Research Institute in different areas under regional stations. They observed that seedlings have been affected by different types of weeds and the mortality rate depended on various types of weeds. The present findings revealed that the average mortality rate was higher in the first year than 2nd and third year ((Figure 1).

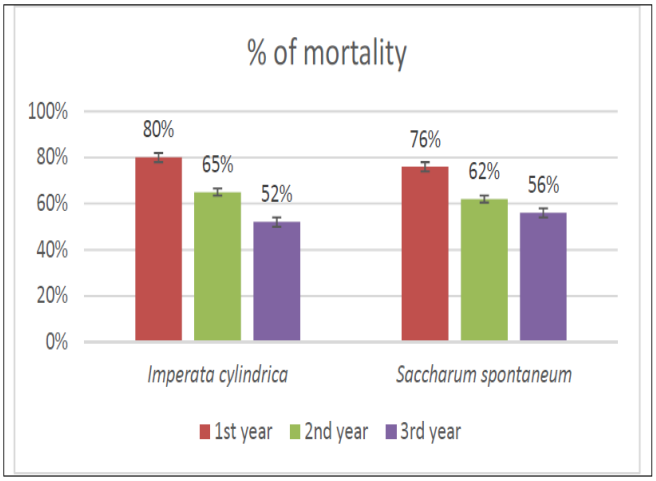

Fig. 1 : Loss of planted tree species in different ages

A mature tree species are also affected by parasitic weeds in the field levels. The scientists of the BFRI reported that *Gmelina aborea* Roxb. is affected by *Dendrophthoe falcata* L. f., *Macrosolen cochinchinensis* Lour. and *Scurrula* spp. and their harmful activities were higher than other parasites. *Gmelina arborea* is a fast-growing softwood timber forest species which are planted for quickly harvesting and providing the paper mills. Its rotation period is ten to twelve years. But unfortunately, the canopy of *Gmelina arborea* is covered by the above parasitic weeds and normal growth and development are hampered which is shown. (Figure 2). A study was conducted by Hoque (1993) and mentioned that forests planted areas were destroyed by undergrowth.

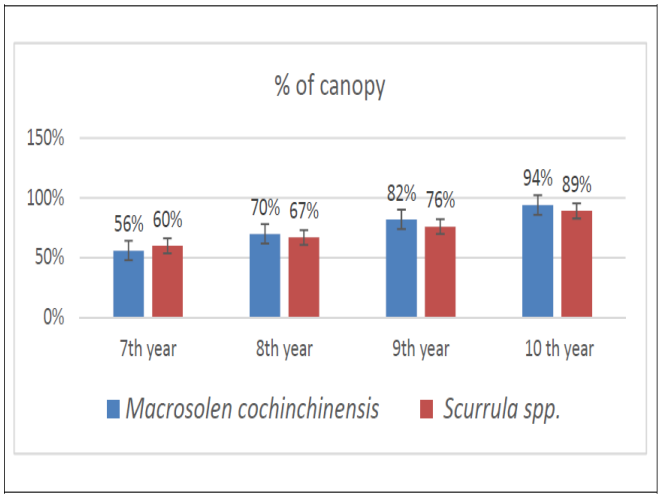

Fig. 2 : Canopy covered by parasitic weeds

The another study was conducted by the scientist of the BFRI and they observed that *Tectona grandis, Acacia auriculiformis, Dipterocarpus turbinatus, Hopea odorata and Gmelina arborea seedlings* were affected by herbaceous weeds such as *Coccinia grandis, Eupatorium odoratum* and *Mikania scandens* etc. Many studies were conducted by many scientists (Hossain *et al*., 1984 and Holm *et al*., 1979) and they suggested weeds are fast growing and planted species are affected quickly by the weeds. The mortality rates are increased due to the effect of weeds (Figure 3).

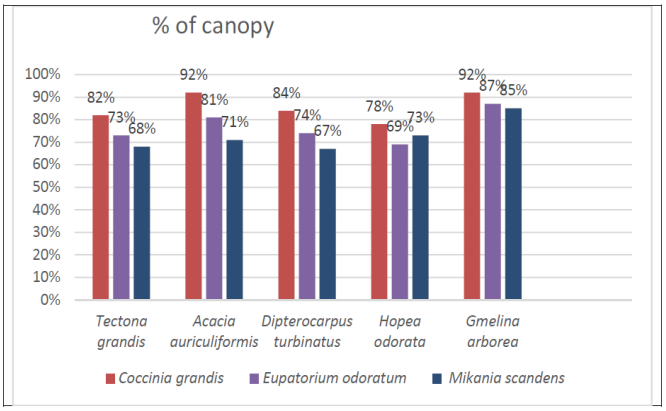

Fig. 3 : Canopy covered by weeds in forest trees

Herbaceous weeds are fast growing and easily covered the canopy of the seedlings in the initial stage (Talukder, 1970; Singh, 1982). Sufficient sunlight cannot reach the ground level of the forests and seedlings cannot uptake available nutrients from the soil. Finally, the planted trees lose their vigorousness and low yields are harvested.

Conclusion

The results revealed that weeds affect the planted forests tree species. The highest yields are hampered by different types of weeds. Weeding is done regularly in the planted orchards for the improvement of tree species and it is the most essential part of the good management practices. All kinds of weeds are harmful to the planted species and their reaction types differ in various stage to the planted tree species. The findings of the present study will be contributed in the protection and sustainable development of planted forest orchards in the whole of Bangladesh.

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