LAND DISTRIBUTION, COMPOSITION AND ABUNDANCE OF TREES IN HOME GARDEN OF BANGLADESH

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Abstract

The land distribution, composition and inventory of timber, fruit and multiple purpose tree species were studied in 65 households of eight villages of four Thanas in four different agro-ecological zones in Bangladesh. Among the eight villages 37,674, trees were counted including 98 species of 33 families. The family Leguminosae dominated with 17 species followed by Moraceae 7, Palmaceae 6, Myrtaceae 6, Rutaceae 5, Meliaceae 4, Anonaceae 3 and rest are in other families. According to the size of household, large farmers have the highest number of trees (177.36 trees/ household) in all the study areas while the landless farmers having small homestead (51.81 trees/household). Among the four agro-ecological zones, Badhadia village of Thana Sonagazi possessed the highest number (186.17) of trees whereas the lowest number (24.4) of trees per household was found in Charpar village of Thana Jamalpur. Among the timber trees akasmoni (*Acacia auriculiformis*) and mahogany (*Swietenia macrophylla*) were the dominant (1987and1785) species in the study areas. Betel nut, (*Areca catechu*), mango (*Mangifera indica*), coconut (*Cocos nucifera*)*,* jackfruit (*Artocarpus heterophyllus*)*,* guava (*Psidium guajava*)*,* jam (*Syzygium cumini*), ber (*Zizyphus mauritiana*) were the common fruit tree species. Among all the four study areas Thana Sonagazi being coastal area possessed the highest number of betel nut and coconut trees whereas Thana Chandina was dominated by tal (*Borassus flabellifer*) species*.*

Key word: Home garden, Community Forestry, Social Forestry

Introduction

Home gardening has been a traditional practice in rural areas of Bangladesh since time immemorial. Tree raising in home gardens is also thought to be reliable as compared to that of cropland cultivation for a country like Bangladesh where 70% of the land comprises flood plain and vulnerable to flood hazards. In addition, a vast majority of

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land less people has their own hut with home garden. Therefore, these areas are often regarded as an important timber production system in rural Bangladesh (Mustafa, 1997).

Intensively managed and densely planted village forest wood species of Bangladesh contain a large variety of trees. One time Bangladesh was endowed with lush green forest resources. The scenario has changed in course of time. The per capita forestland holding in this country has become one of the lowest (0.02 ha) in the world and further an increasing rate of population growth (2.3%) causing further deforestation. The total forest area is only 2.48 million ha (17%) of the total land area. Of this, the homestead forest covers 0.27 million ha. Surprisingly, productivity of this forest is much higher as compared to the natural forests. Still the productivity of Bangladesh homestead forest is much lower as compared to other countries. In addition, the total standing volume of growing stock on homestead forest is estimated to be around 79 million-$m^{3,}$ which is twice as compared to state forests. 70% timber of wood, 90% of the fuel wood and 90 % of bamboo in Bangladesh are met from the homestead forest. Almost all the rural households predominantly rely on bio-mass fuel for their cooking which is again a product of home garden. Moreover, 70 % of the urban households depend on such home garden products as well (Anon., 1986).

Due to the shortage of timber and fuel wood supply from the state owned forests, village forests are under tremendous pressure. It is worth mentioning that there is a market in-equilibrium and huge gap between demand and supply of the same. Thus the supply is not compatible with the population growth. Unfortunately, most of those gardens are growing in an unplanned fashion without considering the variable market demand. Also there is a lack of understanding in place regarding the compatible uses of these scarce resources. Nevertheless the government has made very little attempt to combat this situation.

Although home gardening is an age-old tradition, systematic information and scientific research are inadequate and only becoming available recently. This study is planned to gather information on the present status of home gardens, their tree composition and number of trees per household. Moreover change in species composition, replacement and possible reasons of change are recorded.

Materials and Methods

Selection of villages

Selection of four rural areas was made on the basis of population density in the four agro-ecological zones out of 30. From each agro-ecological zone, one Thana, two

villages and 65 households were selected at random. These units or villages were similar to Primarily Sampling Unit (PSU) of BBS, which has an average size of 250 - 300 households. A detailed survey (including questionnaire) was carried out during September to December 1998 to probe the situation.

Results and Discussion

Trees grown in different parts of the country vary according to various ecological realities. Socio-economic factors also play a dominant role in this aspect (Abedin *and Quddus,* 1990; Miah *et al.*, 1990; Momin *et al.,* 1990; Choudhury and Satter, 1992; Kamal *et al.,* 1999). The relative prevalence of trees in different agro-ecological zones were studied and determined by few scientists. Moreover, several studies have come up with average size of form, home garden and tree densities in different categories of farm (Abedin and Quddus, 1990). In addition, reasons behind growing certain tree species mixture crop, selection of species, uses of trees, tree product and state of some valuable but threatened trees are of great interest for future studies. Data on locality wise landholding size total number of trees, trees per house hold, etc. are presented in table 1. About 98 species of trees including fruit, timber and multiple use tree species were reported from all the eight villages of four agro-ecological zones. However, all the tree species with scientific, english and vernacular names found in the study area are presented in Appendix: 1.

According to farm size large farmers have the highest number of trees (177.36 trees/ household) in all the study areas while the land-less farmers (have only homestead land but no agricultural land) have the lowest number of trees (51.81 trees/household). This was possibly due to the illiteracy and other socio-economic conditions. Similar observations were reported by many scientists like Miah *et al.* (1990); Hossain (1993); Mustafa *et al.* (1994); Bose & Newaz (1998).

Table 1.   Number of trees, landholding size and trees household^{-1} at different localities.

Landholding Size (acre)	Mirzapur	Badhadia	Kamarkhola	Basantapur	Chalkamuata	Radhanagar	Sharifpur	Charpar	Total
00	Trees = 1157 N=17 Trees/HH =68	Trees = 3600 N=32 Trees/HH =112.5	Trees = 347 N=11 Trees/HH =31.54	Trees =251 N=8 Trees/HH =31.38	Trees =173 N=13 Trees/HH =13.30	Trees =325 N=8 Trees/HH =29.7	Trees = 1294 N=36 Trees/HH =35.94	Trees = 210 N=17 Trees/HH =35.94	Trees = 7357 N=142 Trees/HH =51.81
Less 0.05	-	Trees = 98 N=1 Trees/HH =98	Trees =69 N=2 Trees/HH =34.5	Trees =37 N=1 Trees/HH =37	Trees = 36 N=1 Trees/HH =36	Trees = 97 N=3 Trees/HH =32.33	Trees = 268 N=5 Trees/HH =53.60	Trees = 80 N=3 Trees/HH =26.66	Trees = 685 N=16 Trees/HH =42.81
0.05- 0.5	Trees = 2681 N=18 Trees/HH =148.94	Trees = 1785 N=9 Trees/HH =198.33	Trees =761 N=13 Trees/HH =54.35	Trees = 564 N=26 Trees/HH =21.69	Trees = 231 N=11 Trees/HH =21	Trees = 435 N=12 Trees/HH =36.25	Trees =154 N=5 Trees/HH =30.8	Trees = 100 N=11 Trees/HH =9.09	Trees = 6711 N=105 Trees/HH =63.91
0.51- 2.5	Trees = 3767 N=24 Trees/HH =156.9	Trees =4065 N=18 Trees/HH =225.83	Trees =2681 N=32 Trees/HH =83.78	Trees =1659 N=23 Trees/HH =72.13	Trees = 1014 N=28 Trees/HH =36.21	Trees = 1503 N=34 Trees/HH =44.20	Trees = 802 N=15 Trees/HH =54.46	Trees =551 N=23 Trees/HH =23.95	Trees =16042 N=197 Trees/HH =81.43
2.51-5.00	Trees = 1077 N=6 Trees/HH =179.5	Trees =1501 N=4 Trees/HH =375.25	Trees = 373 N=6 Trees/HH =62.16	Trees =406 N=7 Trees/HH =58	Trees = 399 N=8 Trees/HH =49.87	Trees = 536 N=6 Trees/HH =89.33	Trees =242 N=4 Trees/HH =60.5	Trees = 394 N=8 Trees/HH =49.25	Trees =4928 N=49 Trees/HH =100.57
More than 5.00		Trees =1052 N=1 Trees/HH =1052	Trees = 75 N=1 Trees/HH =75	-	Trees = 196 N=4 Trees/HH =49	Trees =377 N=2 Trees/HH =188.5	-	Trees =251 N=3 Trees/HH =83.33	Trees = 1951 N=11 Trees/HH =177.36
Total trees	Trees = 8682 N=65 Trees/HH =137.57	Trees = 12101 N=65 Trees/HH =186.17	Trees =4306 N=65 Trees/HH =66.25	Trees =2917 N=65 Trees/HH =44.88	Trees = 2049 N=65 Trees/HH =31.52	Trees =3273 N=65 Trees/HH =50.36	Trees = 2760 N=65 Trees/HH =42.46	Trees = 1586 N=65 Trees/HH =24.4	Trees =37674 N=520 Trees/HH =72.45

N = Number of household; HH = Household

Among the four agro-ecological zones, Badhadia possessed the largest number of trees i.e. 186.17 trees/ household. Whereas, the lowest number of trees/household were found in Charpar (24.4) trees/household.

In several studies on existing composition of home gardens, common tree species of Bangladesh include mango, coconut, jackfruit, bamboo, guava, palm, etc. with betel nut dominating as garden scale cash crop in the extended home gardens of coastal districts. In this study Sonagazi being a coastal area was most prevalent in species of coconut and betel nut (table 3) whereas, in Thana Chandina abundance of mango, banana, jackfruit, coconut, betel nut, bamboo was found. Mustafa (1997) surveyed 80 home gardens in four agro-ecological regions and reported that *Musa* spp. and *M. indica* were present in each home garden in every region. Besides, other 23 species were also present in at least one home garden in each region. These observations are quite similar with the present study. This study also counted 37,674 individuals of 98 species of 33 families. The family Leguminosae dominates with 17 species followed by Moraceae (7), Palmceae & Myrtaceae (6), Rutaceae (5), Meliaceae (4) and Anonaceae (3).

Multiple purpose tree species

The multipurpose tree species like neem (*Azadirachta indica*), gab (*Giospyros peregrina*), sonalu (*Cassia fistula*), babla (*Acacia nilotica*), mander (*Erythrina indica*), jiyal Bhadi (*Baruga pinnata*), simul (*Bombax ceiba*), arjun (*Terminalia arjun*) were found common in rural areas. Both the fast growing and slow growing trees fall under this group. They provide fuel wood, wind shelter belt, fodder, medicine, oil etc. Some of them are also very good for manufacturing furniture, making tools and also handicrafts. Among the multipurpose tree species sonalu is under endangered status from Chandina and threatened also in other areas. Simul and banyan are decreasing in all the study areas. (Figure 2).

Timber Tree species

Timber trees are summarized in table 2. Among the timber trees akasmoni (*Acacia auriculiformis*) is the dominant timber tree species in the study area. However, they were in abundance in Radhanagar area. Total number of akasmoni (*A. auricoliformis*) in study areas was 1987 however; in Kamoarkhola of Thana Chandina no akasmoni was found. It is worth mentioning that one of the rich farmers of Radhanagar has planted *Acacia* (1900) at large scale. However, the number of Mahogany (*S. macrophylla*) was increased sharply in all the study areas and had been reported to be abundant in all areas. Teak (*Tectona grandis*), akasmoni (*A. auriculiformis*) and other introduced species have replaced many indigenous (figure 1) ones. Rain tree, though it is a traditional timber tree was still popular among the villagers for its rapid growth.

Table 2.   Number of timber Trees in study areas during field survey.

S. No	Scientific Name	Study Areas								Total
		Mirzapur	Badh-adia	Kamarkhola	Basantapur	Chalkamuata	Radhanagar	Sharifpur	Charpara	
1	Albizia sp	1362	948	93	46	13	04	237	15	2754
2	*Acacia auriculiformis*	02	05	-	22	24	1918	15	01	1987
3	*Swietenia macrophylla*	368	295	283	428	38	54	195	124	1785
4	*Bambusa sp*	46	91	171	242	125	221	43	120	1059
5	*Erythrina orientalis*	151	576	02	13	-	49	-	47	838
6	*Samania saman*	-	94	476	-	10	10	-	-	690
7	*Eucalyptus camaldulensis*	02	01	-	-	24	583	02	-	612
8	*Borassus flabellifora*	10	46	136	83	34	10	05	04	318
9	*Lannea coromandelica*	78	43	55	-	127	44	31	114	492
10	*Tectona grandis*	30	07	05	02	17	237	20	01	319
11	*Anthocephalus chinensis*	10	17	161	23	01	22	08	03	245
12	*Aphanamixis polystochya*	-	05	-	-	163	34	09	22	233
13	*Bombax ceiba*	28	33	04	10	24	16	17	09	141
14	*Gmelina arborea*	02	17	-	-	04	18	05	15	71
15	*Azadirachta indica*	-	-	-	56	09	09	03	04	81
16	*Streblus asper*	-	-	14	07	02	04	-	01	28

Table 3: Number of fruit Trees in the study areas during field survey.

Sl No	Scientific Name	Study areas								Total
		Mirzapur	Badhadia	Kamarkhola	Basantapur	Chalkamuata	Radhanagar	Sharifpur	Char para	
1	*Areca catechu*	2021	4041	394	54	339	1123	317	260	8549
2	*Mangifera indica*	1965	2301	883	521	224	295	235	100	6528
3	*Cocos nucifera*	647	850	235	178	63	85	198	34	2290
4	*Artocarpus heterophyllus*	233	315	378	64	393	246	124	179	1932
5	*Psidium guajava*	93	85	95	95	45	49	66	111	639
6	*Syzgium cumini*	142	118	542	34	52	93	16	09	518
7	*Zizyphus mauritiana*	43	40	119	98	63	46	20	27	328
8	*Diospyros embryoptris*	73	169	13	20	03	-	01	03	282
9	*Tamarindus indica*	05	16	25	53	39	17	06	05	166
10	*Moringa oleifora*	-	3	-	-	45	31	40	34	153
11	*Citrus grandis*	43	32	07	12	05	20	18	10	147
12	*Elaeocarpus floribundus*	13	13	6	-	36	36	05	21	130
13	*A. lacucha*	25	19	24	11	04	07	-	06	96
14	*Averrhoa carambola*	34	12	08	06	03	07	02	05	77
15	*Aegle marmelos*	04	05	10	08	26	14	02	05	74
16	*Annona reticulata*	15	08	02	-	08	08	12	-	53
17	*Spondias pinnata*	20	10	03	02	-	03	12	02	52
18	*Litchi chinensis*	18	04	-	02	02	02	06	05	39

Fruit Trees

Abuandance of fruit trees varied. Disparities of their distribution were found during the study period. Betel nut (*A. catechu*)*,* mango (*M. indica*)*,* coconut (*C. nucifera*)*,* jackfruit (*A. heterophyllus*)*,* guava (*P. guajava*)*,* jam (*S. cumini*)*,* ber (*Z. mauritiana*) were found in all the under survey villages and their numbers were 8549, 6528, 2290, 1932, respectively (table 3). Other common fruit trees were gab, tentul, sajna, etc.

Conclusion

Based on the present study it is concluded that among all the four study areas Thana Sonagazi being a coastal area possesses the highest number of betel nut and coconut trees while Thana Chandina is dominated by Tal (*Borassus flabellifer*).

The growing trend of Mahogany has increased in all the four study areas (75%). This species counted more in Modhupur among all the four ecological zones (63%) (Figure 1) Nevertheless, it is growing abundantly nowadays both in Chandina and Jamalpur Thanas (53.5%) according to the respondents. The lowest rank however, stands Sonagazi Thana which falls under coastal zone of this country. Rain tree (*Samania saman*) also shows an increase and ranked third (1774) among all the increased species. *Albizia spp.* are also common in the study area but Chandina and Sonagazi show higher rank. Jamalpur and Modhupur area also support the growth of *Samania saman*. Modhupur and Jamalpur show tremendous growth of akasmoni and teak (*T. grandis*)*. Eucalyptus* also shows an increase in Modhupur and Jamalpur over the years. However, both the Chandina and Sonagazi do not approve such increase. The data through questionnaire survey and FGD are almost cross-matched. Therefore, both the data collecting methods suggest that mahogany, babul, teak, shisham are increasing.

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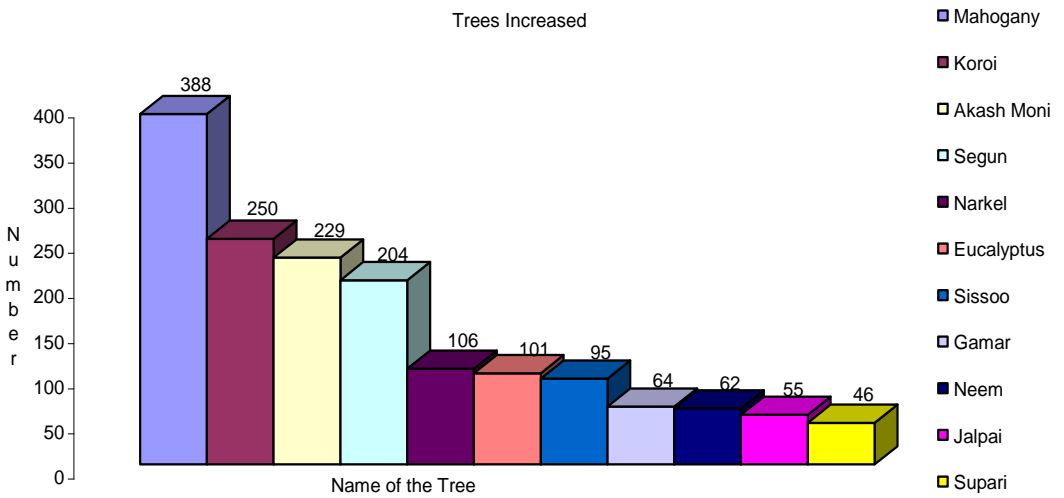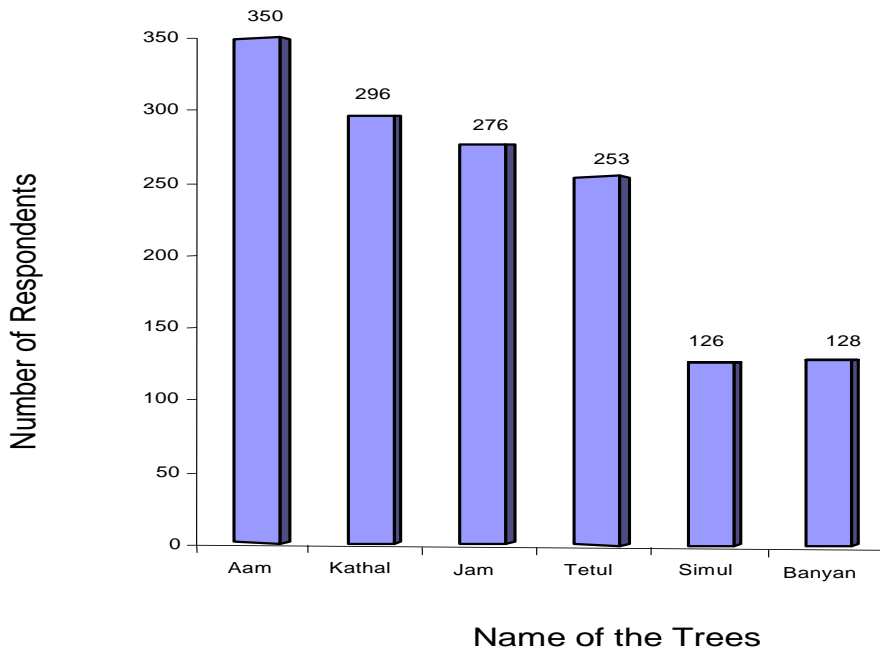Figure 1: Tree increase in all the study areas

Figure: 2 Tree Decreased in study area

Number of Respondents

Name of the Trees

Appendix 1:

The vernacular name, english names and scientific name of the trees found during field survey.

LOCAL NAME	ENGLISH NAME	SCIENTIFIC NAME
Akasmoni	Acacia	*Acacia auriculiformis*
Mangium	Mangium	*Acacia mangium*
Babla	Black baboul	*Acacia nilotica*
Bel		*Aegle marmelos*
Raz koroi		*Albizia falcataria*
Seris	Black seris	*Albizia lebbeck*
Sel koroi		*Albizia procera*
Chatim	Devil's tree	*Alstonia scholaris*
Kaju badam	Cashew nut tree	*Anacardium occidentale*
Sharifa	Custard apple	*Annona squamosa*
Ata	Custard apple	*Annona reticulate*
Sharifa	Custared apple	*Annona squamosa*
Kadam		*Anthocephalus chinesis*
Pitraz		*Aphanamixis polystochya*
Supari	Betel nut palm	*Areca catechu*
Khathal	Jack fruit	*Artocarpus heterophyllus*
Dewa		*Artocarpus lacucha*
Kamranga	Carambola	*Averrhoa carambola*
Neem	Neem tree	*Azadirachta indica*
Mahal bans		*B. nutans*
Talla bans		*B. tulda*
Baria bans	Bamboo	*Bambusa vulgaris*
Hijal		*Barringtonia acutangula*
Simul	Real silk cotton tree	*Bombax ceiba*
Tal	The palmyra plam	*Borassus flabellifer*
Palash	Bastard teak	*Butea monosperma*
Bet		*Calamus viminalis*
Pape	Papya	*Carica papaya*
Chauru/Bon supari	Indian sago palm	*Caryota urens*
Sonalu	Indian laburnum	*Cassia fistula*
Arboroi	Star goose berr y	*Ciccia acida*
Tejpata	Cassia cinnamon	*Cinamomum tamala*
Daruchini	The ciannamon	*Cinnamomum zeylanicum*
Jambura	Pummelo/Saddock	*Citrus grandis*
Lamon/ Labu	Lemon	*Citrus limon*
Musta		*Clinogyne dichotoma*
Narikel	Coconut	*Cocos nucifera*
Sissoo	Sissoo	*Dalbergia sissoo*

Krishnachura	Flame tree	*Delonix rezia*
Chalta		*Dillenia indica*
Gab/Deshi gab	River ebony	*Diospyros peregrina*
Jalpai	Olive	*Elaeocarpus floribudus*
Madar	Coral tree	*Erythrina orientalis*
Eucalyptus	Red gum tree	*Eucalyptus camaldulensis*
Kothbel/Kodbel	The wood apple	*Feronia limonia*
Bot	The banyan tree	*Ficus benghalensis*
Dumur		*Ficus hispida*
Jogya Dumur		*Ficus recemosa*
Ashatha	Peepul tree	*Ficus religiosa*
Kao		*Garcinia cowa*
Gamar/Joginicharra		*Gmelina arborea*
Jaba	China rose	*Hibiscus rosascnensis*
Jarul	Q ueen flower	*Lagerstroemia speciosa*
Jigor/Kafola		*Lannea coromandelica*
Mendi	Henna plant	*Lawsonia inermis*
Ipil-ipil	Ipil-ipil	*Leucaena latisiliqua*
Litchi		*Litchi chinensis*
Kharajora		*Litsea glutinosa*
Khorajora		*Litsea monoptala*
Am	Mango	*Mangifera indica*
Ghora neem		*Melia azedarach*
Muli bans	Bambow	*Melocanna baccifiera*
Datoi/Potka		*Microcos paniculata*
Babul	Indian Madlar	*Mimusops elengi*
Sajuna	Horse radish tree	*Moringa oleifera*
Khejur	Wild date palm	*Phoenix sylvestris*
Amloki	Emblic myrobalan	*Phyllanthus embelica*
Debdaru	Most tree	*Polyalthia longifolia*
Goyam/Piyara	Guava	*Psidium guajava*
Datem	Pomegranate	*Puncia granatum*
Venna	Castor oil plant	*Ricinus communis*
Randi Koroi	Rain tree	*Samania saman*
Pilipata		*Schumannianthus dichotoma*
Bakphul		*Sebania grandiflora* *
Gazari	Sal	*Shorea robusta*
Amra	Hog plum	*Spondias pinnata*
Sheora		*Streblus asper*
Bara Mohagany	Large level mehogani	*Swietenia macrophylla*
Jam/Kalajam	Indian black berry	*Syzygium cumini*
Golapjam	Rose apple	*Syzygium jumbos*
Banjam		*Syzygium fruticosum*
Jam		*Syzygium grandis*

Jamrul	Wax Jambu	*Syzygium samarangense*
Tetul	Tamarind	*Tamarindus indica*
Segun	Teak	*Tectona grandis*
Bohera	Belleric myrobalan	*Terminalia bellirica*
Arjun	White murdah	*Terminalia arjuna*
Kat badam	Indian almond	*Terminalia catappa*
Rongi	Toon tree	*Tonna ciliate*
Poma	Toon tree	*Toona ciliate*
Pitali		*Trewia nudiflora*
Bazna		*Zanthoxylum rhetsa*
Boroi/Kul	Indian jujube	*Ziziphus mauritiana*