

Fruit diversity in the coastal homesteads of Bangladesh

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ABSTRACT

A survey was conducted during October 2011 – September 2012 at 189 homesteads of seven upazillas of Patuakhali coast of Bangladesh to study the species diversity, species richness and relative prevalence of fruit species therein. From the survey, it was clear that the species diversity was higher for some major fruits: mango (0.923), banana (improved) (0.989), pineapple (0.987), coconut (0.901) and papaya (0.921). But of the minor fruits, velvet apple was highest (0.994) while wax jambu was least (0.517). In terms of species richness, there were 57 species and out of those, all (100%) species, 9 (66.0%) were major and 48 (33.94%) were minor, and also 36 were common in each upazilla. It was noted further that mango was in 100% homesteads in 5, jackfruit in 100% homesteads in 4, pineapple in 100% homesteads in 1, coconut in 100% homesteads in 5, guava in 100% homesteads in 6, pummelo in 100% homesteads in 2 and velvet apple in 100% homesteads in 1 upazilla. Again, mango was in 99.47, banana (improved) in 93.12, jackfruit in 96.83, coconut in 98.94, guava in 98.94 and velvet apple in 91.53% homesteads too. Again, in terms of relative prevalence, among the 57 species, 36 were common at all upazillas, the relative prevalence of the most prevalent species, i.e. mango, banana (improved), velvet apple, coconut, jackfruit, papaya and guava were very high while less common species, i.e. papaya, pineapple, palmyra palm, banana (seeded), pummelo, lime, river ebony and monkey jack were low.

Keywords: Coastal, diversity, homestead, minor fruits, prevalent fruit species

Bangladesh, the largest delta on the Earth, is between 88°012 -92°412 east longitude and 20°342 - 26°382 north latitude. It is one of the densely populous countries with a population of 152.5 million and an annual growth rate of 1.37 (BBS, 2011). There are 32.07 million homesteads and over 74% population live in the rural areas. About 7% area (0.53 million ha) of her total 8.4 million ha of cultivable land was occupied by awfully productive homesteads (BBS, 2005). It is blessed with many tropical and sub-tropical fruits. The present production of fruits are nearly 43.83 lakh tons from 1.41 lakh ha (BBS, 2011). Approximately 70 fruit species are presently grown in homesteads. Of those, banana, mango, jackfruit, pineapple, guava, papaya, litchi, jujube and coconut are the major ones (Roy, 2010). The coastal region covers roughly 47,201 extending along with the Bay of Bengal. Now it covers 19 districts facing proximity to the Bay of Bengal (Islam *et al.*, 2006). Her coastal zone constitutes 20% of the area and 28% of the population (Islam, 2004a). Agro-labourers, peasants, fishermen, the folk and the urban poor formed 71% of the 6.85 million homesteads (Ahmed, 2004).

Her coastal area enjoys low-lying edaphic conditions suitable for field crops. So, horticultural crops including fruits are mostly concentrated in the homesteads.

Orchard in the coastal area was almost absent except

some plantations in few areas. Oppositely, major fruits grown in the other parts of the country were very limited to the coastal areas. So, mass of the coastal people were solely dependent on their indigenous fruit resources which were also known as fruit wealth to them. Those species were spontaneous in the natural habitats, survived without any management practices but born fruits at a limited scale; commonly known as minor fruits (Robbani, 2013). So far, 46 underutilized species are identified there and characterized from different homesteads of Bangladesh (Rahim, 2012). The fruit consumption per head per day was about 77g against the minimum requirement of 115g per head per day which indicated that their production could meet only 67% of her requirements (Bhuiyan, 2012). So, to meet the increasing demands, the yields of fruits are to be increased through improved varieties, quality planting materials and proper cultural management practices.

It is necessary to develop plans and package technologies for fruit diversification in the homesteads. For that, it is first necessary to have a clear cut understanding of the homestead fruit diversity and the factors related to the diversity therein. Fruit diversity and its relationship with farmers' various traits are greatly helpful for planning and implementing any effective fruit diversification program to have balanced food intake for the farm families. But such work is absent here.

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Therefore, a survey work was carried out to identify the fruit species in the homesteads of Patuakhali coast to know the magnitude of their diversity.

MATERIALS AND METHODS

The study was conducted at Patuakhali district, central coast of the southern part of Bangladesh. It is located between 21°48'2" - 22°36'2" north latitude and 90°08'2" - 90°41'2" east longitude. Its seven upazillas surveyed were Dumki, Patuakhali Sadar, Kalapara, Galachipa, Bauphal, Dasmina and Mirzagonj. Three unions at each upazilla, three villages at each union and three homesteads having fruit species at each village were randomly selected with the help of Upazilla Agriculture Officer's (UAO) of respective upazillas. Thus, 189 homesteads were selected. The selection was purposive where natural fruit habitat was rich compared to other areas. All homesteads were grouped into four categories: marginal (0.21-.50), small (0.51-1.0), medium (1.01-2.0) and large (>2.0 ha). The size of the homestead varied from 0.21 to 13.6 ha.

The selected homesteads of each location were surveyed following two methods; formal survey and informal survey. Information was collected through a semi-structured interview-schedule and field survey including interviews and the field observations. Focus Group Discussions (FGD) were held in survey area to know the existing homestead fruit species and their utilization. The respondents from selected homesteads were interviewed with that pre-formulated questionnaire. Each homestead was visited twice. Information was recorded through the interview with the head of the family, and house makers (as needed). Data were collected on the name and number of the fruit species with population and the name and number of major and minor fruit morphotypes per species. The survey was conducted during October 2011—September 2012.

Fruit diversity: It is described as the Species richness, Species diversity and Relative prevalence of the species for the study.

Species Richness (SR)

Species richness measures the number of species within an area, giving equal weight to each species (Heywood and Watson, 1995). Fruits of homesteads of seven locations were grouped into two; major and minor ones. Proportions of different fruit groups were also calculated.

Species Diversity (SD)

The most commonly used formula to calculate the

species diversity is 'Simpson index (D)' as suggested by Simpson (1949) which is as follows; $D = 1 / \sum P_i^2$, where P_i is the proportional abundance of the i th species such that, $P_i = N_i / N$ where N_i = Fruit population of the i th species and $N = N_1 + N_2 + N_3 + \dots + N_n$ where n is the number of species.

Relative Prevalence (RP) of species

The percent of homesteads containing a particular species is one of the indicators of the relative prevalence of that particular species in that area. Percent of homesteads having the fruit species was calculated for all the species. The relative prevalence of a species was then calculated using the formula: RP = Population of the species per homestead X % homestead with the species.

The relative prevalence value was calculated to rank the species in different regions according to Millat-e-Mustafa (1997).

Dominance Rank (DR)

The mean dominance rank of the fruit species was determined by pooling the entire set of data from the present study.

RESULTS AND DISCUSSION

In total, 57 species were identified in the study area. Those belong to 23 families of which Rutaceae tops the list. The total species and the total number of fruit-plant population per upazilla are presented in the table 1.

Among the 189 homesteads, 86 (46) were marginal, 53 (28) small, 41 (22) medium and 9 (4.7%) large. All the homesteads were occupied by 9 major (16.98) but 48 minor species (83.02%), and major fruit plant population (66.08) while minor fruit plant population (33.92%). The highest number of species was in Bauphal but the maximum fruit plant population was in Dasmina. In the coastal homesteads of three districts, Miah *et al.* (2013) noted 31 species in Bhola, 30 in Borguna and 30 in Patuakhali among the total 69 (both fruit and timber) tree species. Again, out of 142 species in the offshore islands, 34 fruit (23), 24 timber (17), 21 firewood (15), 15 medicinal (11), 11 ornamental (8), 32 vegetable (22) and 5 species (4%) were recorded by Alam and Masum (2005). Among the 114 species in the southern saline area of Bangladesh, 37.71 fruits (perennial and annual), 32.46 timber, 24.56 vegetable (summer and winter) and 5.26% were spice species (Mannan, 2000). Abedin and Quddus (1990) reported plant species (excluding vegetable species) in the

coastal area where higher (70) than those of Tangail (52), Ishurdi (34), Jessore (28), Patuakhali (20), Rajshahi (28) and Rangpur (21 spp.) districts, respectively. Anam (1999) reported only 28 tree species in the plain area of Barind land. Millat-e-Mustafa (2002) indentified 92 perennial species at 4 sites of the country. Islam (1998) found 77 fruit species in homestead agro forestry at Rangpur. Bashir (1999) indentified 136 useful plant species in the homesteads while surveyed in Gazipur.

Fruit diversity

Species index is a measure of considerable ecological insight (Magurran, 1988). Simson (1949) indexed species diversity (D) and found variation among different groups of plant species. In the present study area, diversity was higher for some fruits: mango (0.923), banana (0.989), pineapple (0.987), coconut (0.901) and papaya (0.921) and velvet apple (0.994) while wax jambu (0.517) was the lowest one. Sellathural (1997) found higher diversity in fruit species. Diversity index varied with different fruit groups as well as different regions. Those values were higher than that of Kerala homesteads (Kumar *et al.*, 1994). So, Bangladesh has the moderate to higher fruit diversity in the coastal homesteads in the table 2.

Relative prevalence of the species

The frequency of occurrence of a particular species in an area is one of the indicators of its biodiversity at that area. It can be noted from the table 3 that mango was 100% homesteads at upazillas like Dumki, Patuakhali Sadar, Mirzagonj, Galachipa, Bauphal and Dasmina, jackfruit was 100% at Dumki, Mirzagonj, Bauphal and Dasmina, pineapple was 100% at Bauphal, coconut was 100% at Dumki, Patuakhali Sadar, Kalapara, Bauphal and Dasmina, guava was 100% at Dumki, Patuakhali sardar, Mirzagonj, Galachipa, Bauphal and Dasmina, pummelo was 100% at Bauphal and Mirzagon and velvet apple was 100% at Bauphal. Mango was 99.47, banana (improved) was 93.12, jackfruit was 96.83, coconut was 98.94, guava was 98.94 and velvet apple was 91.53% homesteads of Patuakhali district. About 70 kinds of fruits were grown in which 90% fruits came from homesteads (Islam, 2004b). Mannan *et al.* (2002) found coconut at 98.6 followed by mango at 96.72, banana at 90.16, jujube at 86.88 and date palm at 80.32% of Noakhali coast. Rahman *et al.* (2009) observed mango at 100, jujube at 100, banana at 100 followed by

black berry at 92.5, jackfruit at 95, coconut at 98.7, guava at 97.5% of Hatia Island. Miah *et al.* (2013) found that coconut at 100 of Bhola and Patuakhali and mango at 100% of Borguna district. Abedin and Quddus (1990) found mango at 95% of Tangail and above 67% of Ishurdi, Jessore and Rangpur districts. Alam *et al.* (1990) observed mango, jackfruit, coconut and banana were available at more than 65% in Jessore. Alam and Masum (2005) found 34 fruit, 24 timber and 21 firewood species in Sandwip offshore Islands. They also mentioned that coconut, guava, date palm and mango were cultivated in more than 75% of the homesteads. Relative prevalence of the fruit species were found in 189 homesteads of the study area in the table 4.

Among 57 fruit species, 36 were common at all upazillas, the relative prevalence of most prevalent species; mango, banana (improved), velvet apple, coconut, jackfruit, papaya and guava were very high while less common species; papaya, pineapple, palmyra palm, banana (seeded), pummelo, lime, river ebony and monkey jack were low. The fruit species were ranked and presented according to their relative prevalence in the table 5.

The mean dominance of mango, banana (improved), coconut and velvet apple ranked top followed by jackfruit, guava and papaya. Velvet apple ranked top while lemon, sapota, rose apple and pomegranate ranked low. Alam *et al.* (1990) found mango as the most prevalent species among the horticultural ones followed by guava, jackfruit, coconut and jujube. Choudhury and Satter (1992) found coconut as the most prevalent crops among the fruit species followed by jackfruit, date palm, banana and mango. Mannan *et al.* (2002) observed mango as the most prevalent among the fruit species followed by jackfruit, guava, jujube and coconut. It was observed that mango, banana and jackfruit were most prevalent among the fruit species and velvet apple was most widespread among the minor fruits.

Fruit species diversity varied from region to region and species to species. For plant biodiversity, fruit species diversity was also worked out considering the seven upazillas at the Patuakhali coast. Species diversity of fruits ranged from 0 to 0.994 over the study site. Velvet apple was highly diverse fruit species in both respect of regions as well as region mean. The second highest species diversity was banana (0.989). Another 34 fruit species had also considerable numbers in the study area.

Table 2 Contd.

19	Garcinia/Garcinia cowa	0.520	0.474	0.859	0.520	0.427	0.750	0.640	0.691
20	Monkey jack/Atrocarpus lakoocha	0.640	0.906	0.903	0.576	0.818	0.592	0.846	0.799
21	Pomegranate/Punica granatum	0.890	0.601	0.925	0.889	0.925	0.889	0.305	0.781
22	River ebony/Diospyras peregrine	0.941	0.741	0.519	0.910	0.462	0.636	0.962	0.857
23	Velvet apple/Diospyras discolor	0.990	0.994	0.994	0.995	0.988	0.990	0.992	0.994
24	Rose apple/Syzygium jambos	0.640	0.840	0.665	0.673	0.560	0.725	0.437	0.595
25	Wax jamb/Syzygium samarangense	0.686	0.178	0.399	0.464	0.599	0.730	0.635	0.517
26	Jamun/Syzygium cumini	0.820	0.683	0.744	0.775	0.828	0.111	0.863	0.782
27	Carambola/Averrhoa carambola	0.654	0.242	0.160	0.541	0.626	0.728	0.834	0.612
28	Date plam/Phoenix sylvestris	0.876	0.760	0.890	0.908	0.755	0.779	0.867	0.837
29	Indian olive/Elaeocarpus floribundus	0.733	0.519	0.733	0.782	0.437	0.265	0.788	0.643
30	Banana (seeded)/Musa spp.	0.979	0.803	0.807	0.983	0.984	0.965	0.989	0.979
31	Palmyra Palm/Borassus flabellifer	0.880	0.915	0.290	0.941	0.979	0.863	0.775	0.868
32	Tamarind/Tamarindus indica	0.729	0.915	0.770	0.502	0.527	0.289	0.576	0.600
33	Sapota/Manilkara zapota	0.889	0.918	0.937	0.840	0.691	0.902	0.305	0.768
34	Custard apple/Annona squamosa	0.527	0.883	0.556	0.750	0.840	0.918	0.717	0.758
35	Jujube (local)/Zizyphus jujum	0.889	0.750	0.265	0.840	0.360	0.705	0.806	0.616
36	Plantain/Musa paradisiaceae	0.510	0.852	0.816	0.750	0.826	0.793	0.581	0.767

Table 3: Distribution of fruit species in the homesteads of seven upazillas in Paluakhali coast

Sl. No.	Fruit Species	% homestead containing species							All
		Dumki	Patuakhali Sadar	Mirzagonj	Galachipa	Kalapara	Bauphal	Dasmina	
1	Mango/Mangifera indica	100	100	100	100	96.29	100	100	99.47
2	Banana(improved)/Musa spp.	96.29	92.59	92.59	96.29	88.88	88.88	96.29	93.12
3	Jackfruit/Atrocarpus heterophyllus	100	96.29	100	96.29	85.18	100	100	96.83
4	Jujube(improved)/Zizyphus jujum	74.07	51.85	29.62	48.14	85.18	51.85	70.37	58.73
5	Pineapple/Ananas sativus	40.74	66.66	85.18	55.55	48.14	100	96.29	65.07
6	Lichi/Litchi chinensis	59.25	48.15	77.77	62.96	62.96	74.07	74.07	65.61
7	Coconut/Cocos nucifera	100	100	96.29	96.29	100	100	100	98.94
8	Papaya/Carica papaya	100	88.88	96.29	40.74	96.29	96.29	88.88	86.77
9	Guava/Psidium guajava	100	100	100	100	92.59	100	100	98.94

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Table 3 Contd.

10	Pummelo/ <i>Citrus grandis</i>	100	85.18	100	92.59	48.14	100	96.29	88.89
11	Lime/ <i>Citrus aurantifolia</i>	92.59	92.59	96.29	66.39	74.07	92.59	92.59	82.54
12	Lemon/ <i>Citrus lemon</i>	14.81	3.70	3.70	14.81	14.81	3.7	7.4	8.99
13	Mango(Green)/ <i>Mangifera indica</i>	59.25	25.92	14.81	11.11	11.11	66.66	40.74	32.8
14	Golden apple/ <i>Spondias dulcis</i>	77.77	33.33	85.18	51.85	44.44	55.55	74.07	60.3
15	Aonla/ <i>Phyllanthus emblica</i>	37.03	62.96	55.55	51.85	55.55	55.55	62.96	54.5
16	Bullock's heart/ <i>Annona reticulata</i>	7.4	33.33	25.92	22.22	25.92	51.85	59.25	32.28
17	Stone apple/ <i>Aegle marmelos</i>	55.55	62.96	88.88	66.66	37.03	70.07	70.07	54.55
18	Elephant's apple/ <i>Dillenia indica</i>	77.77	44.44	81.48	40.74	37.03	70.37	81.48	61.900
19	Garcinia/ <i>Garcinia cowa</i>	22.22	33.33	48.14	25.92	25.92	55.55	44.44	36.5
20	Monkey jack/ <i>Atrocarpus lakoocha</i>	77.77	88.88	70.37	70.37	48.14	74.07	81.48	73.02
21	Pomegranate/ <i>Punica granatum</i>	11.11	29.62	22.22	11.11	29.62	37.03	25.92	23.81
22	River ebony/ <i>Diospyras peregrine</i>	70.37	44.44	62.96	55.55	25.92	37.03	81.48	53.97
23	Velvet apple/ <i>Diospyras discolor</i>	92.59	92.59	96.29	96.29	74.07	88.88	100	91.53
24	Rose apple/ <i>Syzygium jambos</i>	11.11	7.40	22.22	11.11	22.22	14.81	25.92	20.63
25	Wax jambu/ <i>Syzygium samarangense</i>	66.66	48.14	85.18	96.29	7.40	81.48	85.18	67.20
26	Jamun/ <i>Syzygium cumini</i>	74.07	74.07	92.59	25.92	37.03	70.37	66.66	62.96
27	Carambola/ <i>Averrhoa carambola</i>	44.44	48.14	51.85	62.96	37.96	66.66	70.37	54.5
28	Date plam/ <i>Phoenix sylvestris</i>	77.77	29.62	85.18	66.66	70.37	88.88	74.07	70.37
29	Indian olive/ <i>Elaeocarpus floribundus</i>	48.14	44.44	62.96	44.44	44.44	48.14	51.85	49.51
30	Banana (seeded)/ <i>Musa spp.</i>	70.37	62.96	48.14	59.25	14.81	81.48	44.44	54.50
31	Palmyra Palm/ <i>Borassus flabellifer</i>	77.77	70.37	96.29	88.88	92.59	92.59	96.29	87.83
32	Tamarinda/ <i>Tamarindus indica</i>	74.07	66.66	74.07	59.25	88.88	92.59	77.77	76.19
33	Sapota/ <i>Manilkara zapota</i>	11.11	11.11	22.22	14.81	37.03	37.03	62.96	28.04
34	Custard apple/ <i>Annona squamosa</i>	25.92	44.44	25.92	14.81	14.81	18.51	40.74	26.46
35	Jujube (local)/ <i>Zizyphus jujum</i>	3.70	48.14	59.25	14.81	7.40	55.55	48.14	33.86
36	Plantain/ <i>Musa paradisiaceae</i>	22.22	33.33	22.22	48.14	48.14	7.40	33.33	30.68

Table 4: Relative prevalence of common fruit species found in the homesteads of study area

Sl. Fruit No.Species	Dumki		Patuakhali Sadar		Mirzagonj		Galachipa		Kalapara		Bauphal		Dasmina		All	
	Mor	Pop	Mor	Pop	Mor	Pop	Mor	Pop	Mor	Pop	Mor	Pop	Mor	Pop	Mor	Pop
1 Mango/ <i>Mangifera indica</i>	1185.18	4270.37	2077.77	4637.03	2692.59	5981.55	1244.44	4029.62	781.01	4386.54	774.07	6481.48	2062.96	9674.07	5947.81	
2 Banana(improved)/ <i>Musa spp.</i>	249.64	2849.79	586.40	7270.02	685.85	4663.79	399.42	5206.79	450.98	3864.63	460.85	4575.67	788.15	6982.82	5059.07	
3 Jackfruit/ <i>Artocarpus heterophyllus</i>	429.62	2159.25	2243.20	4347.31	2066.66	4229.62	129.99	1133.33	145.12	845.49	1033.33	1611.11	1303.7	5418.51	2820.27	
4 Jujub(improved)/ <i>Zizyphus jujum</i>	54.86	134.42	53.14	96.01	15.35	32.91	48.95	57.05	113.57	186.13	65.29	69.99	101.64	299.72	125.18	
5 Pineapple/ <i>Ananas sativus</i>	30.17	185.59	133.32	794.98	145.12	1435.44	113.15	1028.7	108.76	880.73	314.81	1111.11	278.17	2450.04	1126.66	
6 Lichi/ <i>Litchi chinensis</i>	63.63	269.91	42.8	94.51	103.39	120.98	55.96	90.94	55.96	88.61	71.33	142.65	106.99	315.48	160.44	
7 Coconut/ <i>Cocos nucifera</i>	574.07	3351.85	1955.55	4125.93	1540.64	3448.6	167.62	1875.87	518.52	2969.26	2285.19	3559.26	1103.07	6488.89	3688.52	
8 Papaya/ <i>Carica papaya</i>	281.48	455.56	401.61	1744.68	100.96	1290	70.92	793.68	499.28	2849.47	2000.4	3427.21	980.87	5767.32	32332.56	
9 Guava/ <i>Psidium guajava</i>	274.07	455.56	1677.78	3392.59	1229.63	2114.81	166.67	674.07	178.32	1076.79	1007.4	1585.19	725.93	4800.00	2014.14	
10 Pummelo/ <i>Citrius grandis</i>	344.44	711.11	593.11	681.44	607.41	944.44	164.6	548.68	44.57	96.28	370.37	974.07	259.98	1611.97	795.43	
11 Lime/ <i>Citrius aurantifolia</i>	178.32	630.98	380.65	792.16	385.16	574.17	63.93	218.84	93.27	277.08	404.65	661.84	360.07	1704.34	694.20	
12 Lemon/ <i>Citrius lemon</i>	2.74	4.39	0.55	0.822	0.13	0.27	2.19	3.29	2.74	4.94	0.13	0.27	0.96	1.92	2.71	
13 Mango(Green)/ <i>Mangifera indica</i>	54.86	129.47	11.52	24.96	2.74	4.94	0.41	1.23	0.41	2.06	61.72	66.66	27.16	39.23	38.36	
14 Golden apple/ <i>Spondias dulcis</i>	79.07	221.79	50.61	71.6	170.36	211.37	36.49	61.45	32.92	46.09	20.57	45.26	74.51	134.42	113.14	
15 Aonla/ <i>Phyllanthus emblica</i>	17.83	43.89	63.4	39.64	26.75	56.7	21.24	32.65	56.14	57.61	20.57	45.26	27.78	114.26	55.72	
16 Bullock's heart/ <i>Annona reticulata</i>	0.27	0.55	3.7	13.58	7.68	11.52	2.47	22.44	11.52	19.2	17.28	40.33	59.25	60.88	24.07	
17 Stone apple/ <i>Aegle marmelos</i>	39.09	74.07	63.74	144.57	111.92	913.61	32.1	61.72	6.86	17.83	71.4	124.57	103.81	217.1	221.92	
18 Elephant's apple/ <i>Dillenia indica</i>	86.41	164.18	19.75	49.38	93.35	244.44	30.18	55.83	19.2	24.69	54.73	99.04	87.52	244.44	126.0	
19 Garcinia/ <i>Garcinia cowa</i>	5.76	8.23	16.05	23.45	8.64	26.4	8.64	11.52	8.64	11.52	22.63	45.26	19.75	32.92	22.76	
20 Monkey jack/ <i>Artocarpus lakoocha</i>	77.77	129.62	75.71	246.89	49.52	158.98	71.41	112.07	41	96.28	82.3	128.94	87.52	223.32	159.59	
21 Pomegranate/ <i>Punica granatum</i>	0.41	1.23	13.16	20.84	2.47	9.05	0.82	2.47	3.29	4.53	6.86	20.57	9.60	11.52	10.03	
22 River ebony/ <i>Diospyras peregrine</i>	122.5	505.62	49.38	97.11	121.26	174.89	37.03	123.44	10.56	26.48	94.63	152.23	82.78	543.2	231.85	
23 Velvet apple/ <i>Diospyras discolor</i>	397.79	4015.66	346.36	4680.94	406.56	5788.1	249.64	3569.86	74.85	80.07	378.55	3874.51	385.19	4577.78	3798.13	
24 Rose apple/ <i>Syzygium jambos</i>	1.23	2.06	0.55	1.37	9.05	15.64	1.64	2.88	5.58	8.23	1.92	3.84	11.51	15.36	7.05	

Table 4 Contd.

25	Wax jamba/ <i>Syzgium samarangense</i>	50.39	123.44	69.54	76.67	217.68	271.31	146.22	199.71	5.20	8.22	81.48	156.92	182.98	302.86	162.73
26	Jamun/ <i>Syzgium cumini</i>	6.86	161.86	98.76	175.57	161.18	318.92	8.64	18.24	16.46	31.54	86.00	91.22	83.94	227.14	153.51
27	Carambola/ <i>Averrhoa carambola</i>	32.92	55.96	48.14	58.84	63.37	69.13	48.97	76.95	15.47	25.31	59.25	113.57	62.55	153.77	79.08
28	Date plam/ <i>Phoenix sylvestris</i>	112.33	319.72	122.87	273.16	362.8	1094.16	81.74	269.1	249.24	706.31	457.57	974.39	375.74	1031.49	666.90
29	Indian olive/ <i>Elaeocarpus floribundus</i>	28.53	55.27	45.7	80.65	63.55	72.29	30.04	49.38	24.69	32.91	64.24	74.95	55.69	120.98	69.49
30	Banana (seeded)/ <i>Musa spp.</i>	190.26	1316.18	116.59	1179.92	69.54	146.2	43.89	335.75	4.39	17.55	208.23	1122.61	70.77	697.87	688.01
31	Palmyra Palm/ <i>Borassus flabellifer</i>	79.51	391.73	211.11	724.55	456.49	540.08	141.54	582.66	164.6	1141.94	483.53	1306.55	613.4	1294.57	854.58
32	Tamarinda/ <i>Tamarindus indica</i>	104.25	200.26	76.85	68.88	96.02	200.26	52.67	74.61	144.84	210.68	240.05	283.64	161.3	247.71	183.72
33	Sapota/ <i>Manilkara zapota</i>	0.41	1.23	0.82	2.88	2.47	9.88	1.10	2.74	13.71	24.69	6.88	21.94	34.98	41.97	15.05
34	Custard apple/ <i>Annona squamosa</i>	7.7	15.36	21.4	62.55	7.68	11.52	1.65	3.29	1.10	2.74	2.06	4.80	25.65	27.16	18.20
35	Jujubi (local)/ <i>Zizyphus jujum</i>	0.14	0.42	23.18	46.36	60.58	92.17	1.10	2.74	0.82	1.37	24.67	45.26	19.61	44.57	33.27
36	Plantain/ <i>Musa paradisiaceae</i>	5.76	8.23	12.34	32.1	7.41	12.28	7.13	14.26	8.91	21.4	2.74	6.03	13.58	20.99	16.47

Note : Morphotype = Mor

Table 5: Dominance rank of fruit species in the Patuakhali coast

Sl. Fruit No. Species	Dumki		Patuakhali Sadar		Mirzagonj		Galachipa		Kalapara		Bauphal		Dasmina		All	
	Mor	Pop	Mor	Pop	Mor	Pop	Mor	Pop	Mor	Pop	Mor	Pop	Mor	Pop	Mor	Pop
1	Mango/ <i>Mangifera indica</i>	1	1	2	3	1	1	1	2	1	1	5	1	1	1	1
2	Banana(improved)/ <i>Musa spp.</i>	8	4	6	1	5	3	2	1	4	2	7	2	5	2	2
3	Jackfruit/ <i>Artocarpus heterophyllus</i>	3	3	5	1	4	2	4	9	5	8	8	3	6	2	55
4	Jujube(improved)/ <i>Zizyphus jujum</i>	19	20	20	18	27	27	18	22	10	12	21	24	17	17	20
5	Pineapple/ <i>Ananas sativus</i>	24	17	11	9	14	7	10	6	11	7	13	10	11	8	9
6	Lichi/ <i>Litchi chinensis</i>	18	14	25	19	17	22	15	17	15	15	20	17	15	15	17
7	Coconut/ <i>Cocos nucifera</i>	2	3	3	5	3	5	4	4	2	3	1	4	3	3	3
8	Papaya/ <i>Carica papaya</i>	6	10	7	7	18	8	13	7	3	4	2	5	4	4	6
9	Guava/ <i>Psidium guajava</i>	7	11	4	6	4	6	5	8	6	6	4	7	6	6	7
10	Pummelo/ <i>Citrus grandis</i>	5	7	5	12	6	10	6	10	16	13	11	12	12	10	10
11	Lime / <i>Citrus aurantifolia</i>	10	8	8	10	9	12	14	13	12	10	9	13	10	9	10

Table 5 Conrtd.

12	Lemon/ <i>Citrus lemon</i>	31	22	35	36	36	36	30	30	33	32	36	36	36	12
13	Mango(Green)/ <i>Mangifera indica</i>	20	15	32	30	33	35	36	36	36	35	23	25	29	29
14	Golden apple/ <i>Spondias dulcis</i>	16	15	21	22	12	17	21	22	18	18	28	27	22	20
15	Aonla/ <i>Phyllanthus emblica</i>	26	27	19	28	26	26	25	25	14	17	29	28	28	25
16	Bullock's heart/ <i>Annona reticulata</i>	35	35	33	33	30	31	29	26	24	26	30	30	25	29
17	Stone apple/ <i>Aegle marmelos</i>	22	24	18	16	16	11	22	20	28	27	19	19	16	19
18	Elephant's apple/ <i>Dillenia indica</i>	14	18	28	26	20	16	23	23	20	23	25	21	19	20
19	Garcinia/ <i>Garcinia cowa</i>	29	29	29	31	29	28	26	29	27	29	27	26	31	29
20	Monkey jack/ <i>Atrocarpus lakoocha</i>	17	21	16	14	25	20	12	17	17	14	17	18	21	18
21	Pomegranate/ <i>Punica granatum</i>	33	32	30	32	34	34	35	33	32	33	31	32	35	33
22	River ebony/ <i>Diospyras peregrine</i>	11	9	22	17	15	19	20	15	25	21	15	16	21	15
23	Velvet apple/ <i>Diospyras discolor</i>	4	2	9	2	8	2	3	3	13	16	10	3	8	5
24	Rose apple/ <i>Syzygium jambos</i>	32	32	36	35	28	29	32	31	29	30	35	35	34	32
25	Waxjambu/ <i>Syzygium samarangense</i>	21	23	17	21	11	15	7	14	30	31	18	15	13	12
26	Jamun/ <i>Syzygium cumini</i>	28	19	14	15	13	14	27	28	21	20	16	22	20	19
27	Carambola/ <i>Averrhoa carambola</i>	23	25	23	25	23	25	17	19	22	22	24	20	24	22
28	Date plam/ <i>Phoenix sylvestris</i>	12	13	12	13	10	9	11	12	5	9	8	11	9	11
29	Indian olive/ <i>Elaeocarpus floribundus</i>	25	26	24	20	22	24	24	24	19	19	22	23	26	23
30	Banana (seeded)/ <i>Musa spp.</i>	9	6	13	8	21	21	19	11	31	28	14	9	23	13
31	Palmyra Palm/ <i>Borassus flabellifer</i>	15	12	10	11	7	13	8	9	7	5	6	8	7	9
32	Tamarinda/ <i>Tamarindus indica</i>	13	16	15	23	19	18	16	19	9	11	12	14	14	17
33	Sapota/ <i>Manilkara zapota</i>	34	34	34	34	35	33	33	34	23	24	32	31	27	31
34	Custard apple/ <i>Annona squamosa</i>	27	28	27	24	30	32	31	27	34	34	34	34	30	30
35	Jujube (local)/ <i>Zizyphus jujum</i>	36	36	26	27	24	23	34	35	35	36	26	29	32	30
36	Plantain/ <i>Musa paradisiaceae</i>	30	30	31	29	32	30	28	28	26	25	33	33	33	29

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