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Useful plants in Home gardens: A case study in Kalaroa Upazila, Satkhira district, Bangladesh

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1. Introduction

It estimates 70% of the total land area is under agricultural use, making agriculture the main source of livelihood for most people in a densely populated Bangladesh (FAO 2014). More than 60 million (about 40% of the total population) people are functionally landless, putting land the most valuable and scarce resource of the country. In addition, once heavily forested Bangladesh is now almost devoid of forest vegetation (cover less than 10% of the total land area, FAO 2010). Yet, expansion of forest area is also not possible as the official boundary is already demarcated (Kabir and Webb 2008a). Integrated land use technologies such as home gardening would be an important repository of useful plants for continuous supply of forest products and services (Kabir and Webb 2008b). About 20 million households in Bangladesh have been maintaining home garden covering 2% of the country's total land area and 10% of total forests area (Kabir et al 2010, Alam 2011).

Yet, the extent of scientific studies on home garden systems was inadequate than what their various "economic roles, ecological function, and religio-cultural values would warrant" (Nair, 2001). Therefore, home gardens required considerable research attention mainly due to their certain sustainable supply of socioeconomic products and environmental services for the gardeners (Jose and Shanmugaratnam 1993, Christanty 1990). This research aimed to explore and understand the use of home gardens and its contribution to household economy and biodiversity conservation. The study therefore has important implications for promoting home gardens to improve livelihoods in rural Bangladesh.

2. Methodology

The study area, Kalaroa sub-districts, locally called *Upazila* (administrative unit), were purposively selected from Satkhira district, Bangladesh. The sub-district consists of 12 unions (local administrative unit) and one Paurashava (local municipal administrative unit). A total of 50 households (four from each union and two from only Paurashava) were selected randomly from the study area according to Kabir and Webb (2008a) for primary data collection. A botanical inventory was conducted in each sample households during May to June 2011 where all present trees and shrubs were identified and recorded to species level with individual counting except those are growing in hedgerows. Herbs and climbers those were cultivated by the gardeners were identified and recorded by local name with no individual counting due to difficulties in differentiating the stems.

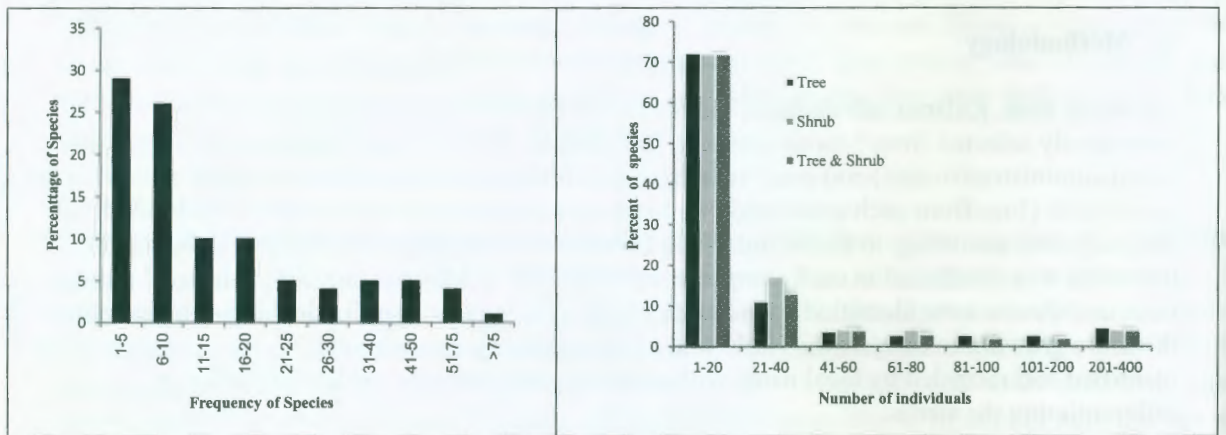
Each species recorded in the home gardens was classified by family, habit (tree, shrub, herb or climber), origin (Kabir and Webb 2008b), conservation status (Bangladesh IUCN Red Listed, Khan et al 2001), and use by the people. Relative frequency, relative density and abundance (Cox 1990) was calculated only for tree and shrub species (except those planted in hedgerows). The average of the relative values of density and frequency for each species of tree and shrub (except in hedgerows) was used in computing the ecological importance of a species in relation to the plant community of study area (Kaya et al 2002, Das and Das 2005).

3. Results and Discussion

The species-sample size curve indicated that the sampling effort was adequate. A total of 271 (109 trees, 53 shrubs, 67 herbs, and 42 climbers and 58% native to Indian Subcontinent) plant species in 79 families were recorded from a total sample area of 9.29 ha (50 homegardens) in Kalaroa' upazila of Satkhira district, Bangladesh. An average home garden composed of 44 (25 native and 19 exotic) species in a mean garden size of 1340 m². A set of common species such as *Areca catechu*, *Cocos nucifera*, *Mangifera indica*, *Musa* spp., *Bambusa balcooa*, *Alocasia indica*, *Xanthosoma nigrum*, *Artocarpus heterophyllus*, *Phoenix sylvestris*, *Citrus limon*, *Citrus grandis*, *Manilkara zapota*, *Moringa oleifera*, *Carica papaya*, *Aegle marmelos*, *Syzygium cumini*, and *Curcuma longa* were reportedly represented among all the sampled homegarden across the region. Four plant species of four different families, *Andrographis paniculata*, *Calamus guruba*, *Mangifera sylvatica*, and *Rauvolfia serpentina*, were on the Bangladesh IUCN Red List.

Farmers intentionally used all plant species recorded from the home gardens. We categorize all the uses into nine main uses. Of the recorded 271 species, 111 (41% of all recorded species) were used for food (fruits and vegetables) followed by 74 (27%) for medicine, 67 (25%) for fuel wood, 51 (19%) for ornamental, 37 (14%) for timber and 11 (4%) for fodder. Cash income from the sale of homegarden products was not an end use. Our results represented that home garden accounted for 18% of the total household annual income. Thirteen percent of all the recorded species were multipurpose (i.e., species having more than two uses).

Although the species richness and similarity in the home gardens across regions were high, the majority of species could be considered rare (low frequency and abundance) - 55% species were recorded from 10 or fewer percent and 32% in one or two home gardens, while only 2% species were found in more than 75% of the home gardens can be considered as common. In addition about 72% of all species of trees and shrubs had 20 or fewer individuals each and 85% had 40 or fewer individuals each. Only few of all the recorded tree and shrubs species had considerably higher density. Thus, home gardens showed the capability of preserving these valuable species while the owners are using them – termed as conservation through use a recent world's biodiversity conservation strategy.



4. Conclusion

Bangladesh used to be important home of large variety of flora and fauna due to its location. Biological resources are consumed at an alarming rate, and indiscriminate and imprudent uses of lands and water have had significant impacts on natural ecosystems. There is a great potential for home gardening to hold significant biodiversity conservation potential through use in Bangladesh.

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