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Use of Underutilized Fruits to Improve Nutritional Security and Livelihood in Southern Bangladesh

Underutilized fruits are domesticated plant species that have been used for centuries as food or medicinal herbs by humans, but importance has diminished over time due to various reasons like poor shelf life, unrecognized nutritional value and lack of consumer awareness.In Bangladesh, many underutilized fruit trees grow without much care largely in homesteads, fallow and forest lands as well by the roadside and railway lines. These fruit trees are well adapted to the local climate, the fruits are nutritious and useful as herbal medicine. Use of these fruits may also contribute to poverty alleviation and household food security of rural people, and many families are, in fact, are dependent on such fruits for their livelihood. Underutilized fruit trees like river ebony (*Diospyros peregrine*), velvet apple (*Diospyros discolor*), Cowa (*Garcinia cowa*) and ber (*Zizyphus mauritiana*), amlaki (*Phyllanthus emblica*) that grow naturally in the southern coastal zone protect the hinterland against natural disasters and balance the coastal ecosystem. Plantations of the underutilized fruit ber (*Ziziphus mauritiana* cv. BAU Kul 1) help reclaim coastal saline soils and also contribute to income generation for the poor people of the coastal region. Almost every year, Bangladesh faces floods and other natural disasters in about one third of its geographical area and people suffer food shortages and malnutrition. In the affected areas, underutilized fruit trees may contribute substantially as risk buffers ensuring household food and nutrition security. This research KGF sponsored project studied the contributions of underutilized fruits to food security, nutrition, rural employment and women participation in some southern districts including coastal districts of Bangladesh. The project work included collection of underutilized fruits from the southern and coastal areas, development and demonstration of integrated management for increasing their production in the southern and coastal areas.

Fig. 1. A ber tree

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Methodology

The project consisted in the collection and conservation of germplasm at the BAU Germplasm Center (BAU-GPC), Mymensingh were done. A survey of underutilized fruit tree growers in Bagherhat, Shatkhira, Khulna, Barishal and Patuakhali was carried out. Ten growers were selected randomly from each district. Saplings of different targeted fruits grown at the BAU nursery were planted at the project locations in different southern districts. Data on the adaptation of the plants were collected. Samples of leaves of bilati gab, sofeda and lotkon showing symptoms of fungal disease were collected for morphological studies and molecular analysis. Causative fungi were isolated and characterized. Detailed studies of the isolated fungi such as, molecular and physiological characteristics and management of the fungi were performed at the Microbiology and Bio-control Laboratory, Department of Plant Pathology, BAU, Mymensingh.

Fig. 2. Saplings of fruit trees distributed to participating farmers

Results and Outputs

Table 1. Species of underutilized fruit trees grown by farmers in different southern districts of Bangladesh

District	Species of underutilized fruit trees
Bagherhat	Fig, river ebony, hog plum, carambola, anola, olive, elephant apple, jamun, longan, bullock's heart, wax jambu, lime, sapota, hortoki, karanda, stone apple
Shatkhira	Fig, hog plum, carambola, anola, longan, wax jambu, lime, sapota, cowa, monkey jack, Malay apple, bilimbi, tamarind, pomegranate, karanda
Khulna	Fig, river ebony, hog plum, carambola, anola, olive, elephant apple, jamun, longan , bullock's heart, wax jambu, lime, sapota, stone apple, tamarind, rattan
Barishal	Fig, river ebony, hog plum, carambola, anola, olive, elephant apple, jamun, bullock's heart, wax jambu, lime, sapota, stone apple, karanda, custard apple, rattan, Malay apple
Patuakhali	River ebony, hog plum, carambola, anola, olive, elephant apple, wax jambu, lime, sapota, Malay apple, cowa, pomegranate, custard apple, monkey jack, tamarind

The baseline survey on underutilized fruit trees in the southern districts of Bangladesh indicated that there is a great opportunity to produce assorted fruits which would be well accepted for consumption by the local inhabitants. The highest number of underutilized fruit trees was found in Bagherhat (462) and the lowest in Patuakhali (182). The species, however, were almost the same in the southern districts (Table 1). The survey indicated that fruit tree growers in the region faced mainly three problems: (i) diseases, (ii) insects and (iii) lack of knowledge about good management. The diseases were mainly (i) leaf blight, (ii) leaf spot, (iii) fruit blight, (iv) leaf curl and (v) die back, and the insects were (i) mealy bug, (ii) caterpillar, (iii) fruit borer, (iv) ant and (v) leaf miner. Growers also faced a lot of post-harvest problems related mainly to (i) fruit abnormalities, (ii) shelf life, (iii) transport and (iv) storage.

Three different fungal disease symptoms in bilati gab leaves were noticed (a) whitish circular spots on green leaves, (b) black irregular spots on both sides of the leaves and (c) blight on leaves of bilati gab. The fungus is white in color and loose in texture. In sofeda, samples from leaves showed two different fungal disease symptoms from (a) red circular spots with dark brown border on leaves and (b) white irregular spots with black color around. The fungus is white and also round in shape and the texture is loose. Samples from diseased leaves of lotkon showed three symptoms (a) blackish irregular spots, (b) black spots at leaf tips and (c) yellowish coloration of the leaves.

Fruit losses due to diseases, insects, during harvest and transport occurred, the greatest loss, >10-20%, was found in Barishal. Sofeda (sapota) was found to be more adaptive than lotkon. The highest percentage of mortality was found in Satkhira. *Sofeda* had the lowest mortality (36.8%) closely followed by *jambura* (40%), while the highest mortality was found in *lotkon* (66.5%).

Twenty-two different pathogens were isolated from fruit plant leaf samples collected from different locations, among which 8 isolates (from *lotkon*) were *Pseudopestalotiopsis* sp., 8 were *Colletotricum* sp. Three isolates from *sofeda* were *Neopestalotiopsis* sp. and 3 isolates from hog plum (amra) were *Pseudopestalotiopsis* sp. In *in vitro* studies, the fungicides Topral, Autostin and Potent effectively controlled *Pseudopestalotiopsis* sp., *Colletotricum* sp. and *Neopestalotiopsis* sp. causing diseases of ltkon, sofeda and hog plum. Relatively high temperature appeared to be conducive to mycelial growth of the pathogenic fungi.

Bilati gab was registered with the name "BAU-KGF Seedless Bilati Gab 2" (Fig. 3). In addition, 8 fruit germplasms of *sofeda, bilati gab, deshi gab* and *kotbel* were collected and planted at BAU-GPC for conservation.

Fig. 3. BAU-KGF Seedless Bilati Gab 2 fruit

Expected Impact

The project provides the valuable information on underutilized fruit trees in southern Bangladesh which would be very useful for future research on fruits of Bangladesh. The findings will be useful in growing fruits like sofeda, grapefruit, hog plum and Indian gooseberry (*amloki*) in the southern part of Bangladesh which can contribute to nutritional security for the local people and generation of income for the rural communities. Rural communities in southern Bangladesh will be benefited

Recommendations

Seed multiplication of underutilized fruit species should be done and seeds distributed to growers in the southern districts. Research should continue to look for indigenous fruit species which are yet to be explored.

This technical bulletin has been prepared on the basis of technical information available from a completed BKGET-KGF Funded CGP Project the details of which are given below:

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Principal Investigator: Dr Md Abdur Rahim, Professor, Department of Horticulture, BAU, Mymensingh, Cell: 01711854471, email: marahim1956@bau.edu.bd; **Project duration:** January 2019 to December 2023

Edited by:
Nasrin Akter, GM Panaullah and Nathu Ram Sarker
Krishi Gobeshona Foundation

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Krishi Gobeshona Foundation, AIC Building, 3rd Floor, BARC Campus, Farmgate, Dhaka-1215, Bangladesh, Cell: 01729 480988, Website: www.kgf.org.bd, e-mail: kgf-bd@live.com