

## Status of banana production in Bangladesh

Md. Shahidul Islam\* and Md. Abdul Hoque

### Introduction

Bangladesh is an agro-based country lying between 20.34<sup>o</sup> and 26.38<sup>o</sup> N latitude and 88.51<sup>o</sup> and 92.41<sup>o</sup>E longitude. The country has a total area of 147 570 square kilometers with the population of about 130 million. The land can be classified as 79% flood plain, 12.6% hilly areas and 8.3% terrace soils. The pH of soil ranges between 4.5 and 8.0. Bangladesh enjoys sub-tropical monsoon climate with temperature ranging from as low as 4<sup>o</sup>C in winter to as high as 42<sup>o</sup>C in summer with an average temperature of 27<sup>o</sup>C. July is the hottest month while January is the coldest. Cold waves are frequent in winter. Low temperature for about two months causes injury to banana, particularly in the northern part of the country. Annual rainfall varies from 1200 in the west to 2500 mm in the southeast. About 90% of the total rainfall occurs in the hot and humid months of May to September. There are considerable variations with respect to temperature, rainfall and relative humidity in different regions of the country as shown in Tables 1, 2 and 3.

**Table 1.** Monthly maximum and minimum temperatures of different regions (<sup>o</sup>C) (1999).

Region	Temp.	Jan	Mar	May	July	Sep	Nov
Dhaka	Max	26.2	33.8	32.3	31.2	31.2	30.2
	Min	12.4	20.1	24.6	26.0	25.8	19.1
Sylhet	Max	27.3	33.5	31.8	32.2	32.2	30.5
	Min	11.7	18.4	23.3	25.3	24.7	18.1
Chittagong	Max	27.2	32.9	32.3	31.4	31.5	30.5
	Min	14.1	21.0	25.2	25.3	25.1	20.0
Rajshahi	Max	24.7	32.2	32.5	31.8	31.2	29.9
	Min	11.2	18.1	24.2	26.5	25.4	18.3
Khulna	Max	26.3	34.8	34.6	32.1	31.9	30.6
	Min	11.6	20.5	25.1	25.4	25.2	17.9
Barisal	Max	26.5	34.2	32.9	30.9	31.1	30.7
	Min	12.1	20.5	25.0	25.1	25.2	18.8

\*Director General, BARI, Joydebpur, Gazipur, Bangladesh.

**Table 2.** Monthly rainfall of different region (mm) (1999).

Region	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Dhaka	0	0	0	050	322	302	442	360	233	422	9	0
Sylhet	0	0	49	207	731	472	775	503	253	344	0	0
Chittagong	0	0	4	006	438	797	713	776	367	262	13	55
Rajshahi	0	0	1	064	305	345	433	567	390	195	7	0
Khulna	0	0	0	018	157	215	388	311	338	155	8	0
Barisal	0	0	0	032	330	457	658	490	409	288	4	6

**Table 3.** Monthly relative humidity of different regions (%) (1999).

Region	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Dhaka	75	69	64	77	82	85	88	86	86	85	78	77
Sylhet	76	70	65	72	82	84	87	86	87	86	80	77
Chittagong	76	72	75	77	83	88	88	89	87	86	80	80
Rajshahi	78	73	62	76	82	85	88	89	88	87	80	79
Khulna	76	73	68	73	80	84	88	87	88	87	79	79
Barisal	82	78	74	79	86	88	91	91	89	89	82	82

### Area and production

Considering the year round availability, popularity and production, banana is considered to be the number one fruit in Bangladesh. This crop accounts for 40.7% of the total fruit production in the country with 22.1% share in area. The total production of banana is recorded to be 572 000 tonnes from an area of 40 500 hectares of land. The average yield of banana is 14 t/ha, which is lower compared to other banana-producing countries in the world. But in commercial orchard, yield is not less than 30 t/ha. Area and production of major fruit crops, excluding palm, are shown in Table 4.

**Table 4.** Area and production of major fruits of Bangladesh (1999-2000).

Name of crop	Area (000 ha)	Production (000 t)
Banana	40.5	572
Mango	50.6	187
Jackfruit	26.7	267
Pineapple	14.2	148
Litchi	5.3	14
Papaya	2.0	12
Watermelon	9.7	79
Ber	4.5	16
Guava	10.1	48
Citrus fruits	10.2	32
Other fruits	9.3	29
Total	183.1	1404

### Uses

Banana is a rich source of calorie, as well as most of the vitamins essential for human nutrition. Dessert bananas are eaten as fresh fruit

while plantain is a good vegetable available throughout the year. Ripe banana mixed with rice and milk is the traditional dish for Bangladeshi. It is used in preparing cakes and other delicious foods. Banana is often the first solid food fed to infant. Plantain has a great demand in the urban areas during the lean period of vegetables from May to October. It is used in fish curry and also mashed with spices. Its green peel is also mashed and eaten. It has medicinal value too. The average food intake of a Bangladeshi is deficient in calorie, vitamins and minerals. Banana, the cheapest fruit of Bangladesh, can improve this situation to a great extent.

### Marketing

Almost all bananas produced in the country are sold in the domestic market. The export markets have their standards and to achieve these, efforts have to be made to produce quality fruits. A small quantity of banana is exported to the Middle-East countries but statistical information is dearth on it. Usually, banana passes two or three hands before it reaches the consumer. Small farmers usually sell their produce to middlemen or collectors in the village, who subsequently sell the same to wholesalers. Retailers and hotels/restaurants will then obtain bananas from the wholesalers. Finally, fruits are sold or served to consumers. Sometimes, retailers collect banana directly from the farmers and sell them at the roadside fruit stalls or markets. As a result, farmers are deprived of their actual price.

### Banana cultivars

#### *Table bananas*

Among table cultivars, Amritsagar, Sabri, Champa, BARI Kola-01, Mehersagar and Kabri are the commercial cultivars. The other cultivars are Dudsagar, Agniswar, Genasundari, Kanaibashi, Basrai, Binisuta etc. The Horticulture Research Centre has 18 cultivars/landraces of table banana in its collection. Besides, there are different types of seeded cultivars growing in the homesteads, roadsides and forests all over the country. The inflorescence of this is a good vegetable. The description of the commercial cultivars is given below:

**Amritsagar (AAA).** Amritsagar is the best table banana in Bangladesh. It fairly resembles the internationally reputed banana Gros Michel, which once occupied 63% of the world market. Plants are medium-sized, weak and cannot withstand strong wind. The ripe banana develops a bright yellow colour. The pulp has a good taste. The average bunch has 5-7 hands and 12-13 fingers in each hand.

**Sabri (AAB).** Syn: Malbhog, Onupam, Martaman. This is a favourite table variety. The plant is tall and can be identified by the yellowish green pseudostem with brownish blotches, reddish margins of the petiole and leaf sheath. The average bunch weight is about 10 kg. A bunch contains 85-120 fingers. Fruits are medium-sized with a thin peel, ivory yellow in colour, firm in texture, sweet and tasty. It is highly susceptible to fusarium wilt, which is a threat to its production and cannot be cultivated more than 2 to 3 times in a ratooning system. The other demerits are easy dropping of ripe fruits from the hand and formation of hard lumps in the pulp. This is widely grown in the north and western areas of Bangladesh.

**Champa (AAB).** It is one of the hardiest tall cultivar grown all over the country. But its cultivation is widespread in Chittagong and Chittagong Hill Districts. It can be grown under rain-fed condition or with scanty irrigation. The plant is resistant to fusarium wilt and fairly resistant to bunchy top disease. Fruits are small in size with thin peel, creamy pulp and sub-acid taste. Fruits turn golden yellow when ripe and have excellent keeping quality. The bunch contains 150-250 fingers and weighs about 16 kg.

**Mehersagar (AAA).** The plant is medium-dwarf. Fruits are large and have greenish to dull yellow colour when ripe. The flesh is very soft and sweet. The keeping quality of fruits is poor and the market price is less. The average bunch weight is about 15 kg. It is susceptible to leaf spot diseases.

**Kabri (AB).** Kabri is known by different names such as Bangla, Shail, Thutae, Manua, etc. The plant is hardy and can be grown without much care. The fruits are very sweet, with a light yellow skin colour and contain a few seeds in most cases.

**BARI Kola-01 (AAA).** Plants are semi-dwarf. Bunch weight is 23.7 kg with 9-11 hands. Fruits are medium to large (150g each), bright yellow and sweet in taste.

**Plantain.** Nine distinct genotypes of plantain have been identified from different parts of the country. Field evaluation of these selected genotypes was done along with FHIA-03. In this trial, FHIA-03 has been found superior to all with respect to yield and disease tolerance. The local genotypes were found susceptible to fusarium wilt. Considering yield potential and disease tolerance, FHIA-03 was released for cultivation as plantain. But its multiplication is very difficult.

### **Production practices**

Banana production in Bangladesh can be categorized basically into three systems: backyard, mixed and commercial small-holder production. The most common production of banana is the backyard production; primarily for home consumption. Crop management is very shy in this system. But productivity and longevity is high. Bananas are grown as perennials in homestead areas. The production is not seasonal. Practically no fertilizer or pesticides are applied. Banana is intercropped with potato, onion, mustard, radish, spinach, amaranth, bitter gourd, cabbage, etc. to obtain additional income in mixed crop production system. In commercial cultivation, banana is grown as a mono-crop. Modern production practices are being followed by most of the growers.

### **Planting materials**

Quality planting material is of prime importance for banana production. But most growers are not well aware to the sucker quality. The farmers collect suckers from old orchards without having known their disease status. As a result they fail to produce a good crop. Biotechnology division of the Bangladesh Agricultural Research Institute (BARI) has developed the micro-propagation protocol of banana. It was observed that the performance of tissue-cultured plants was better with respect to yield and fruit quality. Training programmes were organized for NGO personnels on the technique of micro-propagation. Some NGOs are producing banana plantlets on commercial basis through tissue-culture.

### **Major pests and diseases**

In Bangladesh, banana-scarring beetle is a serious problem which causes scar on the fruits by feeding on young flowers and fruits. The fruits affected by this pest have poor market acceptability. Yield reduction occurs due to severe incidence of this pest. Table banana varieties of ratoon crop were found to have a high incidence of scarring beetle. The growers used to apply DDT and other systemic insecticides directly on the bunch to protect fruits from beetle. But the most successful method to avoid this beetle is the bagging of the bunch before opening the first hand. Mites and thrips also cause considerable damage of the flowers and fruits but are not alarming with a few exceptional cases. Banana aphid is widespread and is responsible primarily for the transmission of Banana Bunchy Top Virus (BBTV) and thus causes damage to the crop to a considerable extent. Stem

borer is another problem in some local cultivars. The exotic variety ITC 1265 (FHIA-23) is very much susceptible to this insect.

Fusarium wilt and sigatoka leaf spot are the serious diseases of banana in Bangladesh. Sabri and plantain cultivars are seriously damaged by fusarium wilt with a threat to extinction. The use of disease-free planting materials and improved drainage system can prevent infection. Most of the table and plantain cultivars are susceptible to sigatoka. Tilt and Bavistin are found effective against the disease. But farmers rarely spray their plants. Recently, Banana Streak Virus (BSV) and Banana Bract Mosaic Virus (BBrMV) have been found to increase in the country but not much emphasis has been given yet in this regard. Only Banana Bunchy Top Virus (BBTV) is known to commercial growers and rouging is being done by them. Tissue-cultured plants can play a vital role in overcoming this serious disease. Nematode is also a problem in banana, but no research work was done in this area in the past.

### Environmental factors

Cyclones, drought, flood, cold temperature, etc. are commonly experienced stresses in different banana-growing regions. The southern part of Bangladesh is cyclone-prone causing occasional heavy damage on banana plantation. The eastern part is subjected to monsoonal damage. In winter, vegetative growth of banana is reduced and bunches are underdeveloped because of low temperature lower than 20°C for about two months. The northern part experiences drought for a long period. Most of the low-lying areas are affected by flood almost every year leading to heavy production loss.

### Research activities

- **Improvement of local cultivars.** In hilly region the local cultivars Kabri (Banglakola) and Champa are being grown without much care. Variability also exists in those cultivars. Hence, research emphasis has been given to develop and improve varieties through clonal selection.
- **Evaluation of improved varieties/landraces.** Eighteen germplasm of banana were received in 2000 from INIBAP Transit Centre (ITC), Belgium through BAPNET. Fifteen of them were planted in the field for sigatoka and performance evaluation under International *Musa* Testing Programme (IMTP) Phase III. The germplasm ITC 1271 (GCTCV-215), ITC 1319 (FHIA-18), ITC 1320 (Jamaica), ITC 1283 (Cuban origin) and one mutant from ITC 0570 (Williams) showed better performance in respect of yield. ITC 1283 produced

bigger bunch with 15 hands awaiting harvest. But problem is that it took longer period from planting to harvest. Performance of these varieties at different planting season is required before final evaluation. Three new banana germplasm ITC 1262, ITC 1442 (GCTCV-106) and ITC 1443 (GCTCV-247) were collected from Belgium in July 2003. These are in the tissue culture laboratory for multiplication. Next year, these three germplasm will be included in field trial. Collection is being continued.

- The banana germplasm received from ITC, Belgium are being grown in earthen pots in insect protected net house to keep the plants in virus-free condition. The local commercial cultivars will also be conserved in net house for producing healthy suckers. The healthy suckers will be used to produce large number of healthy propagules for distribution to the progressive growers.
- It is reported that FHIA-03 is performing well in the farmers' field with respect to yield and cooking quality. But it is very slow in producing suckers in the field as well as in the tissue-culture laboratory. Mortality percentage is also high during establishment in the nursery.
- **Soil nutrient management.** Banana is a quick growing and exhaustive crop for nutrient requirement for its growth. In hilly areas and homesteads, banana is being grown without any fertilizer. Though there is a recommendation of fertilizer application in banana, the farmers do not usually follow. Only the commercial-scale farmers use it. Most of the growers use high amount of phosphate and urea but low potash. Effects of macro-nutrients on banana were studied at some locations but not micro-nutrients. So, the requirement of micro-nutrients for banana cultivation in Bangladesh is yet to be standardized based on research findings. At present, deficiency of zinc and boron is exhibited in the field. In commercial area, farmers use urea after bunch opening to encourage growth of the fingers. Sometimes, banana is observed to ripe before proper maturation, causing yield reduction and quality deterioration.
- **Crop protection program.** In-depth evaluation of *Musa* germplasm against sigatoka leaf spot diseases was initiated but the experiment failed due to the heavy hail storm in April 2003. Thirteen germplasm collected from Belgium were included in this study. The study is being continued in ratoon crop. Sigatoka is a common disease of Cavendish-type banana. There is a programme to identify the species of nematode in banana-growing areas. A plant pathologist is expecting training from BAPNET in this aspect.

- **Postharvest handling.** Bananas are transported to the nearby markets usually by bicycles, tricycles, wheel barrow, boats and shoulder carrier. Trucks are used for distant city markets. Therefore, about 20-30% fruits are damaged due to heavy pressure of the bunches and rough handling during loading and unloading. Natural ripening of banana is done for home consumption only. Heat treatment is the common method for ripening banana in commercial scale. Heating is done either by a candle or stove or burning rice husk to banana covered with the polyethylene film or in a closed room for 6-20 hours, depending on the season and variety. In this system, the firmness or texture of banana is damaged partially due to high temperature created inside the polyethylene cover or closed room. Even the heating period is longer and no cooling system after heat treatment. Fans are occasionally used to cool down the temperature. About 10-15% bananas are damaged within a day due to overheating. Fruit colour also becomes fate. Some businessmen also use ethrel to hasten ripening but not in proper dose and in scientific way. They usually spray ethrel on the whole bunch before loading truck for shipment to distant market. Sometimes immature bunches were harvested especially during higher market price. No processing industry for banana is developed in the country.

### **Development activities**

- Field days and training programmes were organized for the banana growers, NGOs and extension personnel with a view of promoting modern banana production technologies. There are training programmes for the businessmen on proper method of ripening through ethrel. It will help in reducing postharvest losses.
- Last year a good number of tissue-cultured suckers of commercial cultivar BARI kola-01 were distributed to the growers.
- The advantage of using organic fertilizer on banana was demonstrated in the farmers' field by the Fertilizer Company in collaboration with BARI.

### **Institutions involved on banana research**

- Horticultural Research Centre, BARI
- Bangladesh Agricultural University (BAU)
- Bangabandhu Sheikh Mujibur Rahman Agricultural University (BSMRAU)



### **Opportunities**

Banana is a popular fruit in the country. It is the only fruit which is within the buying capacity of poor people. Hence, it is of utmost importance to increase production to meet the demand of the country. The following are the opportunities to improve the present situation of banana industry in Bangladesh:

- Utilization of hilly areas for banana cultivation
- Intervention of modern varieties and technologies for both plain and hilly areas
- Use of improved cultural practices
- Reduction of postharvest losses.

There is also a possibility to export fresh banana and its products.

### **Thrusts**

Research thrusts have already been given on varietal improvement, production of disease-free planting materials, fertilizer management, disease management and postharvest management of banana. Further, alternative techniques to avoid beetle is also ongoing. Emphasis has been given on field days, demonstration and training programmes for quick dissemination of the technologies. Prime importance has also been given on the maintenance of disease-free mother plants of commercial cultivars and released varieties for large-scale multiplication and distribution to the growers.

### **Proposed areas of collaboration**

Collaboration for banana research is needed in the following fields:

- Variety improvement through germplasm exchange
- Banana diseases (identification, yield loss assessment, indexing and management)
- Banana sucker multiplication through tissue culture
- Postharvest handling of banana
- Human resources development with regards to training, visits, higher studies, etc.