Current situation of banana R&D in Myanmar

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Introduction

Myanmar is located between 9° 59' and 28° 31' N latitude and 92°10' and 101° 09' E longitude. The total area is 670 720 km² or 67 658 M ha of which about 9.67 M ha (14%) is currently cultivated. The agriculture sector is the most important as it contributes 35% of export earnings.

Myanmar is home to several species of plants because of different agro-ecological zones. Among them, more than a hundred horticultural crops are grown in the various climatic conditions such as tropical and sub-tropical. From 2001 to 2002, the cultivated area for horticultural crops was more than 1 M ha.

The horticultural crops rank fifth in the agriculture sector. Therefore, the Ministry of Agriculture and Irrigation endeavours to boost the production of these crops through area expansion, introduction of improved varieties, technology transfer and market information to the growers.

Agro-climatic condition

Myanmar has tropical and sub-tropical climates with three general seasons, namely the rainy season (mid-May to mid-October), the dry cold season (mid-October to mid-February) and the hot season (mid-February to mid-May). The average annual rainfall varies over the country, ranging from 2540 mm to 5080 mm in the coastal and hilly regions, and from 762 to 1016 mm in the central dry zone. The temperature in the south differs a little from season to season. However, seasonal temperature variation of central plain lies in the magnitude of about 40°-43°C in the hot season and 10°-15°C in the cold season. In hilly regions, the average daily maximum is approximately 29°C and the minimum is 7°C.

Banana growing in Myanmar

In Myanmar, banana is one of the most important and common fruits. It can be grown throughout the country. According to 2002-2003 statistics, banana cultivated area was approximately 57 847 ha and production was 110.4 M bunches (552 051 t). All produced bananas

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are consumed locally.

Thirteen *Musa* species, including wild species are widely grown throughout the country. Among them, *Musa acuminata*, *M. cavendishii* and four varieties under *M. sapientum* are the most common varieties.

Home or backyard gardening is the common cultivation practice in Myanmar especially in the rural areas. Although commercial plantations can be found in only seven states and divisions, pests and diseases problem exist also in other areas. However, banana growers are not aware of these problems. Therefore, no control measures are being taken by farmers.

Banana R&D activities

The banana R&D activities are as follows:

- Germplasm collection of local cultivars and introduced varieties
- Varietal trials on introduced varieties
- Cultural practices
- Multiplication methods
- Postharvest handling technology

Germplasm collection

The Vegetable and Fruit Research and Development Center (VFRDC) in cooperation with the DAR (Department of Agriculture Research) and Yezin Agriculture University conducted evaluation studies on banana germplasm. In VFRDC, 32 local cultivars and 28 introduced varieties are maintained with which varietal and adaptability trials were conducted. The list of affected germplasm collection and results of evaluation on banana are shown in Tables 1 and 2.

The germplasm is maintained for conservation and for selection on pest and disease resistance/tolerance.

Likewise, Myanmar received from INIBAP ITC 23 cultivars, and their conditions were observed in VFRDC. Results are shown in Table 3.

One set of the 23 varieties was sent to DAR for field trials, while the remaining four sets were planted by VFRDC in the field and in pots in the screenhouse. Two plants of each cultivar were grown in the field and two plants the pots are placed in the screenhouse.

Varietal trial and adaptability test

The banana is essentially planted in tropical lowland. The varietal trial on local cultivars was conducted to get the fruit quality, yield, and

Table 1. Local cultivars, genotype and characteristics.

Cultivars	Genome group	Flower bud shape	Leaf tip	Fruit shape	Fruit peel color	TSS (Brix)
Red banana (Shwe Ni)	AAA	ovoid	obtuse	straight	red-purple	21.75
Cavendish Khunwar themwe	AAA	pointed	slightly pointed	straight	yellow	20.50
Giant Cavendish	AAA	pointed	slightly pointed	straight	green	20.50
Dwarf Cavendish (Themwe)	AAA	pointed	slightly	straight	yellow	22.08
Bluggae	ABB	blunt	obtuse	straight	yellow rusty	16.22
Mysore (Rakhine)	AAB	ovoid	intermediate	straight	yellow (bright yellow)	14.30
Butter(silk) (Htawbut)	AAB	blunt	obtuse	straight	rusty brown	20.00
Pya Ye Sam	AAB	ovoid	obtuse	straight	yellow rusty	21.90
Nget- Phyar	ABB	blunt	pointed	straight	rusty brown	16.00
Sar Galay	AA	ovoid	-	curve in distal	yellow	14.50
Sin Ann	ABB		blunt	obtuse	-	16.50
Thanda Ni	AAA	ovoid	obtuse	straight	green	24.50
Thanda Ni	AAA	ovoid	obtuse	straight	reddish brown	24.50
Green Red	AAA	ovoid	obtuse	straight	green	19.50
Nan Thar Pu	AAB	ovoid	obtuse	curved in distal	-	21.00

Table 2. Exotic cultivars, genotype and characteristics (Sein Hla Bo).

Cultivars	Source	Genome group	Flower bud shape	Leaf Tip	Fruit shape	Fruit peel color	TSS (Brix)
Cavendish (Williams)	Israel	AAA	pointed	slightly pointed	straight	yellow (green)	21.40
Barangan (LKB-1)	LK.Bio (Singapore)	AAB	blunt	obtuse	straight	pinkish yellow	20.00
Giant Cavendish (LKB-2)	Singapore	AAA	pointed	slightly pointed	straight	yellow	19.50
Dwarf Cavendish (Green)	Singapore	AAA	pointed	slightly pointed	straight at distal end	yellow	24.00
Dwarf Cavendish (Green)	India	AAA	pointed	slightly pointed	straight at distal end	green	21.5

resistance to pests and diseases. For the exotic cultivars, the adaptability tests were conducted in lowland Myanmar, including their performance and quality. Based on the local demand and customer preference, the variety selections were observed for yield, fruit quality and shelf-life through multi-location tests.

Cultural practices

For the crop improvement strategy, different planting systems, cultural practices, fertilizer application rate and water management play key

Table 3. List of germplasm received from ITC and their condition upon receipt (20 November 2004).

Cultivars	Number of plantlets	Mean		Leaf shape
		No.of leaves	Stem length(cm)	
ITC. 0506 (FHIA-03)	5	6.8	20.5	pointed tip
ITC. 0570 ('Williams')	5	9.5	14.5	rounded tip
ITC. 1264 (FHIA-17)	5	9.0	19	pointed tip
ITC. 1441 ('P. Ceylan')	5	8.0	26	pointed tip
ITC. 1297 (TMBX 5295-1)	5	8.0	28	pointed tip
ITC. 1122 ('Gros Michel')	5	8.0	25.5	pointed tip
ITC. 1442 (GCTCV-106)	5	9.0	21	pointed tip
ITC. 1282 (GCTCV-119)	5	10.5	10	pointed tip
ITC. 1319 (FHIA-18)	5	8.5	19	rounded tip
ITC. 1418 (FHIA-25)	5	8.5	18.5	pointed tip
ITC. 1344 (CTBP-39)	5	7.0	14	pointed tip
ITC. 1283 (SH3436-9)	5	9.5	15	pointed tip
ITC. 1307 (SH-3640)	5	6.5	14	pointed tip
ITC. 1265 (FHIA-23)	5	9.5	20.5	rounded tip
ITC. 1443 (GCTCV-247)	5	8.0	16.5	pointed tip
ITC. 1332 (FHIA 21)	5	9.5	22	pointed tip
ITC. 0643 ('Cachaco')	5	9.5	14	pointed tip
ITC. 0312 ('P. Jari Buaya')	5	9.5	9.5	pointed tip
ITC. 0504 (FHIA-01)	5	9.0	15	pointed tip
ITC. 0505 (FHIA-02)	5	9.5	17.5	rounded tip
ITC. 1296 (TMBX-1378)	5	9.0	20	long pointed tip
ITC. 1123 ('Yangambi Km 5')	5	9.0	19.5	pointed tip
ITC. 0712 ('AA Cv Rose')	5	8.5	18.5	pointed tip

roles for yield and quality of banana. Standard planting density is 5 m x 5 m. For the trials, 2.55 m x 2.55 m planting density is used due to the adaptation of growers in major banana production areas that lead to nearly four times increment of plant population. However, further research activities should be implemented. Also, appropriate dosage of fertilizer application is required for preventing the lodging of banana, especially for giant cultivars. For this purpose, future research activities will be extended in the area of nutrient requirement, timing and amount of application, irrigation scheduling and crop water requirement in different locations.

Multiplication methods

The popular cultivars were selected to help meet the increasing demand for planting materials. The two multiplication methods were propagation by suckers and division of eye-buds. Results showed that one sucker can produce at least (4-8) eye buds in Dwarf Cavendish that can grow well into new plants like suckers.

Tissue culture

The micro-propagation technique in banana was successfully operated at the VFRDC tissue-culture laboratory under Myanma Agriculture Service since 1987. This activity enhances the rapid multiplication of

good-quality banana varieties. Likewise, the conservation of germplasm was done by this technique. At present, 15 banana varieties were produced and distributed to the growers. VFRDC plans to produce 300 000 plantlets from 2004 to 2005 by tissue culture. Through this rapid method, the increasing demand of the growers will be met.

Postharvest handling

Postharvest losses of banana range from 20-80% in Myanmar were caused by problems in transportation, packing and marketing systems.

These losses may be attributed to physiological and mechanical damage, and pests and diseases. Due to the soft texture and high moisture content, banana is more susceptible to mechanical injury. Thus, growers and distributors need to do careful handling for packing, transportation and storage. On the other hand, the technology for post-harvest handling, temperature control, control atmosphere storage and control of shelf-life is needed. Thus, research activities were conducted in VFRDC.

The effect of KCl on fruit quality of Cavendish banana was tested and shown in Table 4.

Table 4. Effect of KCl on fruit quality of Cavendish banana (VFRDC,Yangon 1998).

Treatments	Stem height (cm)	Fruit weight (m)	Hand weight (kg)	TSS (Brix)	Resistance to lodging	Remarks
KCl (450 gm/plt)	171-220	169.30	2.50	21.50	1.30	VFRDC(D4)
KCl (900 gm/plt)	171-235	190.00	2.70	21.70	1.15	
KCl (1200gm/plt)	171-260	193.10	2.95	22.50	0.50	
Control	171-230	170.40	2.73	20.00	2.10	
CV (%)	-	17.52	0.53	0.98	14.87	
LSD (5%)	-	13.41	2.49	2.24	0.74	

As mentioned earlier, the growers are less aware of pest and disease problems. Major pest and disease problems are on stem borer infestation and anthracnose disease in some area. In VFRDC, IPM implemented on preharvest field conditions influenced the postharvest quality of banana. Results showed that Anthracnose incidence is reduced and increased yield and leaf numbers are observed.

Likewise, chemical treatment, packaging material, controlled atmosphere and other necessary research depend on development of banana production.

Constraints in banana R&D

- Lack of extension staff for horticulture crops
- Limited budget for extensive demonstration plots
- Limited research funding
- Continuous technology transfer to farmers
- Capacity building of staff.

Conclusion

Myanmar endeavours to improve banana R&D through more research activities. Likewise, Myanmar aims to collect banana germplasm and to have technical collaboration with other governments, different organizations and agencies. Knowledge gained from this meeting will be applied to help improve the banana R&D in the country.