STUDY ON RACHIS CHARACTERS OF DIFFERENT VARIETYS OF BANANA

Abstract

Banana is one of the most important staple food around tropics. Bananas can be eaten as green when it is starchy. These crops are the most important components for food security around world by providing income to the farming community through local trade. This experiment was conducted to study the rachis behaviour and male bud characteristics of ABB genomic group and AAB genomic group banana cultivars. Here 5 varieties under ABB genomic group (Behula, Bara Beglo, Bluggoe, Green Bombay, Pantharaj) and 5 varieties of AAB genomic group (Dudhsagar, Martaman, Manohar, Desi Malbhog, Kalibhog) were observed. All of these 10 varieties showed different characteristics in case of male bud, like male bud shape, male bud size, colour of the bract (external face), male bract lifting, wax on the bract, male flower behaviour, compound tepal basic colour, anther colour, stigma colour, ovary shape and dominant colour of male flower, all these were explained in details in this study.

Key word: Banana,rachis and male bud

Introduction

Banana(*Musa spp*. L) is a antique fruit grown in the world. It is the 4th most important crop after rice, wheat and corn in the world (Paul *et al*., 2023).It belongs to Musaceae family and edible banana native to South East Asia. It is possibly the world's oldest cultivated crop (Kumar *et al.,* 2012).It is divided into edible cultivars and non-edible wild species. The edible bananas include dessert, cooking and beer making cultivars, which mostly originated from Southeast Asia (Perrier *et al*. 2009). Their ancestors are *Musa acuminata* Colla denoted as AA and *Musa balbisiana* Colla (BB). The natural hybridization between and within *M. acuminata* and *M. balbisiana* resulted in several cultivars with different genomes and ploidy levels (Hippolyte *et al*. 2012). The possible genomic groups for bananas include; AA, BB, AB, AAA, AAB, ABB AABB, AAAB and ABBB (Creste*et al.* 2003). Among AAB triploids, there are 11 subgroups as reported by Uma *et.al,* (2005).Many banana cultivars with ABB genomes, such as 'Kluai Tip Yai', 'Kluai Hak Muk', and 'Kluai Nam Wa,' are grown in Thailand (Somsong*et al.,* 2015). The edible bananas are indigenous to Asia, which is the fourth most important commodity in the world after rice, wheat and corn. Banana are one of the most important commercial food crops, especially in the tropics. It is a monocotyledonous, perennial, herbaceous succulent plant and one of the world's important fruit crops. It comes under the order Zingiberales and botanically named as *Musa paradisiaca*. It also rich in Carbohydrate (21.8gm/100g), Protein (1.1gm/100gm), Potassium (385 mg/100gm), β-carotene (68µg), Niacin (610µg), Vit-C(11.7mg/100gm) and Water (74 gm) (Aurore *et al.* 2009). Banana contains 20% sugars. Bananas are nutritionally low protein food material but relatively high in carbohydrates, vitamins and minerals (Offem*et al.* 1993).Recently banana flower is an important agricultural by-product that is often consumed as vegetable in many Asian countries such Malaysia, Indonesia, Sri Lanka, Philippines and other South East Asia countries and rich source of different minerals and nutrients.

Thus acquiring knowledge on rachis of bananas can provide additional benefits on

characterization and increasing its use. The present study aimed to characterize the different genomic groups of banana.

Materials and methods

The present experiment was carried out at ICAR-AICRP on Fruits, Mohanpur Centre, Bidhan Chandra Krishi Viswavidyalaya, Mondouri, Nadia, West Bengal during the period of 2019-2021. The experimental site was situated at 23.50^0 North latitude and 89^0 East longitude with an altitude of 9.75 meter above the mean sea level. Ten varieties were planted in a spacing of 2.5m×2m, taken for present investigation and these wereBehula (ABB), Bara Beglo (ABB), Bluggoe (ABB), Green Bombay (ABB), Pantharaj (ABB), Dudhsagar (AAB), Martaman (AAB), Manohar (AAB), Desi Malbhog (AAB) and Kalibhog (AAB). The rachis and male bud parameter were taken by daily visual observation. Rachis and male bud parameters of twelve characters were selected for characterization of rachis and male bud of different varieties of bananas by using NBPGR descriptor.

Result and discussion

Table1 present the rachis and male bud parameters of different variety under the ABB genomic group. The number of scares on rachis varied from 60 for GreenBombay to 34 for Bluggoe. The shape of male bud of all variety were ovoid. The length of male bud was varied from 21-30 cm for all variety. Red-purple colour of the external face of bract ware Behula, Bara Beglo, Bluggoe and Pantharaj, whereas in case of Green Bombay was purple colour. Male bract was lifting one time for Behula and Green Bombay, where two or time for Bluggoe, Pantharaj and Bara Beglo. Most of the variety of ABB genomic group were very wax bract except Pantharaj which was morderate waxy bract. The male flower behaviour all variety of ABB genomic group were falling before bract. The compound tepal basic colour of all variety was cream except Behula which has white colour.Anthar colour was not varied among the variety, all were yellow. The stigma colour was cream for Behula, Bluggoe, Pantharaj, and Green Bombay, whereas pink-purple for Bara Beglo. The overy shape was straight in Pantharaj, but arched in Behula, Bluggoe, Bara Beglo and Green Bombay.The dominant colour of male flowerwere pink in Behula, Bluggoe, Bara Beglo and Green Bombay but purple-brown in Pantharaj.

In an experiment it was found that Mali-Ong (ABB genomic group) The male bud shape is ovoid. The male flower is yellow-orange. The male bud length at harvest is 27–29 cm. Bract base shape: tiny shoulder, obtuse apex, dark red exterior face, dark red interior face, deep grooves, and a waxy texture. Before falling, the bract rolls and creates very prominent scars on the rachis. Male flowers fall after the bracts. Free tepal is oval in shape, translucent white, obtuse, and has a developed apex. There are five anthers, which are yellow with red at the lobe margin, anther exertion is at the same level, and the filament is yellow-green. The ovary shape is curved, the basic color is yellow, the style is straight, and the stigma is yellow. The arrangement of the ovules is four-rowed (Premjet*et al.*, 2022).

Table1:RachisandmalebudparametersofABB

			Bluggoe(ABB	***GreenBombay(A***	***Pantharaj(A***

	Behula(AABB)	***BaraBeglo(ABB)***	***)***	***BB)***	***BB)***
Scaresonrachisnumber	35	35	34	60	37
Male bud shape	Ovoid	Ovoid	Ovoid	Ovoid	Ovoid
Malebudsize	21-30cm	21-30(29) cm	21-30cm	21-30(29) cm	21-30cm
Colourofthebract(externalface)	Red-purple	Red-Purple	Red-purple	Purple	Red-purple
Malebractlifting	Oneatatime	Lifting two or more at a time	Twoatatime	Liftingoneatatime	Twoatatime
Waxonthebract	Verywaxy	Very waxy	Verywaxy	Verywaxy	Morderate waxy
Maleflowerbehavior	Fallingbeforebract	Falling before the bract	Fallingbeforebract	Fallingbeforebract	Fallingbeforebract
Compoundtepalbasiccolour	White	Cream	Cream	Cream	Cream
Antharcolour	Yellow	Yellow	Yellow	Yellow	Yellow
Stigmacolour	Cream	Pink-purple	Cream	Cream	Cream
Overyshape	Arched	Arched	Arched	Arched	Straight
Dominantcolourofmaleflower	Pink	Pink	Pink	Pink	Purple-brown

Table2 present the rachis and male bud parameters of different variety under the AAB genomic group. The result showed that scares on rachis was varied from 33 (Manohar) to 47 (Desi Malbhog). The male bud shape was ovoid (Dudhsagar and Desi Malbhog), like a top (Manohar and Kalibhog) and intermediate (Martaman). The male bud size varied from 15 cm (Manohar) to 26 cm (Dudhsagar).Generally, the AAB Apple banana groups have a bare rachis at the time of fruit maturity, the Sukari Ndizi rachis is always bare, even just a few weeks after flowering (Onyango *et al.*, 2011).The bract colour of external face was purple in Dudhsagar, Martaman, Manohar, Desi Malbhog and Kalibhog. In AAB genomic group male phase is short with whip like rachis ending with a 'top' shaped male bud (Ravishankar*et al.*, 2017).In Dudhsagar, male bract lifting was one at a time and two at time lifting in Martaman, Manohar, Desi Malbhog and Kalibhog. Very waxy on the bract was present in Dudhsagar, Kalibhog and Manohar whereas, moderate wax on the bract was present in Martaman and Desi Malbhog.The male flower behavior was persistent (Dudhsagar) and falling before bract (Martaman, Manohar, Desi Malbhog and Kalibhog). All variety of AAb genome were cream colour compound tepal and anther, and ovary shape was arched. Stigma colour varied among the different variety were cream (Manohar), yellow (Dudhsagar) and black (Desi Malbhog and Kalibhog). Purple brown colour dominant of male flower observed in Manohar and Kalibhog, whereas Dudhsagar, Martaman and Desi Malbhog were cream colour.

Table2:RachisandmalebudparametersofAAB

	Dudhsagar (AAB)	**Martaman(AAB)**	**Manohar(AAB)**	**DesiMalbhog(AAB)**	**Kalibhog (AAB)**
Scaresonrachisnumber	42	42	33	47	39
Malebudshape	Ovoid	Intermediate	Likeatop	Ovoid	Likeatop
Malebudsize	26cm	24cm	15cm	23cm	24cm
Colourofthebract (externalface)	Purple	Purple	Purple	Purple	Purple
Malebractlifting	Oneatatime	Twoatatime	Twoatatime	Twoatatime	Twoatatime
Waxonthebract	Verywaxy	Moderatewax	Verywaxy	Moderatewax	Verywaxy
Maleflowerbehavior	Persistent	Fallingbeforebract	Fallingbeforebract	Fallingbeforebract	Fallingbeforebract
Compoundtepalbasiccolour	Cream	Cream	Cream	Cream	Cream
Antharcolour	Cream	Cream	Cream	Cream	Cream
Stigmacolour	Yellow	Black	Cream	Black	Black
Overyshape	Arched	Arched	Arched	Arched	Arched
Dominantcolourofmaleflower	Cream	Cream	Purplebrown	Cream	Purplebrown

Fig.1 Bloggue

Fig.2 BaraBeglo

Fig.3 Pantharaj

Fig.4 Kalibhog

Fig.5 Manohar

Fig.6 GreenBombay

Fig.7 Martaman

Fig. 8 Bloggue

Fig. 9BaraBeglo

Fig. 10 Dudhsagar

Conclusion

These results indicate that out of 12 different characters of male bud the characters i.e. wax on the bract, compound tepal basic colour, ovary shape, anther colour are the most dominant characters in these 10 varieties. It will help us to characterize different varieties, also to evaluate the relationship among the different genotypes.

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