

A note on Performance of *Annona* Hybrid 'Arka Sahan' under South Andaman Condition

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Abstract

To evaluate performance of *Annona* hybrid 'Arka Sahan' under island condition, grafts of this hybrid were introduced in Andaman islands during 2015. Studies suggested that, during initial period, the grafts established well without exhibiting any mortality. Vigorous vegetative growth was observed and partial fruit set was noticed even without manual pollination. Fruit physicochemical parameters were also studied in this communication. However, plants suffered due to dry stem rot and an unidentified fruit and stem borer pest, causing significant mortality in the plants. This report would serve as a reference for planning any research in future on this hybrid under island condition.

Keywords: Bay islands; fruits; fruit quality; natural pollination

Introduction

Annona hybrid 'Arka Sahan' is the first tri-specific hybrid developed at ICAR-Indian Institute of Horticultural Research Institute, Hessarghatta, Karnataka. The hybrid is characterized by large sized fruits, less number of seeds per fruit and better shelf life. Further, the hybrid requires assisted pollination to facilitate fruit set and development (Jalikap and Kumar 2007). The hybrid is getting popular in a number of states in mainland India. Being a hybrid, its performance in newer areas needs to be evaluated before it could be promoted on large scale.

Soil and climatic conditions of Andaman and Nicobar Islands have been reported to favour growth and development of species of Annonaceae family and *A. squamosa*, *A. reticulata*, *A. glabra* and *A. muricata* are being grown in these islands (Singh *et al.* 2016, Bohra *et al.* 2019). These species are found in a number of backyard gardens in the islands, while species such as *A. reticulata* are commonly noticed in places such as Long island. Considering these, an attempt was made to introduce the hybrid to evaluate its performance under island condition.

Materials and methods

Grafted plants of *Annona* hybrid 'Arka Sahan' were introduced from the ICAR-IIHR, Hessarghatta and hardened for one year. Experiment on performance

evaluation was initiated during 2015 at two spacing (5.0 m × 2.5 m and 5.0 m × 5.0 m). Two years old grafts were planted in pits of size 60 cm × 60 cm × 60 cm filled with soil and well rotten farmyard manure (20 kg). Grafts were grown under rainfed condition and only protective irrigation was given during dry period. After three years of planting, growth parameters such as mean plant height (m), mean number of branches per plant, mean collar girth (cm) and mean canopy spread (m) were measured following standard procedures.

No hand pollination was carried out and fruits were allowed to set during 2018 and fruit related parameters were recorded in the set fruits. Fruit weight (g) was recorded using electronic balance; while fruit polar length (cm), polar circumference (cm), equatorial length (cm) and equatorial circumference (cm) were measured using scale. Fruits were cut opened, rind was removed and its thickness was measured using vernier caliper. Pulp weight (g), seed weight (g) and mean seeds per 100 g pulp were determined. Total soluble solids content (°B) of pulp was determined using hand held refractometer. Results obtained during present study were compared with the report published from ICAR-IIHR, Bengaluru. Symptoms of a fungal disease were observed during the experimentation. Pure cultures of pathogen were isolated on potato dextrose agar medium and samples were identified from National Centre for Fungal Taxonomy, New Delhi.

Table 1: Field performance of *Annona* hybrid ‘Arka Sahan’ under island condition after three years of planting

Spacing (m ²)	Mean plant height (m)	Mean number of branches per plant	Mean collar girth (cm)	Mean canopy spread (m)
5.0 × 2.5	1.8 ± 0.08	5.9 ± 0.70	17.8 ± 0.35	2.3 ± 0.09
5.0 × 5.0	1.6 ± 0.21	7.8 ± 0.73	18.6 ± 1.20	2.1 ± 0.19

Table 2: Comparative quality evaluation of fruits grown under island condition with mainland India

Parameters	Andaman#	Bengaluru*	West Bengal**
Fruit weight (g)	233	285-296	162
Fruit polar length (cm)	7.4	-	8.7
Fruit polar circumference (cm)	24.6	-	-
Fruit equatorial length (cm)	8.4	-	7.6
Fruit equatorial circumference (cm)	25.6	-	-
Total soluble solids (°B)	25	26-32	24.8
No. of seeds/ 100 g fruit weight	8.2	5.9-6.9	-
Mean Seed weight (g)	0.25	0.29-0.36	-
Pulp weight (g)	171.6	-	-
Pulp (%)	73.7	-	52.0
Skin thickness (cm)	0.35	0.16-0.17	-

naturally pollinated condition, *Jalikor and Kumar (2007), **Nandi et al. 2018

Results and discussion

During initial period of establishment, grafts grew well and vigorous growth was noticed. Only two plants were found to die during establishment and gap filling was done, both of which survived. After three years of planting, plants attained an average height of 1.6-1.8 m. At this stage, about 5.9- 7.8 branches were produced in each plant. As the plants during this phase were small and their canopies did not overlap, variations observed in growth of plants could not be attributed to spacing. Collar thickness of the plants varied between 17.8 and 18.6 cm, while canopy spread of 2.1 to 2.3 m was recorded.

Fruiting was observed to certain extent in plants without manual pollination. Fruits (Fig. 1) were comparatively smaller (233.0 g) than that reported

earlier (Jalikor and Kumar 2007) from crop grown under Bengaluru condition (285-296 g), probably due to absence of manual pollination. Island grown fruits had polar length of 7.4 cm, polar circumference of 24.6 cm, equatorial length of 8.4 cm and equatorial circumference of 25.6 cm. Fruits grown in the island had less TSS (25.0 °B) than that grown in Bengaluru (26-32 °B). Fruits had more number of seeds per 100 g fruit weight (8.2), than those reported from Bengaluru (5.9-6.9). However, seed size was smaller in island grown fruits as mean seed weight of 0.25 g was noticed in these fruits, when compared to 0.29 to 0.36 g in those grown in mainland India. Each fruit had about 171.6 g pulp, which contributed to 73.7% of fruit weight. Under West Bengal condition (Nandi et al., 2018), fruits of ‘Arka Sahan’ were much smaller (162 g) with less pulp content (52.0%) than that reported in the islands. Varied performance of cultivars in new

areas is due to climatic variations and tree physiological factors (Rymbai *et al.* 2014) and hence, fruit parameters of 'Arka Sahan' considerably varied in areas tested. Thicker fruits provide advantage in distant transportation of fruits and hence, the thicker skinned fruits (0.35 cm) observed in islands could be of advantage.



Fig. 1: Fully developed fruits of *Annona* hybrid 'Arka Sahan' under island condition

However, plants and fruits were found to be infested with unidentified pest, causing considerable damage. The larvae of the said pest bored into fruits and stem, which was noticed in the form of exudation of frass from the damaged area. Further, stems in some plants exhibited dry rot symptoms, thereby causing mortality of plants. Branches started gradually drying up due to both pest and disease. The pathogen was identified as *Phomopsis annonacearum*, which was not reported earlier from the islands. As no chemical insecticides/ fungicides were available for control in the islands, within a period of few months the pest and pathogen could spread in the complete orchard thereby killing all the plants. Hence, further investigations could not be carried out regarding identification of the pest or developing management strategies for it. Under West Bengal condition, bacterial wilt has been reported in plants of 'Arka Sahan' with plant mortality to the tune of 20% (Nandi *et al.* 2018).

Conclusion

From the present investigation, it could be concluded that, growth and performance of the hybrid was

satisfactory in the initial period under island condition. Further, fruit set was also noticed with acceptable fruit qualities in island grown plants. Manual pollination could help in improving fruit parameters in future. However, considering the pest and pathogen issues, the hybrid is not recommended for cultivation in the islands in the absence of suitable plant protection package.

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