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FRUIT CHARACTERISTICS, YIELD CONTRIBUTING CHARACTERS AND YIELD OF SOME COWA (*Garcinia cowa*) GENOTYPES UNDER NORTH EASTERN HILLY REGION OF BANGLADESH

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ABSTRACT

Rahman SML, Bhuyan MHMB, Mustakim AAMM, Sarker JC, Rahman MS (2014) Fruit characteristics, yield contributing characters and yield of some cowa (*Garcinia cowa*) genotypes under north eastern hilly region of Bangladesh. *Int. J. Expt. Agric.* 4(2), 17-19.

A study on the fruit characteristics, yield contributing characters and yield of five Cowa genotypes was carried out at the Fruit Research Farm and Laboratory of Citrus Research Station, Bangladesh Agricultural Research Institute, Jaintapur, Sylhet, during fruiting season of 2012-2013. A wide variation was observed among the genotypes in respect of different characteristics under the present study. Per cent edible portion and total soluble solids (TSS%) were the highest in GC Jai-004 (43.50%) and GC Jai-018 (14.30%), respectively while the lowest edible portion in GC Jai-012 (38.59%) and the lowest TSS in GC Jai-020 (13.10%). Heaviest (77.0 g) fruits with length and diameter of 4.80 and 5.40 cm was recorded from the genotype GC Jai-004, whereas the lightest (23.5 g) fruits with length and diameter of 3.8 and 3.4 cm was noted in GC Jai-020. The highest number of fruits per plant (1500) was obtained from the genotype GC Jai-001 whereas highest yield per plant (144 kg/plant) was produced from the genotype GC Jai-018.

Key words: fruit characteristics, cowa genotypes, yield contributing characters and hilly region

INTRODUCTION

'Cowa' (*Garcinia cowa* Roxb.) is an important fruit trees in the tropics and subtropics. Cowa is most frequently called cowphal, kao, kowa, kao-gola etc. (Das and Alam, 2001). Cowa belongs to the family Clusiaceae is a native to Asia, Australia and tropical southern Africa, and Polynesia. In Bangladesh, it is a minor fruit but its importance is too high. In Bangladesh, it occurs in the forest of Chitagong, Cox's Bazar, Comilla, Chittagong Hill Tracts and Sylhet and is usually grown in clayey moist soil (Das and Alam, 2001). The tree is long with clear bole and cylindrical canopy structure which is suitable for high land agroforestry system. The genera *Garcinia* is widely used as a source of edible fruits, timber, resin, drug and various other natural products. Apart from the aril being consumed as a dessert fruit, the dried fruit rind, which contains tannin and xanthones and is used as native anti-inflammatory and antidiarrhoeal medicine and for treatment of dysentery (Yapwattanaphun *et al.* 2002). Young leaves of Cowphal are used as a food additive in many Thai dishes. The yellow juice from the bark of Cowphal yields gamboges soluble in turpentine and forming a yellowish varnish (Roy *et al.* 2010). The fruits of cowphal turn deep green to light green with a patch of yellow/red colour when reaches harvest maturity. Cowa is an evergreen plant bear fruits that are consumed by the people and other animals, hence it is also very important to conserve biodiversity. At present consumers are diverted to the indigenous minor fruit as they are not safe from harmful chemicals applied to other elite and exotic fruits. Therefore, to increase the production of best quality minor fruits, it is a crying need to develop its good variety. As Bangladesh is the centre of origin of Cowa, there is much variation exists in our country. Therefore, the present study was under taken to select suitable line(s) for release varieties of Cowa.

MATERIALS AND METHODS

The experiment was conducted at the Citrus Research Station, Bangladesh Agricultural Research Institute, Jaintapur, Sylhet during 2012-2013. Five Cowa genotypes were used as treatment in the experiment. The plants were healthy, about 12 years of age and received similar cultural treatments and bear fruits regularly. At the beginning of the study, the plants were rejuvenated by pruning of dead and diseased branches, freed them from parasitic plants, algae and lichen. Fertilizer @ 30 kg Cowdung, 1000 g Urea, 500 g TSP, 500 g MoP, 500 g Gypsum, 25 g Zinc Sulphate and 50 g Borax (Anonymous 2013) were applied per plant in two splits in circular trench (60 cm broad and 30 cm deep) 1 m away from the base of trunk. First split was applied at the end of September and second at the end of April. Weeding was done twice following fertilizer application. Three full cover spray of Cymcare 10 EC @ 1 ml/L along with Bavistin 50WP @ 2 g/L were done; first at the flower initiation stage when the panicle is around two inches long; second at the pea stage of fruit and third spray at the marble stage of the fruit. These sprays prevent from the attack of fruit borer and anthracnose disease. Three hand weeding were done throughout the rainy season to avoid loses of soil nutrients by weed and also to destroy the harbor of insect pests. Data were taken on yield contributing characters, yield and fruit characteristics. Data were analyzed by MSTAT-C computer programme and DMRT was performed for interpretation of results (Gomez and Gomez, 1984).

RESULTS AND DISCUSSION

The growth condition of the genotypes was excellent, good and poor with dense, sparse and medium branching density (Table 1). The quantitative and qualitative characteristics of the Cowa genotypes are presented in Table 2 and Table 3, respectively. Flowering started from last week of February and continued up to mid March. The fruits of all the genotypes became harvestable condition between 6 June and 17 June (Table 1). The genotype GC Jai-001 was the earliest and GC Jai-020 was the latest in respect of harvesting time. Wide range of variability was observed among the genotypes under study in respect of different physico-chemical characteristics of fruits. Fruit weight of different genotypes varied from 77.0 to 23.5 g (Table 2). Anonymous (2011) reported that individual fruit weight of Cowa was 50.25 g having fruit length of 3.79 cm and breadth of 4.18 cm. This was more or less similar to the results of the present findings. The heaviest fruit (77.0 kg) was recorded in GC Jai-004 followed by GC Jai-018 (42.8 g) whereas the lightest (23.5 g) fruit weight was obtained from the genotype GC Jai-020. The length and breadth of fruits varied from 4.8 to 3.8 cm and 5.4 to 3.4 cm, respectively.

Table 1. Growth condition, flowering and harvesting time of five Cowa genotypes

Genotypes	Branching density	Growth condition	Flowering time	Date of harvest
GC Jai-001	Medium	Good	Last week of February	6 June
GC Jai-003	Dense	Excellent	Last week of February	8 June
GC Jai-004	Medium	Good	1 st week of March	12 June
GC Jai-018	Sparse	Poor	2 nd week of March	15 June
GC Jai-020	Sparse	Poor	2 nd week of March	17 June
Range	-	-	Last week of February to 2 nd week of March	6 June to 17 June

The longest and widest fruit was produced by the genotype GC Jai-004 while GC Jai-020 had the shortest fruit. The highest percentage of edible portion (43.5%) was obtained from the genotype GC Jai-004, which was closely followed by GC Jai-003 (41.8%) and GC Jai-020 (37.7%). The lowest percentage of edible portion (31.2%) was recorded in GC Jai-018. Among the genotypes studied, GC Jai-018 had the highest total soluble solid content (14.3%) which was closely followed by GC Jai-001 (13.7%) and the genotype GC Jai-020 had the lowest soluble solid content (13.1%). Anonymous (2011) reported that the total soluble solids content of Cowa was 18.7% which is more or less supported the above findings.

Table 2. Quantitative characteristics of fruits of five Cowa genotypes

Genotypes	Fruit weight (g)	Number of fruits/plant	Yield/plant (Kg)	Fruit size (cm)		Edible portion (%)	TSS (%)
				Length	Diameter		
GC Jai-001	29.7d	1500a	105.0b	3.9c	3.8cd	36.7b	13.7b
GC Jai-003	34.2c	800d	76.0d	4.0bc	4.1c	41.8a	13.3c
GC Jai-004	77.0a	750e	105.0b	4.8a	5.4a	43.5a	13.3c
GC Jai-018	42.8b	1200c	144.0a	4.5b	4.5b	31.2c	14.3a
GC Jai-020	23.5e	1300b	96.6c	3.8c	3.4d	37.7b	13.1c
LSD	3.149	7.503	1.501	0.568	0.424	2.903	0.312
CV%	2.77	0.25	0.52	4.90	3.68	2.77	0.83

In a column means followed by common letters are not significantly different from each other at 5% level of probability by DMRT

The fruit shape was found globose with mature fruit colour yellow to deep yellow and skin textures of all the Cowa genotypes were found smooth while flesh textures of ripe fruits were soft and juicy. The flesh colors of ripe fruits were light orange to orange (Table 3). Anonymous (2011) reported that the fruit shape of Cowa was globose, fruit colour was yellow and flesh colour was deep orange which already supported the above findings. Number of fruits per plant varied from 750 to 1500. The highest number of fruits per plant (1500) was produced from the genotype GC Jai-001 closely followed by GC Jai-020 (1300) and GC Jai-018 (1200) while the lowest number of fruits per plant (750) was recorded from GC Jai-004. The highest yield per plant (144 kg) was produced by the genotype GC Jai-018 while the lowest yield was recorded from GC Jai 003 (76.0 kg). Anonymous (2011) reported that number of fruits per plant was 1250 which absolutely supported the above results. Roy *et al.* (2010) have described the qualitative and quantitative characteristics of Cowa fruits. Several genotypes under the present study have more or less similar characters as those of standard genotypes.

Table 3. Qualitative characteristics of the fruits of five Cowa genotypes

Genotypes	Fruit shape	Fruit color at maturity	Flesh color	Skin texture	Flesh texture
GC Jai-001	Globose	Yellow	Orange	Smooth	Soft
GC Jai-003	Globose	Deep Yellow	Orange	Smooth	Soft
GC Jai-004	Globose	Deep Yellow	Light Orange	Smooth	Juicy
GC Jai-018	Globose	Yellow	Orange	Smooth	Juicy
GC Jai-020	Globose	Deep Yellow	Orange	Smooth	Soft

CONCLUSION

The findings of the present study will help in selecting Cowa varieties for fresh consumption, processing, and varietal development programmes. Considering the overall qualitative and qualitative characteristics of the fruits of all the studied genotypes, GC Jai 004 and GC Jai 018 were found to be superior to other genotypes in respect of fruit weight, fruit yield per plant, edible portion, TSS, skin color and pulp color. These genotypes deserve a place in any Cowa varietal trial for selecting superior varieties for north-eastern region of Bangladesh.

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