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Evaluation of existing jackfruit germplasm

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ABSTRACT

Evaluation of ten germplasm of existing jackfruit was performed at Regional Agricultural Research Station, Rangpur, Bangladesh during 2012-13. Ten existing jackfruit germplasm were selected and marked for this study includes consecutive numbering of AH Bur-001 to AH Bur-010. Age, growth, yield and yield attributes and also qualitative characteristics were compared among them. The number of fruits per plant was exceedingly higher (220) in AH Bur-001 while others produced under 65 fruits and the fewer (35) in AHBur-004. However, single fruit weight did not differed greatly and ranged from 5.0 to 7.5 kg. Larger fruit (7.5 kg) was recorded from AH Bur-008 and smaller fruit (5.0 kg) was recorded from AHBur-009. The germplasm AHBur-001 and AH Bur-003 have the greater sweetness (TSS value of 22) and the germplasm AH Bur-005, AH Bur-008 and AH Bur-010 has less sweetness indicating TSS value of 18. The excellent taste was also observed in AH Bur-001 and AHBur-003, and good taste was observed in rest of the germplasm. The germplasm AH Bur-001 performed better in terms of earliness, fruit size, quality and yield followed by AH Bur-003 and AH Bur-007. Therefore, these germplasm can be included in the variety development program after comparing with the already BARI released jackfruit variety.

Key words: *Artocarpus heterophyllus*, genetic diversity, on-farm conservation, growth and yield.

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INTRODUCTION

Jackfruit (*Artocarpus heterophyllus* Lam.) is the national fruit of Bangladesh. It is a highly cross pollinated crop, with highly diverse local resources whose genetic base is being threatened. The plants produced from seeds are quite different from each other in respect of size, shape, quality and yield (upto 50 cm × 100 cm and weighing up to 50 kg) potentiality (Jagadeesh et al. 2006; Jarrett, 1959). This important tropical fruit is facing high chance of losing promising indigenous germplasm. Research on this issue reported that, in Bangladesh uniform and high yielding exotic genotypes are replacing genetically diverse stands, and genetic variation is gradually being lost due to increased production (Haque, 1991).

Jackfruit was identified as deserving priority attention in the Commonwealth Science Council in 1992 because it an important and diverse crop there (Azad et al. 1999; Hossain, 1996; Saha et al. 1996) and Bangladesh is considered as the secondary centre of jackfruit diversity (Arora, 1998; Dhar, 1998; Hossain, 1996). On farm conservation of jackfruit can be maintained through the continued cultivation and management of a diverse population of in the same agro-

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ecosystem where the crop has evolved. Conservation and sustainable use of the underutilized crop is considered to a crucial issue in feeding the ever increasing population in Bangladesh. Therefore, cultigens and wilt genotypes of underutilized crop must be identified and assessed for genetic diversity and ensured in situ conservation and long term sustainable use and conservation (Haque, 1991). In this present study, the existing germplasm of jackfruit were evaluated to find out the promising germplasm for further variety development program.

MATERIALS AND METHODS

The experiment was conducted at Regional Agricultural Research Station, Burirhat, Rangpur, Bangladesh during cropping season 2012-13. Ten existing jackfruit germplasm were selected and marked for this study includes consecutive numbering of AH Bur-001 to AH Bur-010.The recorded age of the selected tress ranged from 16 to 81 years. The trees under this study were fertilized according to the doses mention in Krishi Projukti Hatboi (Mondal et al. 2011). Intercultural operations such as weeding, irrigation and spraying of pesticides were done regularly.

Data on plant age, growth, flowering and harvesting, yield and yield contributing parameters were recorded. In addition qualitative traits of jackfruit germplasm were compared. The compiled data were analyzed for measuring range, mean, standard error of mean and coefficient of variance using Microsoft Office Excel package.

RESULTS AND DISCUSSION

Age, growth, time flowering and harvesting of jackfruit varied among the existing germplasm (Table 1). Both younger plants having age on 16 year and older plants as old as 81 year are included in this study. Plant height ranged from 12.0 to 15.8 m. The germplasm AH Bur-005 gave the tallest plants (15.8 m) while AH Bur-002 gave the shortest plants (12.0 m). Base girth varied from 1.7 to 4.0 m. The maximum base girth (4.0 m) was recorded from AH Bur-009 and minimum (1.7 m) was recorded from AH Bur-004. In case of canopy spread, maximum canopy were found in east-west (19.0 m) and it was obtained from AH Bur-009 and minimum (7.8 m) was obtained from AH Bur-002. Similarly in case of north-south, the canopy spread was maximum (20.5 m) in AH Bur-009 and minimum (12.2 m) in AH Bur-003. Flowering time also varied from 4th week of January to 3rd week of February. The time of harvesting was within 4th week of May to 2nd week of July. The fruits of germplasm AH Bur-001 was harvested in 4th week of May while the fruits of germplasm AH Bur-008 were harvested in 2nd week of July.

The yield and yield contributing characters of the selected jackfruit germplasm were also showed considerable variation (Table 2). The number of fruits per plant was exceedingly higher (220) in AH Bur-001 while fewer (35) in AH Bur-004. However, single fruit weight ranged from 5.0 to 7.5 kg. Larger fruit (7.5 kg) was recorded from AH Bur-008 and smaller fruit (5.0 kg) was recorded from AH Bur-009. The length of fruit was maximum (55.0 cm) in AH Bur-008 and minimum (38.0 cm) in AH Bur-006, AH Bur-009 and AH Bur-010. The breadth of fruit was maximum (22.0 cm) in AH Bur-002 and AH Bur-005 and minimum (18.0 cm) in AH Bur-010. Wide variation was observed in respect of yield. The yield ranged from 186.0 to 1210.0 kg per plant. The germplasm AH Bur-001 produced the highest yield (1210.0 kg/plant) and the germplasm AH Bur-004 produced the lowest yield (186.0 kg/plant). Maximum number of bulbs per fruit (130) were recorded from AH Bur-001 while minimum (85) were recorded from AH Bur-005. The germplasm AH Bur-007 gave maximum bulb weight per fruit (3.6 kg) and the germplasm AH Bur-009 gave minimum bulb weight per fruit (2.5 kg).

Fruit and seed characteristics of jackfruit showed considerable variation among the selected germplasm (Table 3). Sweetness was not varied greatly and the measured total soluble sugar percentage was varied justfrom 18 to 22. The germplasm AH Bur-001 and AH Bur-003 have the greater sweetness (TSS value of 22) and the germplasm AH Bur-005, AH Bur-008 and AH Bur-010 hasless sweetness indicating TSS value of 18.

Table 1
Age, plant growth, time of flowering and harvesting of jackfruit germplasm during 2012-13.

Germplasm	Age of tree (yrs)	Plant Height (m)	Base girth (m)	Canopy spread (m)		Time of flowering	Time of harvesting
				E-W	N-S		
AH Bur-001	41	14.0	2.6	18.5	17.0	4th week of Jan.	4th week of May
AH Bur-002	41	12.0	1.8	7.8	13.0	4th week of Jan.	4th week of June
AH Bur-003	31	14.6	2.0	14.7	12.2	2nd week of Feb	4th week of June
AH Bur-004	31	12.8	1.7	9.8	12.6	3rd week of Feb.	4th week of June
AH Bur-005	16	15.8	3.0	15.6	14.8	2nd week of Feb.	4th week of June
AH Bur-006	16	14.9	2.8	14.0	17.0	3rd week of Feb.	1st week of July
AH Bur-007	31	14.5	2.9	12.8	15.0	2nd week of Feb	1st week of July
AH Bur-008	31	14.0	3.2	14.0	14.0	3rd week of Feb.	2nd week of July
AH Bur-009	81	15.5	4.0	19.0	20.5	1st week of Feb.	4th week of June
AH Bur-010	51	14.8	3.2	17.0	16.0	3rd week of Feb.	1st week of July
Range	-	12.0-15.8	1.7-4.0	7.8-19	12.2-20.5	-	-
Mean	-	14.29	2.72	14.32	15.21	-	-
SE	-	1.16	0.71	3.55	2.52	-	-
CV (%)	-	8.11	26.10	24.79	16.56	-	-

Table 2
Yield and yield contributing characters of jackfruit germplasm during 2012-13.

Germplasm	No. of fruits/ plant	Single fruit weight (kg)	Fruit size		Yield/ plant (kg)	No. of bulbs/ fruit	Bulb wt./ fruit (kg)
			Length (cm)	Breadth (cm)			
AH Bur-001	220	5.5	48.0	20.0	1210.0	130	3.0
AH Bur-002	50	7.0	48.0	22.0	350.0	100	3.3
AH Bur-003	65	6.0	45.0	20.0	390.0	120	3.0
AH Bur-004	35	5.3	42.0	19.0	186.0	95	3.0
AH Bur-005	40	7.0	45.0	22.0	280.0	85	3.3
AH Bur-006	38	5.5	38.0	20.3	209.0	120	2.8
AH Bur-007	55	6.0	40.0	21.0	330.0	100	3.6
AH Bur-008	45	7.5	55.0	20.0	338.0	100	3.3
AH Bur-009	40	5.0	38.0	19.0	200.0	110	2.5
AH Bur-010	60	5.5	38.0	18.0	330.0	90	2.7
Range	35-220	5.0-7.5	38-55	18-22	186-1210	85-130	2.5-3.6
Mean	68.8	6.03	43.7	20.13	382.3	105	3.05
SE	55.43	0.84	5.59	1.28	2.99.2376	14.53	0.33
CV (%)	85.54	14.07	12.81	6.39	78.27	13.84	10.02

The longer bulb (5.5 cm) was found in AH Bur-005 and AH Bur-008 while shorter (3.9 cm) in AH Bur-001. Whereas higher bulb breadth (3.8 cm) was recorded in AH Bur-009 and lower (2.0 cm) in AH Bur-008. Pulp weight per fruit was maximum (3.24 kg) in AH Bur-005 and minimum (1.84 kg) in AH Bur-009. Maximum edible portion (43.33%) was obtained from AH Bur-007 while minimum (34.24%) was obtained from AH Bur-008. Larger seed size (3.1 cm × 2.2 cm) was found in AH Bur-002 whereas smaller seed size (1.8 cm × 1.3 cm) was found in AHBur-001. Average bulb weight ranged from 22 to 40 g. AH Bur-007 gave maximum average bulb weight (40 g) and AH Bur-006 gave minimum average bulb weight (22g). Average seed weight was maximum (10.0 g) in AH Bur-004 and AH Bur-007 and minimum (6.0 g) in AH Bur-009.

Table 3.
Fruit and seed characters of jackfruit germplasm during 2012-13.

Germplasm	TSS (%)	Bulb size		Pulp wt./ fruit (kg)	Edible portion (%)	Seed size		Av. bulb wt.(g)	Av. seed wt.(g)
		Length (cm)	Breadth (cm)			Length (cm)	Breadth (cm)		
AH Bur-001	22	3.9	2.8	2.11	38.47	1.8	1.3	27.5	6.8
AH Bur-002	20	5.1	2.9	2.5	36.42	3.1	2.2	35.0	7.5
AH Bur-003	22	4.0	2.6	2.06	34.40	2.3	1.6	26.0	7.8
AH Bur-004	20	4.1	2.5	2.05	38.67	2.2	1.7	30.0	10.0
AH Bur-005	18	5.5	3.2	3.24	39.52	3.0	2.0	38.5	6.5
AH Bur-006	20	4.0	2.6	1.92	34.98	2.0	1.5	22.0	7.3
AH Bur-007	20	5.0	2.2	2.8	43.33	2.0	1.5	40.0	10.0
AH Bur-008	18	5.5	2.0	2.5	34.24	1.9	1.3	30.0	8.0
AH Bur-009	20	5.3	3.8	1.84	36.80	2.0	2.0	30.0	6.0
AH Bur-010	18	4.0	3.6	2.10	38.29	2.6	1.5	30.0	6.6
Range	18-22	3.9-5.5	2.0-3.8	1.84-3.24	34.24-43.33	1.8-3.1	1.3-2.2	22-40	6-10
Mean	19.8	4.64	2.82	2.31	37.52	2.29	1.66	30.9	7.65
SE	1.48	0.69	0.57	0.44	2.77	0.46	0.31	5.33	1.38
CV (%)	7.48	14.94	20.39	19.13	7.40	20.08	18.67	17.89	18.04

Table 4.
Qualitative characters of jackfruit germplasm during 2012-13.

Germplasm	Taste	Sweetness	Fibrousness	Bulb colour	Bulb shape	Bulb texture	Vivipary
AH Bur-001	Excellent	Very sweet	Medium	Yellow	Oblong	Soft	Absent
AH Bur-002	Good	Fairly sweet	Medium	Whitish yellow	Long	Soft	Present
AH Bur-003	Excellent	Very sweet	Less	Yellow	Long	Hard	Absent
AH Bur-004	Good	Very sweet	Less	Yellow	Long	Medium	Absent
AH Bur-005	Good	Fairly sweet	Medium	Whitish yellow	Long	Soft	Absent
AH Bur-006	Good	Very sweet	High	Yellow	long	Soft	Present
AH Bur-007	Good	Sweet	Less	Yellow	Oblong	Medium	Present
AH Bur-008	Good	Sweet	Less	Whitish yellow	Oblong	Hard	Present
AH Bur-009	Good	Fairly sweet	Less	Yellow	Oblong	Soft	Absent
AH Bur-010	Good	Sweet	Less	Yellow	Long	Soft	Present

The qualitative characters also differed among the selected jackfruit germplasm (Table 4). The excellent taste was observed in AH Bur-001 and AH Bur-003, and good taste was observed in rest of the germplasm. The germplasm AH Bur-001, AH Bur-003, AH Bur-004 and AH Bur-006 were very sweet. The less fiber was obtained in AH Bur-003, AH Bur-004, AH Bur-007, AH Bur-008, AH Bur-009 and AH Bur-010. The whitish yellow color bulb was found in AH Bur-002, AH Bur-005 and AH Bur-008. The remaining germplasm gave yellow color bulb. The bulb shape was oblong in AH Bur-001, AH Bur-007, AH Bur-008 and AH Bur-009 whereas long bulb shape was recorded from rest of the germplasm .The bulb texture was soft in AH Bur-001, AH Bur-002, AH Bur-005, AH Bur-006, AH Bur-009 and AHBur-010. The germplasm AH Bur-003 and AH Bur-008 gave hard bulb texture. The character vivipary was absent in AH Bur-001, AH Bur-003, AH Bur-004, AH Bur-005 and AH Bur-009 but present in AH Bur-002, AH Bur-006, AH Bur-007, AH Bur-008 and AH Bur-010.

CONCLUSION

The germplasm AH Bur-001 performed better in terms of earliness, fruit size, quality and yield followed by AH Bur-003 and AH Bur-007. Therefore, these three germplasm can be included

in the variety development program after comparing with the already BARI released jackfruit variety.

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