



Germination, viability and vigour of seeds of different types of jackfruit

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ABSTRACT

An experiment was conducted at the orchard of Jackfruit Research Project, Bangladesh Agricultural University, Mymensingh during July to November 2002, to study the germination, viability and vigour of seeds of different types (Ghila, Khaja and Dorosa) of jackfruit in relation to seed kind and storage time of seed. The highest germination percentage (95.83) obtained from fresh seeds of Ghila either washed or non washed and the lowest (37.50) from Dorosa with non-washed 20 days seed. The highest viability percentage (100.00) was found from fresh non-washed seeds of Ghila and the lowest (45.83) from Dorosa with non-washed and 20 days stored seed. Maximum vigour of seed was observed in Khaja type with non-washed and fresh seeds of jackfruit.

INTRODUCTION

Jackfruit (*Artocarpus heterophyllus* Lam) is one of the most common and important fruit which is considered to be the national fruit of Bangladesh. It is a multipurpose tree. Each and every parts of this fruit is utilized, nothing is rejected and remain unused (Purseglove, 1968). The edible pulp is rich in carotene, ascorbic acid and sugar (Haque, 1977). Seeds are used as vegetable and propagated usually by seed.

The farmers of Bangladesh grow jackfruit from seed as vegetative propagation is not widely accepted. On the other hand uniform healthy seedlings are needed to use as rootstocks in grafting and budding. The scientific information related to the germination, viability and Vigour of it is insufficient in the country. This absence of the information make seedling raised be weak. Hence to produce vigorous seedling, a study on germination, viability and vigor of seed of different types of jackfruit is essential which will

ultimately contribute for the improvement of jackfruit cultivation in the country.

MATERIALS AND METHODS

The present study was carried out at the orchard of Jackfruit Research Project, Bangladesh Agricultural University, Mymensingh during the period from July to November 2002. The experiment consisted of jackfruit seed of three type viz. Ghila (P₁), Khaja (P₂) and Dorosa (P₃), two seed kind viz. Washed (W_w) and non-washed (W₀) seed, and six storage time of seed viz. fresh (T₁), 4 (T₂), 8 (T₃), 12 (T₄), 16 (T₅), and 20 (T₆) days storage seed. The experiment was laid out in RCBD with 36 treatment combination and three replications. To obtained seeds, matured, ripe and disease free fresh fruit were collected from this Jackfruit Research Project. Seeds were sown in polybags filled with soil of good tilth. Intercultural operations such as weeding and irrigation were done uniformly in polybags. Data on the emergence of normal seedlings were taken for calculation of germination percentage and for

viability, all the normal and abnormal seedling were counted at 26 days after sowing. Germination index was calculated by no. of seeds germination at first counted divided by days required to first count plus(+) no. of germination at second counted divided by days required to second count plus (+) no. of seeds germination at last counted divided by days required to last count (Agrawal, 1996). Lengths of seedling were measured by a centimeter scale and dry weights of seedlings were recorded after sun and electrical oven dry. The collected data were statistically analyzed to evaluate the effects of the treatments. The significance of differences between the pairs of treatment mean was evaluated by the LSD test for interpretation of the result (Gomez and Gomez, 1984)

RESULT AND DISCUSSION

Table 1

Main effect of (a) jackfruit type (b) seed kind (c) storage time of seed on germination of seed, viability of seed, germination index, length of seedling and dry weight of seedling of jackfruit.

a)

Jackfruit type	Germination of seed (%)	Viability of seed (%)	Germination index	Length of seedling (cm)	Dry weight of seedling (g)
P ₁	75.00	80.56	0.336	18.12	1.82
P ₂	67.36	76.39	0.281	19.45	1.90
P ₃	65.97	73.27	0.291	16.94	1.73
LSD (0.01)	6.53	6.06	0.027	0.29	0.06

b)

Seed kind	Germination of seed (%)	Viability of seed (%)	Germination index	Length of seedling (cm)	Dry weight of seedling (g)
W _w	69.21	76.16	0.304	18.08	1.81
W ₀	69.68	77.32	0.302	18.26	1.83
LSD(0.05)	NS	NS	NS	NS	NS

c)

Storage time	Germination of Seed (%)	Viability of seed (%)	Germination index	Length of seedling (cm)	Dry weight of seedling (g)
T ₁	93.75	96.53	0.472	20.93	2.44
T ₂	90.28	95.83	0.431	19.76	2.39
T ₃	78.47	84.72	0.307	18.34	1.91
T ₄	65.28	72.22	0.256	17.70	1.64
T ₅	47.92	61.11	0.188	16.82	1.37
T ₆	40.97	50.00	0.162	15.47	1.16
LSD (0.01)	9.24	8.56	0.039	0.42	0.08

The result of experiment revealed that germination, viability and vigour of jackfruit seed were significantly influenced by jackfruit type and storage time of seed (Table 1). The highest germination (75.00%) and viability (80.56%) of seed were obtained from Ghila where they had lowest germination (65.97%) and viability (73.26%) in Dorosa. The seedling length and dry weight were found to be highest followed by Ghila and Dorosa. All the parameters were higher in fresh seed and they declined gradually with increasing storage time. Singh (1986) reported that jackfruit seed is recalcitrant in nature and loss the viability quickly after extraction from fruit, and germination become difficult even after short period of storage. Singh and Singh (1981) stated that seedling vigor appreciably decreased with increase in storage time.

Table 2

Combined effect of jackfruit type and seed kind on germination of seed, viability of seed, germination index, length of seedling and dry weight of seedling of jackfruit

Treatment combination	Germination of Seed (%)	Viability of seed (%)	Germination index	Length of seedling (cm)	Dry weight of seedling (g)
P ₁ W _w	75.00	79.17	0.338	18.05	1.82
P ₁ W ₀	75.00	81.94	0.334	18.18	1.83
P ₂ W _w	67.36	77.08	0.282	19.39	1.89
P ₂ W ₀	67.36	75.69	0.280	19.81	1.91
P ₃ W _w	65.28	72.22	0.291	16.81	1.72
P ₃ W ₀	66.67	74.31	0.291	17.08	1.74
LSD (0.01)	9.24	8.56	0.039	0.42	0.08

Table 3

Combined effect of jackfruit type and storage time of seed on germination of seed, viability of seed, germination index, length of seedling, and dry weight of seedling of jackfruit.

Treatment combination	Germination of seed (%)	Viability of seed (%)	Germination index	Length of Seedling (cm)	Dry Weight of Seedling (g)
P ₁ T ₁	95.83	97.92	0.512	21.40	2.45
P ₁ T ₂	91.67	95.83	0.442	19.93	2.38
P ₁ T ₃	87.50	87.50	0.353	18.30	1.97
P ₁ T ₄	75.00	79.17	0.307	17.71	1.68
P ₁ T ₅	56.25	66.67	0.222	16.34	1.34
P ₁ T ₆	43.75	56.25	0.180	15.03	1.12
P ₂ T ₁	91.67	95.83	0.448	22.27	2.46
P ₂ T ₂	89.58	95.83	0.408	20.93	2.43
P ₂ T ₃	75.00	87.50	0.284	19.37	2.08
P ₂ T ₄	60.42	68.75	0.225	19.01	1.73
P ₂ T ₅	45.67	62.50	0.170	18.07	1.49
P ₃ T ₆	41.67	47.92	0.152	17.04	1.20
P ₃ T ₁	93.75	95.83	0.457	19.12	2.41
P ₃ T ₂	89.58	91.67	0.443	18.42	2.34
P ₃ T ₃	72.92	79.17	0.286	17.35	1.69
P ₃ T ₄	60.42	68.75	0.237	16.38	1.53
P ₃ T ₅	41.67	54.17	0.171	16.05	1.26
P ₃ T ₆	37.50	45.83	0.155	14.33	1.11
LSD (0.01)	16.01	14.83	0.068	0.73	0.14

The combined effects of jackfruit type, seed kind and storage time of seed showed significant variation on the parameters studied. In case of combined effect of jackfruit type and seed kind higher germination (75.00%) and germination index (0.338) were obtained from Ghila with washed seed while the higher viability (81.94%) from Ghila with non-washed seed (Table 2). The lowest germination (65.28%) and viability (72.20%) were found from treatment combination of Dorosa with washed seed while the lowest germination index (0.280%) from Khaja with non-

washed seed. The maximum seedling length (19.51cm) and weight (1.91g) was recorded from Khaja type with non-washed seed whereas they were minimum in Dorosa with washed seed.

The combined effect jackfruit type and storage time of seed, the highest germination (95.83%), Viability (97.92%) and germination index (0.512) was obtained from Ghila with fresh seed (Table 3). The lowest germination (37.50%) and viability (45.83%) was found in Dorosa with 20 days stored seed and germination index (0.280) from Khaja

with 20 days stored seed. Khaja with fresh seed produced maximum seedling length (22.27 cm) and seedling dry weight (2.47g). The minimum seedling length (14.33 cm) was obtained from Dorosa with 20 days stored seed while dry weight was lowest (1.11g) in Dorasa with 20 days stored seed of Jackfruit.

Combined effect of seed kind and storage time, seed exhibited significant variations on all the parameters (Table 4). Maximum germination percentage (94.44) was obtained from non washed with fresh seed and minimum (40.28) from washed and 20 days stored. The highest viability percentage (97.22) obtained from non-washed with fresh seed while lowest (48.61%) from washed with 20 days stored seed. The germination index was maximum (0.479) in washed with fresh seed, and seedling length (20.99 cm) and dry weight (2.45g) in non-washed with fresh jackfruit seed. But the minimum germination index (0.160) and dry weight of seedling (1.14g) were recorded from washed with 20 days stored seed while seedling length (15.43 cm) from washed with 20 days stored seed.

Combined effect of jackfruit type, seed kind and storage time of seed were significant on

germination, viability and vigour contributing characters (Table 5). Treatment combination of Ghila with washed and fresh seed provided higher germination percentage (95.83). It was lowest (37.50%) in Dorosa with washed and 20 days stored seed which is similar to Dorosa with non-washed and 20 days stored seed. Maximum viability percentage (100.00) was obtained from Ghila with non-washed and fresh seed and minimum (45.83) from Dorosa with non washed and 20 days stored seed. The highest germination index (0.516) recorded from Ghila with washed and fresh seed and lower (0.149) in Khaja with non-washed and 20 days stored seed. Khaja with non-washed and fresh seed produced maximum seedling length (22.30cm) and dry weight (2.49g). The minimum seedling length (14.33cm) was obtained from Dorosa with washed and 20 days stored seed and dry weight (1.10g) from Dorosa with washed and 20 days stored jackfruit seed. Therefore it was found that washed or non-washed fresh seeds of Ghila showed maximum Germination, non-washed fresh seeds of Ghila had maximum viability while non-washed fresh seeds of khaja had maximum vigour.

Table 4

Combined effect of seed kind and storage time of seeds on germination of seed, viability of seed, germination index, length of seedling and dry weight of seedling of jackfruit.

Treatment combination	Germination of seed (%)	Viability of seed (%)	Germination index	Length of Seedling (cm)	Dry Weight of Seedling (g)
W _w T ₁	93.06	95.83	0.479	20.87	2.43
W _w T ₂	91.67	97.22	0.434	19.71	2.38
W _w T ₃	79.17	83.33	0.301	18.12	1.89
W _w T ₄	63.89	72.22	0.257	17.64	1.61
W _w T ₅	47.22	59.72	0.185	16.73	1.37
W _w T ₆	40.28	48.61	0.164	15.43	1.14
W _o T ₁	94.44	97.22	0.465	20.99	2.45
W _o T ₂	88.89	94.44	0.427	19.82	2.39
W _o T ₃	77.78	86.11	0.314	18.56	1.92
W _o T ₄	66.67	72.22	0.255	17.76	1.68
W _o T ₅	48.61	62.50	0.190	16.91	1.37
W _o T ₆	41.67	51.39	0.160	15.51	1.15
LSD (0.01)	13.07	12.11	0.055	0.59	0.06

Table 5

Combined effect of jackfruit type, seed kind and storage time of seed on germination of seed, viability of seed, germination index, length of seedling and dry weight of seedling of jackfruit.

Treatment combination	Germination of seed (%)	Viability of seed (%)	Germination index	Length of Seedling (cm)	Dry Weight of Seedling (g)
P ₁ W _w T ₁	95.83	95.83	0.516	21.30	2.44
P ₁ W _w T ₂	91.67	95.83	0.448	19.89	2.38
P ₁ W _w T ₃	91.67	87.50	0.348	18.23	1.98
P ₁ W _w T ₄	75.00	79.17	0.319	17.62	1.62
P ₁ W _w T ₅	54.17	66.67	0.215	16.24	1.34
P ₁ W _w T ₆	41.67	50.00	0.182	15.02	1.14
P ₁ W _o T ₁	95.83	100.00	0.508	21.50	2.47
P ₁ W _o T ₂	91.67	95.83	0.436	19.97	2.39
P ₁ W _o T ₃	83.33	87.50	0.358	18.37	1.96
P ₁ W _o T ₄	75.00	79.17	0.294	17.80	1.72
P ₁ W _o T ₅	58.33	66.67	0.229	16.43	1.35
P ₁ W _o T ₆	45.83	62.50	0.178	15.03	1.10
P ₂ w _w T ₁	91.67	95.83	0.453	22.23	2.45
P ₂ w _w T ₂	91.67	95.83	0.417	20.87	2.45
P ₂ w _w T ₃	75.00	87.50	0.273	19.32	2.08
P ₂ w _w T ₄	58.33	70.80	0.223	18.93	1.69
P ₂ w _w T ₅	45.83	62.50	0.171	17.98	1.51
P ₂ w _w T ₆	41.67	50.00	0.155	16.99	1.21
P ₂ w _o T ₁	91.67	95.83	0.444	22.30	2.49
P ₂ w _o T ₂	87.50	95.83	0.398	21.00	2.44
P ₂ w _o T ₃	75.00	87.50	0.295	19.40	2.08
P ₂ w _o T ₄	62.50	66.67	0.227	19.08	1.76
P ₂ w _o T ₅	45.67	62.50	0.170	18.17	1.49
P ₂ w _o T ₆	41.67	45.83	0.149	17.10	1.19
P ₃ w _w T ₁	91.67	95.83	0.469	19.07	2.41
P ₃ w _w T ₂	91.67	91.67	0.439	18.37	2.34
P ₃ w _w T ₃	70.83	75.00	0.282	16.80	1.64
P ₃ w _w T ₄	58.33	66.67	0.231	16.37	1.50
P ₃ w _w T ₅	41.67	50.00	0.170	15.97	1.27
P ₃ w _w T ₆	37.50	45.83	0.157	14.28	1.10
P ₃ w _o T ₁	95.85	95.83	0.444	19.17	2.40
P ₃ w _o T ₂	87.50	91.67	0.447	18.48	2.34
P ₃ w _o T ₃	75.00	83.33	0.290	17.90	1.74
P ₃ w _o T ₄	62.50	70.83	0.243	16.40	1.56
P ₃ w _o T ₅	41.67	58.33	0.171	16.13	1.26
P ₃ w _o T ₆	37.50	45.83	0.153	14.39	1.15
LSD(0.05)	17.05	16.79	0.0728	0.89	0.15
LSD(0.01)	22.64	20.98	0.097	1.03	0.21

REFERENCES

- Agrawal RL (1996). Seed Technology. 2nd edn. Oxford and IBH pub.Co. Pvt. Ltd.66 Jan path, New Delhi. 829 p.
- Gomez KA and Gomez (1984).Statistical Procedures for Agricultural Research. 2nd edn. International Rice Research Institute, Manila, The Philippines.p.188-189.
- Haque MA (1977). Notes on variability of fruit characteristics of selected jackfruit plant from some localities of Mymensingh district. Bangladesh Journal of Agricultural Science, 4(1):119-120.
- Purseglove JW (1968). Tropical Crops, Dicotyledins 2. Longmans, Greenece and Co.,London.p.384-386.
- Singh LB (1986) Propagation of jackfruit (*Artocarpus heterophyllus*) Carrier Science, 20 : 102 103.

Singh RM and Singh ID (1981). Papaya, In: Propagation of tropical and subtropical Horticultural Crops, Ed. Bose, T.K.; S.K Mitra and M.K. Sadhu, Naya prokash Calcutta.p. 280.