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Long term seed storage studies in muskmelon (*Cucumis melo* L.)

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ABSTRACT

Muskmelon *cv* Arka Jeet seeds were conserved in moisture permeable, semi permeable and impermeable containers at low (5°C) and sub-zero (-20°C) temperatures for 15 years. Seed deterioration in terms of loss of viability and vigour were minimal in low temperature stored seeds. The recovery of viable seed was 86% in –20°C stored seeds after 15 years of storage. Seedlings raised from stored seeds were vigorous, healthy and free from morphological abnormalities. Storage of muskmelon seeds at sub-zero temperature (-20°C) provides effective protection to genetic and planting material.

Key words: Muskmelon, seeds, storage, low temperature, viability, vigour, germination

INTRODUCTION

Muskmelon (*Cucumis melo* L) is an important cucurbitaceous vegetable crop, widely cultivated for its juicy fruits and for dessert purposes. The fruit is rich in carbohydrates, Vitamin A and C contents. Besides seeds are also eaten after removing seed coat. Muskmelon is a warm season crop and grows well under tropical and sub-tropical conditions. The crop is raised through seeds under open and protected cultivation. Seeds are also valued for germplasm conservation. They are high value seeds demanding suitable protection during seed storage, to produce high quality plants. Two important parameters namely seed viability and vigour determine seed quality, which ensures good seedling establishment and adequate plant population in field. High seed quality is preferred for crop production, crop improvement and genetic conservation. Seed storage under improper condition affects the seed quality and causes great loss to farming community (Harrington, 1972). Several factors are associated with the seed deterioration. Low temperature storage is promising in reducing the deterioration (Bass, 1980) and helps in preserving the planting and genetic material although the quantum of viable seeds recoverable after a set period is variable. Thus, an experiment was conducted with a view to lower the deterioration process by storage at temperatures so that seeds remain viable for fairly longer period.

MATERIAL AND METHODS

Seeds of *cv* Arka Jeet were used for long term storage study. Seeds were extracted from mature ripe fruits. They were washed thoroughly in order to remove mucilaginous, inert and chaffy materials. Then the seeds were dried to 6.4 per cent moisture content and packed in moisture permeable (Per), semi permeable (Semi-per) and impermeable (Imp) containers and stored at low (5°C) and sub-zero (-20°C) temperatures for 15 years. Seed quality in terms of viability and vigour was determined periodically. Seed viability was based on the percentage of germination obtained in Clelands seed germinator at an alternating temperature cycle of 20-30°C for 16 h and 8 h, respectively. Seed viability was calculated on the basis of emergence of

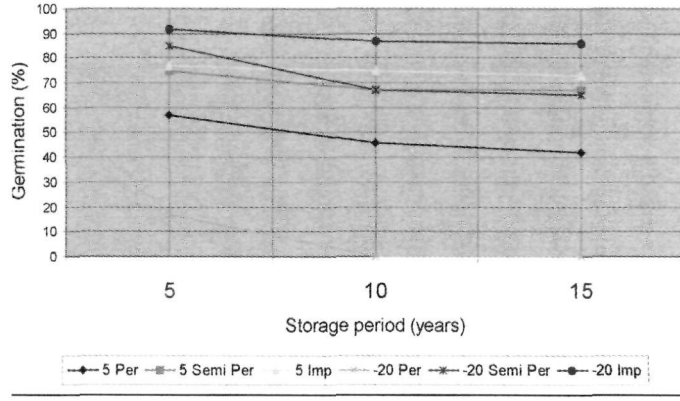

Fig. 1. Viability of muskmelon seeds stored at –20°C

Table 1. Influence of low temperature and storage containers on seed viability and plant vigour in muskmelon

Storage Temp.	Storage containers	Shoot length (cm)	Root length (cm)	Dry wt (mg)	Vigour Index-I	Vigour Index-II
Low (5°C)	Per	8.8	8.6	13.5	751	584
	Sem Per	9.6	9.8	16.1	1302	1077
	Imp	11.0	11.5	17.7	1651	1301
Sub-zero (-20°C)	Per	-	-	-	-	-
	Sem Per	10.6	9.8	16.1	1319	1047
	Imp	10.4	10.8	18.3	1843	1589
CD at 5%		NS	NS	1.9	188	219

normal seedlings. Seedling length was recorded on one week old seedlings. Dry weight was recorded on seedlings dried at 65°C for 48 h. Vigour index I and vigour index II were calculated by multiplying percentage of germination with seedling length and dry weight respectively (Abdul-Baki and Anderson, 1972). The data was statistically analysed for variance and means were compared using protected least significant difference test at 0.05 probability level.

RESULTS AND DISCUSSION

High seed viability (86%) was preserved for 15 years as against two years under ambient conditions (Doijode, 1987). Loss of seed viability and reduction of seed vigour were rapid under ambient conditions particularly at higher temperature and humidity. Seeds preserved in moisture impermeable container *viz.*, laminated aluminium foil pouches at 5° C and –20°C showed 73% and 86% of germination respectively after 15 years of storage (Fig.1). Initially high viability was retained for first two years under ambient condition thereafter it declined rapidly. However, high seed viability was maintained at low and sub-zero temperatures for 15 years. The loss of viability was more in the seeds stored in moisture permeable container followed by semi permeable container both at 5°C and –20°C storage. Seed quality was affected by chilling injury in moisture permeable container at sub zero temperature. Fonseca *et al* (1980) reported that seeds stored at higher temperature deteriorates faster and exhibit lower germination percentage and lower seedling vigour. Such a process was lower at cooler temperatures (Harrington, 1972, and Doijode, 2002).

Apart from seed viability, seedling vigour was also well preserved with low temperature storage. High vigour in terms of seedling growth and dry weight accumulation was greater in young seedling emerged from the seeds stored at -20°C (Table 1). Likewise, these seeds showed higher vigour indices I and II. Seed storage in moisture impermeable container helped in maintenance of high seed quality. Seed deterioration process was faster and greater in the seeds stored in moisture permeable containers (Bass and Clark, 1974). Aluminium foil laminated pouches were impermeable to exterior moisture vapour contents and also effective in preserving high seed viability and vigour during storage.

Muskmelon seeds are high value and low volume material used in crop production, improvement and germplasm conservation. Improper handling and storage under ambient condition hastens the process of seed deterioration (Doijode, 2002). Suitable storage conditions are necessary to minimize the deterioration process so that seeds remain viable for longer period. The importance of an ideal storage is to control loss of viability, simple to use and stable for inheritance of plant characters. As a result, seeds were successfully conserved for longer period. Seedlings raised from stored seeds were normal and did not show any morphological variations. Further, recovery of viable seeds was high (86%) even after prolonged (15 years) storage.

Seed storage in moisture impervious containers at –20°C was effective in maintaining high viability and vigour for long-term (15 years). This avoids frequent growing of crop in field, prevent risk of genetic contamination and crop breeder can readily access and conserve the valuable genetic material for future use.

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