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MAINTENANCE OF POLLEN GERMINATION CAPACITY OF *CARICA PAPAYA* L., (CARICACEAE)

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Abstract

Pollen germination of *Carica papaya* L., of the family Caricaceae was examined upto 48 weeks in refrigerator (+4°C), freezer (-20°C, -30°C) and freeze drier (-60°C). Pollen stored at low temperature showed better germination percentage as compared to pollen stored at +4°C and fresh. Freeze dried pollen (-60°C) showed the highest germination percentage. Whereas lowering the storage temperature and moisture contents tends to increase the viability.

Introduction

Germination capacity of stored pollen can be maintained in hybridization and crops improvement programmes. Fruit tree pollen is generally required to be stored for controlled crossing, either to achieve a desired breeding objective or to overcome a constraint involved in commercial fruit production (Ganeshan & Alexander, 1991). The ability of pollen to grow is dependent upon the inherent chemistry of the pollen (Stanley & Linskens, 1974). Likewise, the pollen grains of different species required varying range of growth media like water, sugar solution, inorganic salts and vitamins for their successful germination (Iwanomy, 1971; Mehan & Malik, 1975; Amma & Kulkarni, 1979). Previously various workers have studied the viability of stored pollen such as Kapoor (1976) analyzed the pollen germination of some cucurbits. Pinny & Polito (1990) reported that germination of olive pollen improved markedly in storage conditions. Stored pollen of almond were analyzed for their germination capacity (Martinez-Gomez *et al.,* 2001), germination capacity of strawberry was studied by Aslantus & Pirlak (2002). Similarly, Khan & Perveen (2006a,b) studied the germination capacity of okra and egg plant respectively. Present studies were carried out to examine the storage conditions and viability of C*arica papaya* pollen.

Materials and Methods

During the peak of flowering period of *Carica papaya* pollen were collected in large quantity from cultivated fields and green house. Fresh pollen were systematically subjected to preliminary viability tests (Alexander, 1996). Pollen culture media were prepared according to standard method of Brewbaker & Kwack (1963). Pollen tube equal to at least twice the diameter of pollen grains were counted as germinated, burst pollen were not counted as germinated. The viability of stored pollen was assessed in terms of germination percentage. The stored pollen were germinated in humidity chamber in different sucrose solution ranging from 20-70% to which10% boric acid was added. Light microscopy was carried out under Nikon type-2 microscope.

Table 1. Germination capacity of stored pollen of *Carica papaya* L. (Caricaceae) at different temperature and humidity conditions in sucrose and boric acid solutions.

Weeks	Different temperature and humidity conditions							
	Germination % at +4°C	Solutions (%)	Germination % at - 20°C	Solutions (%)	Germination % at -30°C	Solutions (%)	Germination % at -60°C	Solutions (%)
Fresh	54.00	0	54.00	0	54.00	0	54.00	0
4	53.40	20	71.00	60	75.00	40	75.50	30
8	52.00	20	70.60	40	79.10	30	73.40	50
12	51.30	30	70.10	60	76.20	40	74.20	40
16	48.28	30	70.20	40	75.00	40	72.20	30
20	44.00	40	74.40	50	76.00	30	71.20	50
24	40.00	40	71.90	60	73.00	40	71.50	40
28	35.70	20	68.70	60	73.00	50	71.50	40
32	33.90	30	64.00	70	71.10	50	70.10	40
36	33.00	30	62.60	60	65.50	40	67.30	30
40	28.60	30	59.20	60	61.50	50	65.40	40
44	23.40	30	54.60	50	47.00	50	62.60	40
48	20.10	20	50.98	60	52.50	50	62.60	40

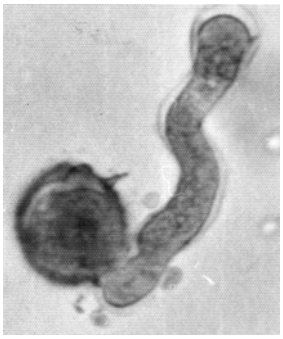

Fig. 1. Pollen germination in *Carica papaya* (LM) after 20 weeks storage at -20^{o}C (X 40).

Results and Discussions

In the present investigation an attempt has been made to compare the efficiency of pollen storage in *Carica papaya* L. Pollen viability was examined up to 48 weeks in different storage conditions viz., refrigerator at (+4^{o}C), freezer (-20^{o}C-30^{o}C) and freeze drier (-60^{o}C). Pollen grains at room temperature showed 54% germination in sucrose solutions to which 10% boric acid was added. Pollen stored at low temperature i.e., in a freeze drier showed better germination percentage in 30%-40% solutions in first 4-12 weeks, but after that germination percentage decreased slowly. This condition seems to have more potential to maintain viability as compared to other conditions. Similarly, pollen stored in freezer at –20^{o}C and –30^{o}C showed good germination but with the increase in time the germination percentage gradually decreased and at 48 weeks the germination was 50.96% and 52.50% respectively (Table 1, Figs. 1,2). Present findings are also in agreement with those of (Stanley & Linskens, 1974) where pollen stored at low temperature presented better germination capacity than high temperature. Similarly, Aslantus & Pirlak (2002) also reported that germination capacity of strawberry pollen increased in low temperature. However, germination percentage of +4^{o}C and fresh pollen was almost same in first week. Pollen stored at +4^{o}C showed low 53.40% germination in early weeks but germination further decreases rapidly and upto 48 weeks germination was 20.10%.

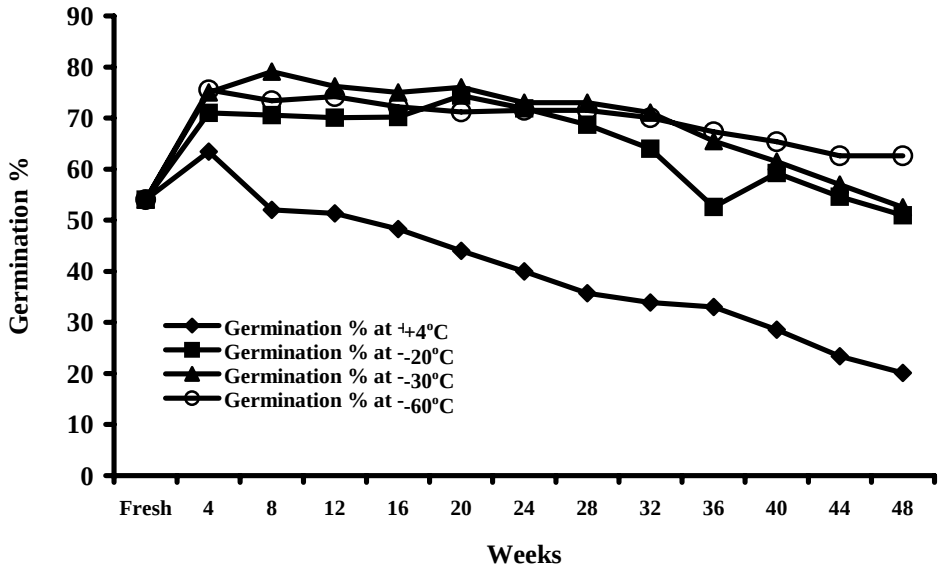

Fig. 2. Germination percentage of stored pollen of *Carica papaya* L., (Caricaceae) at different temperature upto 48 weeks.

Conclusively temperature and humidity are the major influencing factors in pollen behavior of different conditions. Pollen stored at –60°C showed better result and pollen showed 60% viability after storing for 48 weeks. The most important factors for successful pollen conservation are storage temperature and moisture content of material, lowering of both temperature and humidity tends to increase the period of viability.

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