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POLLEN GERMINATION CAPACITY AND VIABILITY IN *LAGENARIA SICERARIA* (MOLINA) STANDLEY (CUCURBITACEAE)

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Abstract

Present investigation of pollen germination and viability pertain to a monoecious species *Lagenaria siceraria* (Molina) Standley belonging to Cucurbitaceae. The pollen germination was examined up to 48 weeks in different concentrations of sucrose and boric acid solutions using "hanging drop technique". Viability under storage was determined by storing pollen in different humidity conditions in a refrigerator (4ºC), freezer (-20°C. -30°C), freeze drier (-60°C). The pollen were also treated in vacuum and in organic solvents. Pollen stored at low temperature showed better percentage of germination compared to pollen stored at 4°C and fresh. Freeze dried pollen (-60°C) showed the highest percentage of germination.

Introduction

Pollen storage is useful for breeding programmes, genetic conservation, artificial pollination and self-incompatible. Longevity of pollen, defined as the period of time over which the pollen retains its viability i.e., germinability and fertilization ability, varies greatly with plant species and storage conditions (Dafni & Firmage, 2000). Mostly binucleate pollen can he stored for long periods of time without loss of viability as compared to trinucleate pollen (Hanna & Towill, 1995). Pollen stored at low temperature presented germination capacity better than high temperature. Pollen grains of tomato stored in open air lose half of their original germination capacity within 2 days at 25°C and within 5 days at 6°C (Abdul-Baki, 1992), while pollen stored at -20°C under dry conditions retain viability for greater than three years (Hanna & Towill, 1995). According to Aslantus & Pirlak (2002), the germination capacity of strawberry pollen increased in low temperature. There are several reports on pollen germination and viability of different taxa with varied aims and objective like King (1961), Nair & Singh (1972), Shivanna & Rangaswamy (1992), Taylor & Hepler (1997) and Thomas (2000). Storage of pollen in vacuum and in organic solvents is also reported by different workers such as, Datta & Chaudhary (1965); Iwanomi (1971); Hanson & Campbell (1972). Khan & Perveen (2010) studied the germination capacity of C*itrullus lanatus* (Cucurbitaceae).

Present investigation is the first attempt to analyze storage conditions of *Lagenaria siceraria* (Molina) Standley. No reports are available on germination capacity and viability of stored pollen of this economically important plant from Pakistan.

Materials and Methods

Pollen viability of *Lagenaria siceraria* (Molina) Standley, has been examined up to 48 weeks in different conditions as refrigerator, freezer, freeze drier, vacuum and in organic solvents. During the peak of flowering period of *Lagenaria siceraria* (Molina) Standley

polliniferous material were collected in large quantity from cultivated fields and green house. Fresh pollen were systematically subjected to preliminary viability tests (Alexander, 1969). Pollen culture media were prepared according to standard method of Brewbaker & Kwack (1963). The germination was scored after 3-6 hours of incubation at room temperature in humid chambers using different solutions. Pollen grains must produce tubes equal to at least twice the diameter of pollen grains to be counted as germinated pollen while burst pollen were not counted as germinated pollen. The viability of stored pollen was assessed in terms of percent germination. The pollen grains slides were also prepared for light (LM) and scanning (SEM) microscopy using the standard methods of Erdtman (1952). For light microscope the pollen grains were mounted in unstained glycerin jelly and observations were made with a Nikon type-2 microscope.

Result and Discussion

Pollen germination capacity of *Lagenaria siceraria* (Molina) Standley (Cucurbitaceae) was examined up to 48 weeks using different concentrations of sucrose and boric acid solution (20%-40%). Pollen were preserved at different conditions like refrigerator (4ºC) and freezer (-20ºC, -30ºC) and freeze drier -60C. Fresh pollen grains showed only 63% of germination in 20% sucrose boric acid solution at room temperature, while in stored conditions the percentage of germination was high. The percentages of pollen germination were 62.5%, 68.8% and 78.40% at -20ºC and -30ºC and -60ºC in 4 weeks of storage respectively. After that rate of germination decrease slowly and after 48 weeks of storage all conditions showed low germination percentage (23.3%-58.9%). However, at -60C *Lagenaria siceraia* (Molina) Standley pollen showed good germination percentage after 16 weeks i.e., 70.50%. *Citrullus lanatus* (Thunb.) Mats & Nakai showed 76.0% germination after 16 weeks of storage (Khan & Perveen, 2010). However, Perveen & Khan (2011) reported that -30ºC is more suitable condition than freeze drier for storage *Praecitrullus fistulosus* (Stocks) Pangalo pollen. The germination percentages at -20°C and fresh pollen were almost same in first week of storage (Table 1). Pollen stored at 4°C showed 66% germination in early weeks but then germination decreased rapidly and after 48 weeks germination was 23.70%. Pollen were treated in vacuum over silica jel, this condition showed good germination up to 14 hours but decreased at the end, germination was higher as compared to organic solvents.

Conclusion

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 58.8% viability after storing for 48 weeks. The most important factors for successful pollen conservation are storage temperature and moisture content of material; lowering both tend to increase the period of viability. Long-term storage has been achieved in many taxa by freeze-drying method (Khan & Perveen, 2008, 2009).

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Table. 1. Germination capacity of stored pollen of Lagenaria siceraria at different temperature in sucrose and boric acid solutions.

Period in week	% of germination at 4°C	% of solutions	% of germination at -20°C	% of solutions	% of germination at -30°C	% of solutions	% of germination at -60°C	% of solutions
4	66.6	30	62.25	30	68.80	40	78.40	40
8	57.60	30	78.50	30	73.80	40	75.00	40
12	55.5	30	70.00	30	74.30	40	70.30	40
16	50.50	30	70.51	30	80.00	40	70.50	40
20	45.50	30	60.11	30	75.00	40	69.30	40
24	38.50	30	61.20	30	71.10	40	68.00	40
28	31.60	30	59.70	30	65.40	40	68.50	40
32	32.40	30	54.00	30	61.70	40	65.00	40
36	29.40	30	56.30	30	60.00	40	63.40	40
40	28.30	30	52.30	30	57.30	40	61.00	40
44	24.40	30	50.60	30	54.10	40	60.00	40
48	23.31	30	46.30	30	52.60	40	58.90	40

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