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Pollen Germination Capacity, Viability and Maintanence of *Pisium sativum* L., (Papilionaceae)

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Abstact: Pollen germination and viability of *Pisum sativum* L., belongs to family Papilionaceae was examined up to 48 weeks in different concentrations of sucrose and boric acid solutions. Viability under storage was determined by storing pollen in different conditions as refrigerator (+4°C), freezer (-20°C, -30°C), freeze drier (-60°C), in vacuum and in organic solvents. Pollen stored at low temperature showed better germination percentage compared to pollen stored at +4°C and fresh. Freeze dried pollen (-60°C) showed the highest germination percentage, while in vacuum pollen showed good germination compared to organic solvents, where benzene showed reasonable germination in early hours but later lost viability.

Key words: *Pisum sativum* · low temperature · humidity · freeze drier

INTRODUCTION

The pollen grains is the structure used to transport the male gamete to the female part of a flower. The correct identification of pollen is important in the study of vegetation and climatic history, in forensic science, in the analysis of origins of honey and beeswax and in alleviation of hay fever (aerobiology). Passing from descriptive palynology toward the functional aspect of pollen or biopalynology successfully pollen preservation.

Maintaining the germination capacity of stored pollen can be useful in time saving in hybridization programs and also in crops improvement. Pinny and Polito[1], reported germination of Olive pollen improved markedly in storage conditions. According to Aslantus and Pirlak [2], the germination capacity of strawberry pollen increased in low temperature. The pollen are of two types Trinucleate and Binucleate, the former one is very hard to germinate on artificial media while the later one is easy to handle. At low temperature the pollen shows germination capacity better than at high temperature [3]. There are several reports on pollen germination and viability of different taxa [4-6] with varied aims and objective Recently extensive studies have been carried out on pollen storage, various methods have been tried for successful storage of different taxa, Gill *et al*. [7], Malik and Thind [8], Shivanna and Rangaswamy [9], Thomas [10], Roger *et al*. [11], Kopp *et al*. [12], Pansoen *et al*. [13], Poulton *et al.* [14], Kenta *et al*. [15] and Candace and Maureen [16].

Storage of pollen in vacuum and in organic solvents reported by different workers as, Datta and Chaudhary [17], Iwanomi [18], Hanson and Campbell [19].

Present investigation is the first attempt to analyzed storage conditions of *Pisum sativum* L., No reports are available on maintenance and germination capacity of stored pollen of this economically important plant.

MATERIALS AND METHODS

During the peak of flowering period of *Vigna mungo* polliniferous material was collected in large quantity from cultivated fields and green house. Fresh pollen was systematically subjected to preliminary viability tests [20]. Pollen culture media was prepared according to standard method of Brewbaker and Kwack [21]. 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 was 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 [22],

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Table 1: Germination capacity of stored pollen of *Pisum sativum* L. (Papilonaceae) at different temperature and humidity conditions in sucrose and boric acid solutions

Period in week	Different temperature and humidity condition							
	% 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	78.4	30	78.0	50	79.0	40	75.5	30
8	76.0	20	75.6	60	78.1	30	73.4	30
12	70.3	30	73.1	30	77.2	30	74.2	40
16	67.3	30	70.2	30	75.0	70	72.2	40
20	63.0	40	66.4	30	75.0	30	71.2	50
24	60.0	40	61.9	30	73.0	30	71.5	40
28	56.7	20	56.7	30	73.0	40	71.5	30
32	53.9	30	54.0	40	72.1	50	70.1	30
36	53.0	30	50.6	30	70.5	30	67.3	30
40	50.6	30	51.2	30	67.5	40	65.4	40
44	47.0	30	47.2	30	57.0	40	62.6	40
48	45.1	20	42.96	20	48.5	40	62.6	60

for light microscope the pollen grains were mounted in unstained glycerin jelly and observation were made with a Nikon type 2 microscope.

RESULTS AND DISSCUSSIONS

Pollen viability of *Pisum sativum* L., (Papilionaceae) has been examined up to 48 weeks in different conditions as refrigerator, freezer, freeze drier, vacuum and in organic solvents. Pollen stored at low temperature freeze drier showed the better germination percentage in high solutions (30%, 40%) in first 4-12 weeks, but after that germination percentage decreased slowly. This method seems to have more potential to maintained viability compared to other conditions. Similarly, Pollen stored in Freezer at -20 and -30°C showed good germination but as the time proceeds the germination percentage gradually decreases and after 48 weeks the germination was 49.96 and 48.50%, respectively (Table 1). The germination percentage of +4°C and fresh pollen was almost same in first week. Pollen stored at +4°C showed above 76% germination in early weeks but then germination decrease rapidly and after 48 weeks germination was 45.10% (Fig. 1). Among solvents benzene showed good germination up 14 hours of soaking compared to acetone and chloroform, where pollen lost viability very early. Pollen was treated in vacuum over silica jel, this condition showed good germination up to 14 hours but decrease at the end, here germination was higher compared to organic solvents.

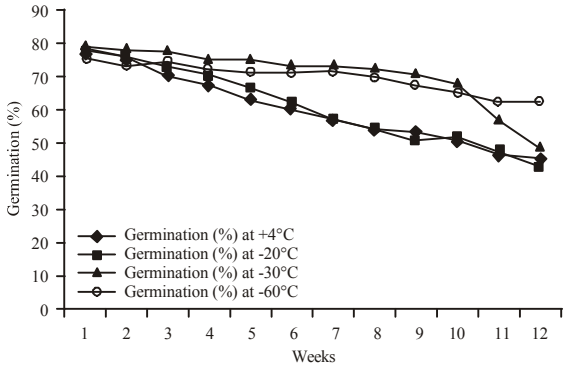

Fig. 1:

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 48 weeks. The most important factors for successful pollen conservation are storage temperature and moisture content of material; lowering both tends to increase the period of viability. Long-term storage has been achieved in many taxa by freeze-drying method (King 1961).

Dry pollen grains stored at -20C for nearly 10 months have a germination percentage of about 80%.

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