



IN VITRO GERMINATION OF FRESH AND STORED POLLEN GRAINS IN MANILKARA ZAPOTA, (L.) P.ROYEN

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Abstract

The aim of present study is In vitro germination of the pollen grains in Manilkara zapota, (L.) P.Royen **Chiku** by using “Hanging Drop Method”(Shivanna and Rangaswamy, 1992). Pollen grains are resting plant organs for In vitro germination uptake of water leads to swelling of the grains and their activation. Therefore, Humidity is a first essential requirement for pollen germination. Other factors which have been found important for pollen germination and pollen tube growth are 1) Carbohydrates –for germinating pollen grains sugar is always necessary it controls osmotic pressure and it serve as respiratory substrate. It prevents the bursting of pollen. Many sugars tested for their ability to promote pollen germination and tube growth sucrose is most effective.

2) Boron- In the form of boric acid has most differentiating effect on pollen germination and pollen tube growth. Boron (10-20ppm) is supplied exogenously. Boron reduces bursting of pollen tubes as well as enhances percentage germination and pollen tube growth.

3) Calcium-on calcium supplemented following features is noticed:

a) The growth of pollen tube is more vigorous.

b) Pollen tubes are more straight and rigid.

The effect of either sucrose or boric acid individually showed good result but sucrose in combination with boric acid and calcium enhances pollen germination as well as pollen tube growth development. Freezing temperature 6⁰C and high relative humidity (RH) 55 to 80% seems to be the best method to maintain pollen viability of stored pollen grains for a long period (7 days) of time. During this study, it was observed that low temperature and high relative humidity is better than the high temperature and low humidity with respect to pollen germination capacity.

Keywords: Chiku, Germination, In vitro, Palghar.

Introduction

Pollen is a unique cell that potentially can be used and manipulated to the advantage of the geneticist, breeder, physiologist and farmers. Pollen is a haploid



and independent. The ability of pollen to germinate on artificial media is used as a test of viability. The pollen grain used to transport the male gamete to the female part of a flower that is ovule, plays vital role in fertilization (Patel et al., 2012). High crop yield generally depend viable pollen grains. Pollen tube germination can be affected by many factors, including temperature, availability of sucrose, calcium and boron (Sawadis, 1995; Taylor et al., 1997). Calcium is required for maintenance of membrane integrity (Kell et al., 1990; Sheen et al., 1992). Boron is required for the growth and development of vascular plants (Cakmak et al., 1995).

The literature on pollen storage has been reviewed by Visser, (1955), Aslantus & Pirlak, (2002), Bomben et. al. (2006), Dutta et al (2013). Many researchers have same consensus that low temperature and high humidity are the two major factors in storage of pollen grains for a long period of time (king, 1961, Ganeshan, 1986; Shivanna & Rangaswamy, 1992). Last 2-3 decades the tropical tree of Manilkara zapota (L.) P.Royen (**Chiku**) it is an important fruit trees all over South East Asia grown in home gardens, orchards and plantation. The largest producers of sapodilla fruit are India. It has represented an important species in many rural communities in Palghar District because of local uses as a food and medicine. It is very important commercially as the source of an edible fruit, a latex and timber. The edible fruit is greatly enjoyed and very widely eaten in the tropics. The tree is widely cultivated commercially and in gardens in the tropics for this fruit and also for the latex contained in the sap.

Materials and Methods:

In flowering period July and August as well as November and December are shown more flowering but the flowering is observed throughout the year in low quantity of the Manilkara zapota, (L.) P. Royen (**Chiku**). Pollen grains were collected in the morning time in between 6 a.m. to 7 a.m. in large quantity from the campus of S.D.S.M.College, Palghar, around 200 plants are cultivated. Some Pollen grains were stored in a refrigerator at 6^oC and some are used for the process of germination by hanging drop method in this process the cavity slides are used. The drop of sucrose solution placed in the center of cover slip and the pollen grains are dusted in this sucrose solution drop then the cavity side is inverted on cover slip after applying petroleum jelly on the border of cavity slide it helps sealing of the cover slip. It involves suspending the pollen grains in a drop of nutrient medium (on a cover glass) hanging over a shallow depression. The cavity slides along with the culture medium and pollen grains incubated in humidity chamber at dark places in the Botany laboratory. The pollen germination media was prepared by different percentage of Sucrose Solution (1%-20%). The germination were scored after 2-3 hours of incubation at room temperature in humid chambers. Pollen tube equal to twice diameters of pollen



were counted as germinated while other pollen grains were considered as ungerminated. The stored pollen grains are also tested for germination process.

Result and Discussion:

During this study, Researcher was observed that freshly 80% pollen grain was germinated in 3 % sucrose solution while stored pollen grain (6°C) observed 44% of germination in same concentration.

Table No. 01 shows the percentage of Germination of fresh Pollen Grains.

Sample Numbers	Different Sucrose concentration	% of Germination
01	1	30
02	2	56
03	3	80
04	4	71
05	5	52
06	6	35
07	7	30
08	8	22
09	9	18
10	10	16
11	11	12
12	12	10
13	13	06
14	14	06
15	15	04
16	16	02
17	17	00
18	18	00
19	19	00
20	20	00

Table No. 02 shows the percentage of Germination of stored Pollen Grains after 04 days

Sample Numbers	Different Sucrose concentration	% of Germination
01	1	15
02	2	27
03	3	22
04	4	35
05	5	26
06	6	17
07	7	15
08	8	11
09	9	09
10	10	08
11	11	06
12	12	05
13	13	03
14	14	03
15	15	02
16	16	01
17	17	00



18	18	00
19	19	00
20	20	00

Table No. 03 shows the percentage of Germination of stored Pollen Grains after 06 days.

Sample Numbers	Different Sucrose concentration	% of Germination
01	1	13
02	2	25
03	3	37
04	4	68
05	5	24
06	6	15
07	7	13
08	8	09
09	9	07
10	10	07
11	11	04
12	12	03
13	13	02
14	14	02
15	15	01
16	16	01
17	17	00
18	18	00
19	19	00
20	20	00

Conclusion:

The pollen grains can be transported from place to place after maintaining the humidity and temperature. This knowledge is useful for the fertilization as well as hybridization. Indirectly, this knowledge helpful to increase the crop production.

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