

Sucrose Needs for Pollen Germination of *Impatiens Balsamina* L

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ABSTRACT: *In vitro* pollen germination is the simplest method to test pollen viability and also can be exploited for study of pollen physiology. A nutrient medium (*in vitro*) is supplemented with some essential compounds necessary for pollen germination and tube growth. During *in vitro* pollen germination and tube growth the need and concentration of sucrose in the medium was ascertained *Impatiens balsamina*, an important horticultural plant was selected of various concentrations tried 0.8% sucrose gave good percent germination. As a major component of pollen tube reserves carbohydrates have a vital role to play in its germination and growth. Sucrose is the best carbohydrate source for pollen germination and tube growth for most of the systems investigated.

KEYWORDS: Sucrose, Pollen germination, Pollen tube growth, *Impatiens balsamina*.

I. INTRODUCTION

Germination is the first most critical morphological event in the pollen to fulfill its ultimate purpose of discharging the male gametes in the Embryo sac. It is significant to understand the physiology and biochemistry of pollen germination. Our knowledge of the physiology and biochemistry of pollen germination and the tube growth comes largely from *in vitro* studies. The ability of the stored pollen to the set seeds following pollination is correlated with *in vitro* germination percentage (Akhiman *et al.*, 1978; Janssen and Hermsen, 1980). Pollen grains contain different biochemicals like sugar, starch, lipids, phytic acid and m-RNA. These storage products get metabolized on germination and elongation of pollen tube, thus play an important role in germination and in initial stage of pollen tube growth. Pollen grains are rich in proteins, carbohydrates, minerals and vitamins (especially B-complex with low values of fats, sodium and fat-soluble vitamins like D, K and E). A nutrient medium (*in vitro*) is supplemented with some essential compounds necessary for pollen germination and tube growth. Sucrose is the carbohydrate source for pollen germination and tube growth. (Tupy, 1960; Hrabetova and Tupy, 1964). Sugar in the culture medium serves functions like (a) maintaining osmotic pressure of the medium and (b) as a substrate for metabolism of pollen.

II. MATERIAL AND METHODS

Collection of pollen in a viable condition is the primary requirement for any experimental study on pollen. The flowers of *Impatiens balsamina* L. were collected from the botanical garden of the Department of Botany. Pollen used for the experiments was collected from various flower of *Impatiens balsamina* L. to reduce variability of pollen. The flowers of *Impatiens* were collected at anthesis in the morning and the pollen grains were collected from the anthers that had just dehisced. The pollen grains were germinated in medium containing different sucrose concentrations like 0.1%, 0.2%, 0.3%, 0.4%, 0.5%, 0.6%, 0.7%, 0.8% and a medium without sucrose was used as control. The watchglasses containing the medium and pollen were placed in moist filter paper lined petri dishes to ensure that the material would not dry up. The percent germination and percent bursting of pollen was noted at regular intervals by keeping pollens in medium up to 2 hour. The concentration of sucrose giving maximum percent germination and pollen tube length was noted.

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III. RESULT AND DISCUSSION

In vitro pollen germination is an efficient technique for realizing the basic (Mascarenhas, 1993) and applied aspects of pollen biology (Herrero, 1991; Kristen and Kappler, 1990). During *in vitro* pollen germination and tube growth, different nutritive requirement like sucrose, boron, calcium, hormone, light and other factors are studied for different plants. Satisfactory pollen germination requires solution of carbohydrate, especially sucrose (Patel *et al.*, 1997), with or without other substances. *Impatiens balsamina* L. pollen germinated on the modified basal medium of Brewbaker and Kwack in order to obtain the optimum percentage of pollen germination and tube growth in this plant. Only one type of pollen grain was seen in *Impatiens balsamina* L. pollen and during germination one to three pollen tubes emerge, but only one matures and increases in length. To standardize the media, pollen were cultured in different concentrations of sucrose such as 0.1%, 0.2%, 0.3%, 0.4%, 0.5%, 0.6%, 0.7% and 0.8%. Germination was obtained in all these concentrations but, the best results in terms of percent germination was obtained with 0.8% sucrose [Table-1]. At the end of 120 minutes 70.8% germination was obtained with 0.1% of sucrose, while in 0.2% sucrose the percent germination was up to 71.4% within 120 minutes. And in 0.8% sucrose the percent germination was up to 94.7% within 120 minutes. Moreover, at the end of 2 hrs, best germination and least bursting was observed with 0.8% sucrose. 30% sucrose proved to be good for optimum germination in *Catharanthus roseus* (Patel *et al.*, 1997; Rathod Zankhana, 2001). 15% sucrose in water chestnut (Hoque and Arima, 2000), 12% sucrose in the media is good for *Brassica oleracea* (Ferrari and Wallace, 1975). 10% sucrose in *Bambusa vulgaris* (Koshy and Jee, 2001) and *Datura metel* L. (Patel, 2002; Katara Mital, 2009) and *Najas marina* (Jain and Shah, 1991) and 15% sucrose in *Bassia latifolia* (Singh and Singh, 2001). The pollen of *Pistacia vera* from Anacardiaceae need 50% sucrose concentration (Golan Goldhirsh *et al.*, 1991), Avocado cultivars, germinates in 15% sucrose concentration (Sahar and Spiegel, 1984). Thus 0.8% sucrose is most suitable in the medium for germination of pollen of *Impatiens balsamina*.

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TABLE -1 Showing percent pollen germination (%G) & percent pollen bursting (%B) under different concentration of Sucrose.

TIME in min.	Control		0.1%		0.2%		0.3%		0.4%		0.5%		0.6%		0.7%		0.8%	
	%G	%B	%G	%B	%G	%B	%G	%B	%G	%B	%G	%B	%G	%B	%G	%B	%G	%B
15	40	3.57	26.1	7.14	24	4	29.7	13.5	39.1	13.04	40	5	45.1	6.45	48	16	51.2	17.0
30	45	5	28.8	5.76	30.3	9.09	33.3	9.09	47.2	7.27	55.2	10.5	50	9.09	53.3	8.33	58.3	16.6
45	53	7.6	32.2	6.45	35.7	14.2	38.7	19.3	52.2	19.04	62.1	12.1	57.5	7.5	59	15.9	67.7	10.1
60	56	8	42.3	15.3	42.8	17.8	43.7	25	57.6	6.77	68.9	17.2	64.1	11.3	61.3	13.6	69.2	7.69
75	58	8.8	54.5	13.6	48.6	21.6	51.4	17.1	62.7	11.6	72	14	70.7	12.1	72.4	10.3	72.4	14.4
90	62.5	9.3	60	12.5	56.5	26.6	55	20	75.3	12.3	78.7	19.1	77	12.5	81.2	12.5	84.2	11.1
105	67.5	8.10	66.6	13.3	64.8	16.2	66.6	23.8	80	13.3	81.6	12.2	82.6	10.8	87.6	15.1	90.6	9.30
120	76.3	10.9	70.8	10.4	71.4	8.57	79.1	12.5	86.8	14.7	85.7	8.16	88.2	11.7	90.3	16	94.7	12.2