Asian J. of Bio Sci. (2007) Vol. 2 No. 1 : (170-172)

A Review :

Whether optimum pollen germination and tube length attained in the same growth medium (sucrose + boric acid) by red missile cultivar of *capsicum frutescens* l. and further evidence of a criticism of Nair, Nambudiri and Thomas (1973)

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(Accepted : April, 2007)

Bobko and Zerling (1938) observed higher viability in the pollen when the plants were given boron-rich fertilizers. Antles (1951) reports that the pollen which failed to germinate in sugar solutions without boric acid, gave 100 per cent germination in sugar alone when the plants were given boron-rich fertilizers for a period of four years.

Key words : Minerals, Growth regulators, Physiology of Pollen, Crop Physiology.

INTRODUCTION

Red missile cultivar of *Capsicum frutescens* L., is a member of Solanaceae is cultivated for their fruits which are berries and used as condiments or eaten row or prickled. They are also used as an ornamental plants. Healthy plants of uniform growth were transplanted to pots (15 cm.) containing garden soil. Each pot contains a solitary plant. After uniform flowering and fruiting foliar applications of different concentrations (25, 50, 100-100-500 mg/ml) of boric acid were made on these plants by an air-compressor in the evening in March. After treatment successive flowers (*viz.* F, F-24, F-48, F-72 series *i.e.* open flowers and the flower buds which require 24, 48, 72 hours to open respectively.) were plucked at the same time soon after the dehiscence of anthers (in open flowers) by weekly intervals for 6 weeks to find out the effect of the mineral on the physiology of pollen. Pollen viability was tested by using 2,3,5-triphenyl tetrazolium chloride (Hauser and Morrison, 1964). An optimum concentration of sucrose (2% for F and F-24 series) was used for the germination of pollen of successive flowers. Pollen grains were incubated soon after the dehiscence of anthers. The cultures were then transferred to a moist filter chamber, stored at room temperature (26.6-31.8°C) having RH 59% and in diffuse laboratory light. The experiments were run in triplicate and average results were recorded. Observations were made by 24 hours after incubation. For each experiment a random count of 100 grains was made (from different fields on the slide) to determine the pollen viability and germination. For measurement of length of pollen tubes, 50 tubes were selected randomly and measured at a magnification of 100x.

Foliar applications of the different concentrations of boric acid failed to improve the viability of pollen of reed missile cultivar of *Capsicum frutescens*. Potentiality of germinability of pollen was noted in F and F-24 series. Pollen of F-24 series showed higher percentage of germination with the longer tube length than F series. The mineral improved the germination of pollen as well as tube growth of successive flowers throughout the experiment (Table 1).

Horticulturists and plant breeders often fail to get fertile seeds in spite of all the care taken during artificial pollination. Unless sterility is the main cause, failure of seed setting may be due to slow growth of the pollen tube or its early degeneration in the style. As a rule, the length of the pollen tube obtained *in vitro* is significantly shorter than that *in vivo*. Consequently, one of the main problems is to obtain *in vitro* germination and tube length comparable to that *in vivo*. Foliar application of 200 mg/ml boric acid produced maximum germination of pollen in successive flowers. However, the treatment of 300 mg/ml mineral showed the longest pollen tubes (Table 1). This proves that the minerals can be most successfully used as the growth substances. With an increase in the time interval between the treatment and the observation on the physiology of pollen there is increase in the germination of pollen as well as tube growth to some

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Table 1 : Effect of foliar applications of boric acid on the germination of pollen and tube growth of successive flowers of red missile cultivar of *Capsicum frutescens* L.

		Concentrations of boric acid in mg/ml													
		25		50		100		200		300		400		500	
W	SF	%	µm	%	µm	%	µm	%	µm	%	µm	%	µm	%	µm
1	F	30	35	32	38	33	40	35	47	30	58	27	45	20	40
	F-24	32	70	37	78	40	80	42	82	43	85	29	70	23	65
2	F	32	39	33	40	34	45	36	50	32	60	30	47	22	42
	F-24	34	71	38	80	42	82	44	85	44	90	31	72	25	66
3	F	33	40	34	45	35	50	37	55	33	64	32	50	25	50
	F-24	35	75	39	85	43	85	45	90	45	92	33	75	27	67
4	F	34	47	35	46	36	52	38	58	35	65	33	55	27	52
	F-24	36	76	40	86	44	86	46	91	46	93	35	76	28	70
5	F	35	49	36	55	37	58	39	60	37	67	35	57	29	53
	F-24	37	77	42	87	45	88	48	92	47	95	36	77	30	72
6	F	23	40	25	50	27	55	28	57	25	60	20	45	20	30
	F-24	28	50	30	52	32	53	33	54	34	55	30	50	22	50

SF, successive flowers; W, time interval in weeks; %, pollen germination in %; µm, pollen tube length in µm. In control : 95% pollen viability, in F series 13% pollen germination with 25 µm pollen tube length and in F-24 series 18% pollen germination with 50 µm pollen tube length was noted.

extent, but further increase in the time interval there is decrease in the germination as well as tube growth of the pollen of successive flowers (Table 1). In the present investigation there was an increase in the germination of pollen as well as tube growth of either series with an increase in the time interval and the observations of pollen counts till 5th week, but further increase resulted in decline (Table 1).

Present investigation proves that the pollen germination and tube elongation are two distinct processes differing in their sensitivity to different concentrations of the mineral (Table 1). However, Nair, Nambudiri and Thomas (1973) stated that it has been significant that the optimum percentage of germination and tube length were attained in the same growth medium. With the present work (Table 1) as well as the extensive work of Salgare (1979, 86, 2004, 05a, b, 06) and Salgare and Bindu (2002, 05) and Salgare and Tessy Mol Antony (2005a, b) it could be concluded that the observations of Nair, Nambudiri and Thomas (1973) are superficial and misleading.

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