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A Review:

Alteration of resting period of pollen of five cultivars of Apocynaceae by mineral (Potassium Borate): Further Evidence of a criticism of Brewbaker and Kwack (1963) and Saoji and Chitaley (1972)

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Boric acid altered the resting period of pollen of 5 series and failed in 5 series of the Apocynaceae.

Key Words : Palynology, Minerals, Growth regulators.

INTRODUCTION

Palynology, in recent years has attracted the attention of workers of different disciplines on account of its numerous applications to problems of plant taxonomy, genetics, geology, medical and agricultural sciences. Pollen physiology furnishes the information required for effecting hybridization of plants growing in different geographical and climatic regions with blooms in different seasons.

MATERIALS AND METHODS

Pollen of 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) of 5 cultivars of Apocynaceae *e.g.* red-, pink- and white-flowered cultivars of *Nerium odorum* Soland. and pink- and white-flowered cultivars of *Catharanthus roseus* (L.) G. Don. were collected at the stage of the dehiscence of anthers in the open flowers. Germination of pollen grains of successive flowers was studied by standing-drop technique in the optimum concentrations of sucrose as well as in the optimum concentrations of sucrose supplemented with the optimum concentrations of boric acid (Table 1). The rate of pollen germination of successive flowers was determined by fixing the cultures at one hour intervals. Such preparations were continued for 10 hours. Observations on the germination of pollen were recorded 24 hours after incubation.

RESULTS AND DISCUSSION

Potentiality of pollen germinability was recorded in F series of all the 5 cultivars of the Apocynaceae studied. It was the pollen of F-24 series of red-flowered cultivar of *Nerium odorum* and both the cultivars of *Catharanthus roseus* found germinated in the optimum concentrations of sucrose. It should be pointed out that the pollen of F-48 and F-72 series of pink-flowered cultivar of *C. roseus* showed their germination in the optimum concentrations of sucrose. Thus the potentiality of pollen germinability in Apocynaceae was observed in 10 out of 20 series investigated (Table 1).

Germination of pollen of F-72 series of pink-flowered cultivar of *Catharanthus roseus in vitro* culture of sucrose was noted in the present investigation. However, Trisa Palathingal (1990-M.Phil.Thesis) failed to germinate the pollen of F-72 series of pink-flowered cultivar of *C. roseus* in Brewbaker and Kwack's (1963) culture medium. This proves that the culture medium is also having the bearing on the germination of pollen. This also confirms that Brewbaker and Kwack's (1963) culture medium is not ideal for pollen cultures. This was also pointed out earlier by the author (2006h, m, o, 07f).

The delay in pollen germination was interpreted by Saoji and Chitaley (1972) as being due to the grains not being mature enough to effect pollination, immediately after being shed from the anther. Further they stated that 4-5 hours are required for the complete maturation of pollen grains. It was Salgare (1983) who pointed out of the first time that the pollen require resting period before germination and it was the failure of Saoji and Chitaley (1972) who misinterpreted the resting period for pollen maturity. Further he (1983) stated that this resting period differs species to species which is also noted in the present investigation (Table 1). This resting period is altered by different

Table 1. Effect of potassium borate on the rate of pollen germination of Successive flowers of five cultivars of Apocynaceae

			Conc.		trfpg	
Cultivars	Series	%PV	SC	OCM	C	T
Nerium odorum						
Pink-flowered	F	91±0.42	50	10	1	4
White-flowered	F	61±2.87	50	10	3	2
Red-flowered	F	61±3.17	20	05	1	6
Red-flowered	F-24	61±3.17	20	10	1	7
Catharanthus roseus						
White-flowered	F	89±0.97	20	01	1	1
White-flowered	F-24	89±0.97	50	10	2	2
Pink-flowered	F	93. ±0.98	20	10	1	1
Pink-flowered	F-24	93. ±0.98	50	01	1	5
Pink-flowered	F-48	93. ±0.98	50	Ng	8	Ng
Pink-flowered	F-72	93. ±0.98	80	Ng	Ng	Ng

C, in control sets time required for germination of pollen in optimum concentrations of sucrose; OCM, optimum concentrations of mineral in mg/ml; Conc, optimum concentrations of sucrose and boric acid; SC, optimum concentrations of sucrose in %; Ng, no germination of pollen even after 24 hours of sowing; PV, pollen viability; T, time required for germination of pollen in optimum concentrations of sucrose + boric acid (in treated sets); trfpg, time required for the germination of pollen in control sets and treated sets in hours.

chemicals. Present work as well as the extensive work of Salgare (1983, 84, 85, 86b, 2001, 04, 05a-b, 06b-f, i, k, n-o, 07a-b, d, g), Salgare and Theresa Sebastian (1986), Salgare and Shashi Yadav (2002, 05), Salgare and Sanchita Pathak (2002, 05) and Salgare and Sanju Singh (2006) made it very clear that Saoji and Chitaley's (1972) arguments are superficial and misleading.

Boric acid altered the resting period of pollen of 5 series and failed in 5 series of the Apocynaceae (Table 1). The mineral extended the resting period of pollen of all the 5 series. Boric acid caused maximum extension in the resting period of the pollen of F series of pink-flowered cultivar of *Nerium odorum*. Alteration of resting period of pollen of successive flowers by the minerals was noted by Salgare and Shashi Yadav (2002, 05). Alteration of the resting period of pollen by the herbicides was noted by the author (1983, 84, 85, 86b, 2001, 04, 05a-b, 06b-f, i, k, n-o, 07a-b, d, g) and Salgare and Theresa Sebastian (1986). Recently Salgare and Sanchita Pathak (2002, 05) and Salgare and Sanju Singh (2006) noted the alteration of resting period of pollen by the heavy metal. Variation of the resting period of pollen of successive flowers of 5 cultivars of *Petunia axillaris* in various sugars was recorded by the author (2007b, f).

Sudhakaran (1967) stated that in *Vinca rosea* L. [*Catharanthus roseus* (L.) G. Don.] besides pollen grains which produced single pollen tube, it has also been noticed that tetraploid grains frequently produce more than one pollen tube. Pollen tubes are branched quite frequently. Aberrations of this type in the pollen tube development are not observed in diploid pollen tubes, but quite frequently met with the pollen grains of irradiated plants. Salgare (1983, 86a, 2006a-c, e, g-h, j, l-m, 07b-c, e-f) made it very clear that Sudhakaran (1967) had failed to trace out the branched pollen tubes and polysiphonous condition which is fairly common even in diploid pollen grains. Apart from this Sudhakaran (1967) was not able to report the various types of pollen tube deformities either with diploid or tetraploid grains. Present findings as well as the previous work of Salgare (1983, 86a, 2006a-c, e, g-h, j, l-m, 07b-c, e-f) also proved that Sudhakaran's (1967) observations are superficial and misleading.

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