Whether optimum pollen germination and tube length attained in the same concentrations of the growth medium (sucrose + potassium borate) by five cultivars of Apocynaceae!: Further evidence of a criticism of Banerji and Gangulee (1937), Brewbaker and Kwack (1963), Sudhakaran (1967-Ph.D.Thesis), Dharurkar (1971 - Ph.D. Thesis), Nair, Nambudiri and Thomas (1973)*

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All the concentrations (1-1000 mg/ml) of mineral (potassium borate) stimulated the germination as well as tube growth of all the 5 cultivars of the Apocynaceae.

Pollen physiology has attracted the attention of plant breeders and horticulturists ever since the discovery of pollen tube by Amici (1924).

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 soon after the dehiscence of anthers in the open flowers. Germination of pollen grains was studied by standing-drop technique in the optimum concentrations of sucrose which acts as control as well as in the optimum concentrations of sucrose supplemented with the wide range of concentrations (1, 5, 10, 20-20-100, 200-200-1000 mg/ml) of mineral (potassium borate). Pollen grains were incubated soon after the dehiscence of anthers. The cultures then transferred to a moist filter chamber, stored at room temperature (28.3-31.5°C) having RH 66% and in diffuse laboratory light. The experiments were run in triplicate and average results were recorded. Observations on the germination of pollen and tube growth were recorded 24 hours after incubation. For each experiment a random count of 200 grains was made to determine the percentage of pollen germination. For measurement of length of pollen tubes, 50 tubes were selected randomly and measured at a magnification of 100x.

In the present investigation even the different cultivars of the same species showed the variations in the percentage of their pollen viability (Table 1). Reduced pollen viability has been interpreted as an indication of suspected hybridity in wild populations. Nevertheless, variations in pollen viability may affect the breeding systems of the species concerned, and if the pollen viability can be altered by the environment, then the breeding system itself may be under some degree of environmental control.

As a rule the percentage of pollen germination is always less than the pollen viability. However, Banerji and Gangulee (1937) and Dharurkar (1971-Ph.D.Thesis) reported higher percentage of pollen germination than the pollen viability in *Eichhornia crassipes.* The claim of Banerji and Gangulee (1937) and Dharurkar (1971) was challenged by Salgare (2006) who stated that the observations of Banerji and Gangulee (1937) and Dharurkar (1971) were exaggerating.

Salgare (1986, 2006) observed the germination of pollen of F-72 series of pink-flowered cultivar of *Catharanthus roseus in vitro* culture of sucrose. Trisa Palathingal (1990-M.Phil.Thesis) stated that the pollen of F-72 series of pink-flowered cultivar of *C. roseus* failed to germinate in Brewbaker and Kwack's (1963) culture medium. This confirms that Brewbaker and Kwack's (1963) culture medium was not perfect.

Potassium borate stimulated the germination of pollen as well as tube growth of all the series investigated of the Apocynaceae (Table 1). 1-1000 and 1-10 mg/ml proved to be the widest and the narrowest ranges of concentrations of the potassium borate, respectively which stimulated the germination of pollen of the Apocynaceae. An optimum concentration produced as high as 480.00% and as low as 9.76% stimulation in the germination of the pollen of the Apocynaceae (Table 1).

Pollen germination stimulation (in %) is in the following proportions in various floral series, F:F-24:F-48:F-72 for potassium borate. These are for optimum concentrations of potassium borate:

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Table 1 : Effect of potassium borate on pollen germination and tube growth of successive flowers of five cultivars of Apocynaceae

Cultivars	Series	%PV	iocs		rcvs			pgtgstcv			
			SC	V/O	RCPG	RCTG	OCM	SPG	OCM	STG	V/O
N. odorum											
Pink-flowered	F	91±0.42	50	1.53	1-600	1-1000	05	+156.25	10	+655.43	11.58
White-flowered	F	61±2.87	50	1.20	1-1000	1-1000	20	+480.00	60	+528.21	07.54
Red-flowered	F	61±3.17	20	1.50	1-200	1-400	20	+086.36	20	+142.18	09.68
Red-flowered	F-24	61±3.17	20	4.41	1-400	1-200	40	+150.00	10	+240.00	07.29
C. roseus											
White-flowered	F	89±0.97	20	1.65	1-1000	1-1000	20	+286.96	20	+683.93	12.91
White-flowered	F-24	89±0.97	50	1.06	1-600	1-1000	10	+053.45	20	+748.33	8.98
Pink-flowered	F	93. ±0.98	20	4.15	1-1000	1-1000	10	+181.82	10	+261.40	08.96
Pink-flowered	F-24	93. ±0.98	50	1.96	1-10	1-1000	05	-009.76	10	+214.89	06.16
Pink-flowered	F-48	93. ±0.98	50	0.09	Ng	Ng	Ng	Ng	Ng	Ng	Ng
Pink-flowered	F-72	93. ±0.98	80	0.08	Ng	Ng	Ng	Ng	Ng	Ng	Ng

iocs, in optimum concentrations of sucrose; OCM, optimum concentrations of mineral in mg/ml for germination of pollen and tube growth; pgtgocm, pollen germination and tube growth in optimum concentrations of mineral; PV, pollen viability; rcms, range of concentrations of mineral for stimulation of pollen germination and tube growth; RCPG, range of concentrations of mineral for stimulation of pollen germination; RCTG, range of concentrations of mineral for stimulation of pollen tube growth; SC, optimum concentrations of sucrose in %; SPG, stimulation in pollen germination in %; STG, stimulation in pollen tube growth (in μm) in %; V/O, *in vitro* tube length in compare to *in vivo* in%.

238.28±5.20:71.07±4.30:0:0 (Table 1)

This shows that the potassium borate produced maximum stimulation in the germination of pollen of F series of the Apocynaceae.

1-1000 and 1-200 mg/ml proved to be the widest and the narrowest ranges of concentrations of the potassium borate, respectively which stimulated the pollen tube growth of the Apocynaceae (Table 1). An optimum concentration produced as high as 683.93% and as low as 142.18% stimulation in the pollen tube growth of the Apocynaceae.

Proportions of pollen tube growth stimulation produced by vitamin B_1, in optimum concentration, among various floral series, F:F-24:F-48:F-72, are as under:

454.23±4.60:401.07±5.60:0:0 (Table 1)

This shows that potassium borate produced the maximum stimulation in the tube growth of F series of the Apocynaceae.

The tube length *in vitro* culture of potassium borate (in an optimum concentration) was 12.91% in F series of white-flowered *Catharanthus roseus* of the tube length found *in vitro* was the longest of all the cultivars investigated of the Apocynaceae (Table 1).

Pollen germination and tube elongation are two distinct processes differing in their sensitivity to different concentrations of the herbicide was also confirmed with the present work (Table 1, Salgare, 1986). However, Nair *et al.* (1973) stated that it has been significant that the optimum percentage of germination and tube length were attained in the same growth medium. However, with the present work (Table 1) as well as previous extensive work of Salgare (1986) it could be concluded that the observations of Nair *et al.* (1973) were superficial and misleading.

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. Present work proves that Sudhakaran (1967) had failed to trace out the branched pollen tubes and polysiphonous condition which is fairly common even in diploid pollen grains. Present investigation also proved that Sudhakaran's (1967) observations were superficial and misleading.

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