

Monitoring of herbicide (2,4-D) toxicity by using pollen as indicators - pollen of apocynaceae and further evidence of acriticism of the hypothesis of Berg (1973), Brandt (1974), Vick and Bevan (1976), Rasmussen (1977), Navara, Horvath and Kaleta (1978), Mhatre (1980 - Ph.D. Thesis), Mhatre, Chaphekar, Ramani Rao, Patil, Haldar (1980), Shetye (1982 - Ph.D. Thesis) and Giridhar (1984 - Ph.D. Thesis) - *A Critical Review*

S. A.SALGARE

Salgare Research Foundation Pvt. Ltd., Prathamesh Society, Shivaji Chowk, Karjat - 410 201 (MS), India

E-mail : drsalgare@rediffmail.com & drsalgare@sancharnet.in

(Accepted : December, 2005)

SUMMARY

All the concentrations (10^{-17} - 10^{-2} - 10^{-3} , 1, 5, 10, 20-20-100 mg/ml) of 2,4-Dichlorophenoxy acetic acid tried found to be toxic for the germination of pollen of F-72 series of pink-flowered cultivar of *Catharanthus roseus* (L.) G. Don. However, pollen of F series of pink-flowered cultivar of *Nerium odorum* Soland. and F and F-24 series of both the cultivars of *C. roseus* showed their germination even in the highest concentration (100 mg/ml) of 2,4-D tried.

Key words : Palynology, Toxicology, Environmental Sciences.

The use of vegetation as biological indicator of environmental quality has a long history dating back to the miners canary, to the recognition about 100 years ago. Recent studies have shown the feasibility of using natural vegetation for monitoring pollution (Berg, 1973; Brandt, 1974; Rasmussen, 1977; Navara *et al.* 1978).

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 supplemented with the wide range of concentrations (10^{-17} - 10^{-2} - 10^{-3} , 1, 5, 10, 20-20-100 mg/ml) of 2,4-Dichlorophenoxy acetic acid (Table 1). The cultures then transferred to a moist filter chamber, stored

at room temperature (20-31.8°C) having RH 59% and in diffuse laboratory light. Observations 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.

Potentiality of pollen germinability was recorded in F series of all the 5 cultivars of Apocynaceae studied. Pollen of F-24 series of red-flowered cultivar of *Nerium odorum* and both the cultivars of *Catharanthus roseus* were found germinated in the optimum concentrations of sucrose. 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).

Even the lowest concentration (10^{-17} mg/ml) of 2,4-D tried found to be toxic for the germination of pollen of F-72 series of pink-flowered cultivar of *C. roseus* (Table 1). This proves that the pollen of the said series are highly sensitive and acts as an ideal indicators of pollution. Thus it is confirmed that the pollen development and activity are more sensitive indicators of adverse factors in the botanical environment and the use of an entire vascular plant (Berg 1973; Brandt 1974; Rasmussen 1977; Navara *et al.* 1978; Mhatre *et al.* 1980; and Giridhar 1984) as an indicator of

* Paper was presented at the Proc. of 4th Indian Paly. Conf., held on March 19-21, 1984 at Deptt. Environ. Sci., Andhra Univ., Waltair - 530 003.

* Paper was presented at the Proc. of 2nd Ann. Conf. Nat. Environ. Sci. Acad, held on May 25-27, 1985 at Awadh Univ., Faizabad.

* Paper was presented at the Proc. of 1st Nat. Symp. on Environmental Biology, held on December 30-31, 1986 at Deptt. Zoology and Microbiology, Sir Krishnadevaraya University, Anantpur - 515 003