

A Review:

Evaluation of MH as male gametocide on *Phaseolus aureus* and a new method of plant breeding and further evidence of a criticism of the hypothesis of Nair, Nambudiri, Thomas (1973), 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)

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SUMMARY

In the present investigation foliar applications of 5, 10, 25, 50, 100, 200-200-1000, 1000-1000-5000 mg/ml Maleic Hydrazide (MH) (1,2-dihydropyridazine, 3-6-dione) were made on 3 weeks old crop (pre-flowering stage) of *Phaseolus aureus* Roxb. - Var. J -781 – Mung to find out the effect on pollen fertility, germination and tube growth 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.). The observations on the physiology of pollen were made after 5 weeks of treatment. Treatment of all the concentrations of MH above 800 mg/ml prevented the flowering. Pollen viability was tested by using 2,3,5-Triphenyl tetrazolium chloride (Hauser and Morrison, 1964). An optimum concentrations of sucrose (10% for F-24 Series, 20% for F & F-48 Series, 30% for F-72 Series) was used for the germination of pollen of successive flowers.

After 5 weeks of treatment the effect of 5-50 mg/ml MH is nullified on the fertility of pollen of all the 4 series of *P. aureus*, while the treatment of the lowest concentration of MH is nullified on the germination of pollen and tube growth. The treatment of the highest concentration (800 mg/ml) of MH which showed the flowering produced 51.52 ± 0.20 , 50.32 ± 0.36 , 48.42 ± 0.09 , 45.96 ± 0.30 % pollen fertility in F, F-24, F-48, F-72 series respectively against 85.14 ± 0.25 , 85.40 ± 0.50 , 85.41 ± 0.36 , 85.85 ± 0.45 % pollen fertility in control in F, F-24, F-48, F-72 series respectively. None of the concentrations of MH could suppress the cent percent pollen fertility which is essential for the successful plant breeding program. This proves that existing method *i.e.* the chemical induction of pollen sterility fails here. Hence we have to find out an alternative method of plant breeding. It is interesting to note that all the concentrations of MH above 200 mg/ml suppressed the germinability of pollen of all the 4 series investigated. When there is no germination of pollen than the transfer of the male gamete to the female does not take place and the question of the seed-setting does not arises. Hence we should explore this new method of plant breeding which is very economical one. As low as 100 mg/ml MH treatment inhibited the germination of pollen as well as tube growth of all the 4 series even after 5 weeks of treatment. This proves that the pollen is highly sensitive acts as an ideal indicator of pollution. It is also confirmed that the pollen of F-24 and F-48 series produced higher percentage of germination with the longer tubes than F series confirming that the use of pollen of F series is not ideal for pollen storage and their subsequent use in plant breeding program which is used in the existing method. MH stimulated the germination of pollen as well as tube growth of all the 4 series investigated. This proves that the herbicides can be used as growth substances.

Key words : Plant Breeding, Crop Physiology, Herbicides.

In crops which are not as fortunately placed as maize with regards to the possibility of producing hybrid seeds cheaply and on a large scale, extensive research is in progress to isolate spontaneously occurring male sterile lines. The numerous instances of male sterility occurring among plants in nature without associated ovule sterility indicate that it may be possible to reproduce this situation artificially. Attempts have been made to induce the selective abortion of pollen through treatment with various chemicals (Jain, 1959). These chemicals are commonly called as gametocidic or pollinocidic compounds.

In recent years (Salgare, 2001b) the importance of

gaining a knowledge on the germination potential of pollen in the bud stage of floral development has been realized, because of its possible applications in pollen storage and its subsequent use in plant breeding program. This is a new line of study and further work there in is likely to help in solving certain problems in hybridization.

MATERIALS AND METHODS

Seeds of *Phaseolus aureus* Roxb. - Var. J -781 – Mung were obtained from the authorized dealers and were sown in the garden soil at the Institute of Science, Mumbai. Foliar applications of 5, 10, 25, 50, 100, 200-200-1000, 1000-1000-5000 mg/ml Maleic Hydrazide (MH) (1,2-dihydropyridazine, 3-6-dione) were given to 3 weeks old crop (at pre-flowering stage) of *P. aureus* by an air-compressor. After 5 weeks of treatment, successive flowers (*viz.* F, F-24, F-48, F-72 series *i.e.* open flowers and the flower buds which require 24, 48,

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