GERMINATION STUDIES OF POLLEN GRAINS *IN VITRO* OF CERTAIN MALVACEAE

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RESUMEN

Los autores han estudiado la germinación de granos de polen en dos especies de *Hibiscus, H. ficulens* y *H. panduraeformis*. En ellas, lo mismo que en otras especies de Malváceas anteriormente examinadas, se observan granos de polen que desarrollan más de un tubo polínico (especies polisifonadas). También se hallaron tubos polínicos ramificados, aunque éstos eran escasos en *H. panduraeformis*. En ambas especies el porcentaje de fertilidad es elevado.

Introduction

Amici (1830), who first discovered the pollen tube, recorded polysiphonous pollen grains of *Hibiscus trionum* and *H. syriacus*; some grains of cotton species gave rise to 20 to 30 tubes on germination. Guignard (1904) supported the previous worker in his findings after *in vivo* studies of pollen grains of *H. trionum* and recorded that only one tube was viable and played an active part in fertilization. Stenar (1925) recorded 10 tubes in *Althaea rosea* and 14 tubes in *Malva neglecta*. Lang (1937) observed 5 to 10 tubes in the pollen grains of *Anoda cristata* and *Lavatera cachmeriana*. Iyenger (1938) reported two tubes per grain in diploid Asiatic cotton (*Gossypium herbaceum*) and the tetraploid American cotton (*G. hirsutum*). He held the opinion that the frequency of two tubes is greater in the tetraploid American types than in the diploid Asiatic ones and noted branching of the tubes in the styles only. He also noted polysiphonous pollen grain in *H.*

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vitifolius. Purewall and Randhawa (1947) found branching and polysiphonous condition (six tubes) in the pollen grain of *Hibiscus esculentus* (= *Abelmoschus esculentus*).

Datta (1958) recorded polysiphonous pollen grains in *H. vitifolius, H. esculentus, H. subdariffa* var. *altissima, H. cannabinus, Abutilon avicenneae, Sida rhombifolia* and F_1 hybrid of *H. cannabinus* × *H. radiatus*. He also recorded branching in some pollen of *Hibicus* spp. (cf. his Table-I). Prasad (1962) recorded polysiphonous pollen grains in *H. vitifolius, H. mutabilis, H. esculentus* and branching in the latter. Pollen grains of *Sida spinosa* and *Abutilon indicum* are mono-siphonous and only sparingly the pollen grains gave out two tubes in the former species.

Hibiscus ficulens Linn. (=*Abelmoschus ficulens* Wight & Arn.) is an annual yielding a glossy white fibre useful for twine and light cordage. It is also an economic species in many other respects.

Hibiscus panduraeformis Burm. is an annual or perennial also yielding silvery white fibres.

Fertility percentage and germination behaviour *in vitro* were studied in 1962.

Materials and Methods

Seeds were received through the courtesy of Dr. V. R. Dnyansagar, Vidharbha Mahavidyalaya, Amravati, and were sown in pots in the Department.

A culture medium with 4 % sucrose agar-gelatin was prepared in the usual way. The medium was thinly smeared on clean slides and pollen from freshly opened flowers were uniformly dusted and slides were kept in humid chambers. After germination the slides were stained with aceto-carmine for microscopic examination. For studying fertility percentage, pollens were dusted on slides and stained with 1 % aceto-carmine. They were counted after some time after sealing the slides with paraffin.

Observations

Pollen grains are round and spinescent. Spines are of various shapes and lengths distributed uniformly on the exine wall. They are polyforate. Stained grains are regarded as potentially viable.

Table I, shows the fertility percentages and measurements.

Table I

Species	Nº of pollen examined	Nº of stained pollen	Nº of unstained pollen	Fertility percentage	Range of diameters in μ	Average diameter of 100 pollen in μ
H. ficulens	300	278	22	92.96	128-144	134.56
H. panduraeformis.	364	312	52	85.71	112-32 -183.04	132.12

Polysiphonous grains are found in both species. Branching is rarely observed in *H. panduraeformis* in culture. Table II gives the details.

Table II

Species	Maximum nº of tubes observed from one pollen	Range of nº of tubes per pollen	Branching	Longest tube observed in μ
H. ficulens	9	1 - 9	Frequent	268.08
H. panduraeformis.	5	1 - 5	Rare	198.00

H. ficulens pollen germinates within 2 ½ - 3 hours, whereas *H. panduraeformis* pollen germinates after 20 hours. Only one pollen tube was found viable in both cases. It is very difficult to find out viable pollen tube in *H. panduraeformis*

formis because of the presence of numerous starch granules and oily substances within the tubes clogging careful microscopic observation.

References

Amici, G. — 1830. Note sur le mode d'action du pollen sur le stigmate (extrait d' une lettre à M. Mirbel). — Ann. Sci. nat. Ser. 1 21: 329-32.

Datta, R. M. — 1958. Studies of the pollen grain and pollen tube in certain Malvaceae. — Madroño, 14: 227-32.

Guignard, L. — 1904. La double fècondation chez les Malvacées. — J. Bot. 18: 296-308.

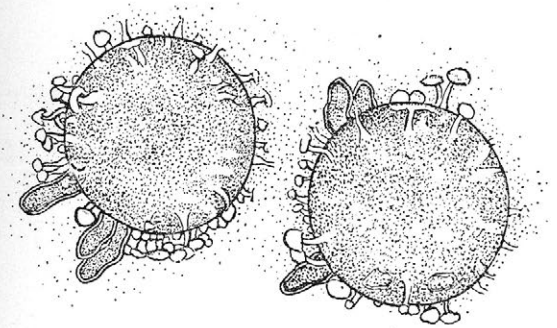
Iyenger, N. K. — 1938. Pollen tube studies in *Gossypium*. — J. Genet. 37: 69-106.

Lang, C. H. — 1937. Investigation of pollen of Malvaceae with special reference to the inclusions. — J. R. micr. Soc. 57: 75-102.

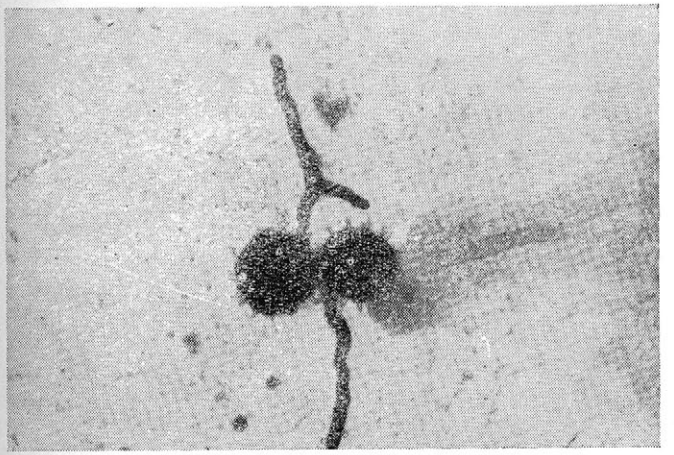
Purewall, S. S. and G. S. Randhawa. — 1947. Studies in *Hibiscus esculentus* L. I. *Chromosomes and pollination*. — Ind. J. Agr. Sci. 17: 129-36.

Prasad, S. S. — 1962. Comparative studies in pollen grain germination of certain plants of Malvaceae and related families *in vitro*. — Proc. Acad. nat. Sci. India, Sect. B, 32: 399-402.

Stenar, H. — 1925. Embryologische studien. I. Zur. Embryologie der Columniferen. Uppsala.



Polysiphonous pollen grains of *H. panduraeformis*.



Polysiphonous pollen grains of *H. ficulens* showing branched pollen tube.