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Research Article

IN VITRO GERMINATION OF DIFFERENT VARIETIES OF GOSSYPIUM POLLEN GRAIN

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ABSTRACT

Cotton is one of the most commercial crops playing a key role in economic, political and social affairs of the world. To alleviate environmental stress-related yield reductions, a better understanding of the relative sensitivities of pollen development, dehiscence, pollen germination, pollen tube growth, fertilization, and subsequent boll development is needed. Number of pollen grains viable to germinate at the time of germination after their deposition on stigma is an important event in the process of fertilization leading to formation of fruits and seeds. Progress in identifying the sensitivities of these developmental stress responses has been hampered in part by the lack of a rapid and reliable method of germinating Gossypium varieties pollen in vitro. Since pollen grains of a large number of species readily germinate *in-vitro* on a simple medium, *in-vitro* germination has been extensively used in studies on structural and physiological details of germination and tube growth.

Keywords: Gossypium flower anther, sucrose, boric acid, calcium nitrate and magnesium sulphate, and micro slides.

1. INTRODUCTION

Palynology, a term coined by Hyde and Williams [1] means the science of pollen and spore. The basic palynology can also be referred investigation of pollen and spore dispersal preferably by wind and water. Understanding the Palynology of commercially important crop plants like cotton is an important aspect of investigations. The *Gossypium* is botanical name of cotton. Cotton is a valuable crop plant. It is used as a textile fiber because of their mature dry hairs, which is twisted in such a way that the fine & strong thread can be spun from them.

Number of pollen grains viable to germinate at the time of germination after their deposition on stigma play very important role in the process of fertilization leading to formation of fruits and form seeds. Germination of pollen grain is the first morphogenetic process for its function to transport & discharge of sperm cells into embryo sac.

The whole process of pollen germination and tube elongation is demarcated into four phases namely inhibition phase, lag phase, tube initiation, and rapid elongation phase. In some varieties pollen grains starts to germinate as soon as they reach the stigma, if condition of temperature and humidity are favorable. Several numbers of tubes may emerge from a single pollen grain [2]. Mostly, at the time of pollen germination it produces single pollen tube. Since pollen grains of a large number of species readily germinate *in-vitro* on a simple medium, *in-vitro* germination of pollen grain has been extensively used in the studies of the structural and physiological details of the germination and tube growth. Two celled pollen grain in generak are more amenable to in vitro germination as compared to three celled pollen. Numbers of methods have been used for the *in vitro* germination and it has been comprehensively describe by Shivanna and Rangaswamy [3]. Detail processes involved in the pollen germination and tube growth are of the paramount importance. In *in-vitro* germination of the pollen grain is the most frequently used method for checking the viability of the pollen grain [4].

2. MATERIAL AND METHODS

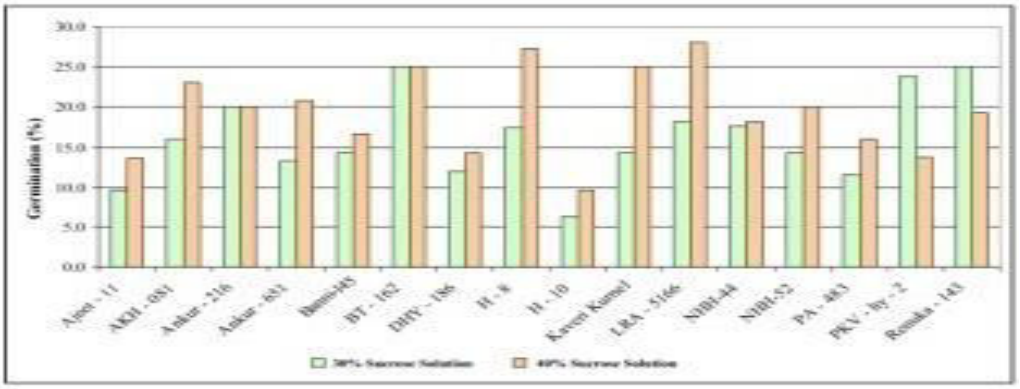
For i*n-vitro* pollen germination dehisced anthers from matured flowers of selected cotton varieties were collected. *In vitro* pollen germination of pollen grain was carried out in different media such as, sucrose, boric acid, calcium nitrate and magnesium sulphate with 10%, 20%, 30%, 40%, and 50% concentrations. The micro slides of pollen grains prepared in different concentrations were observed under compound

microscope and Counted the number of germinated and ungerminated pollen grain and subsequently, calculated the percentage of the *in vitro* germination.

3. OBSERVATION

In vitro pollen germination was found in the maximum in sucrose solution of 30% and 40% concentration in all varieties. It was found to be 16.1% and 19.3% in NHH-44, 13.8% and 20.7% in Ankur-651 17.5% and 24.2% in AKH-081, 11.9% and 11.4% in DHY-186, 10.7% and 16.9% in PA-348, 24.4% and 19.2% in Renuka-143, 5.0% and 9.8% in H-10), 23.1% and 14.5% in PKV-hy-2, 19.5% and 27.8% in H-8, 12.6% and 20.5% in NHH-52, 23.2% and 23.6% in BT-162,20.2% and 27% in LRA-5166, 14.2% and 25.2% in Kaveri Kurnel, 20% and 22% in Ankur-216, 11.1% and 17.0% in Banni- 145 and 9% and 15.7% in Ajeet-11

The percentage of the pollen germination in different concentration of media like Potassium Nitrate, Boric Acid, Calcium Nitrate and Magnesium Sulphate was found to be very less



GraphNo.03: Pollen germination in different Sucrose solutions

Fig. 1: Graphical representation of percentage of the pollen germination in different concentration of sucrose solutions

4. RESULT AND DISCUSSION

During the present study of *in vitro* germination of pollen grain % of different cotton varieties in 30% and 40% sucrose solution was found to be 16.1 and 19.3 % in NHH-44, 13.8 and 20.7 % in Ankur- 651, 17.5 and 24.2 % in AKH-081, 11.9 and 11.4 % in DHY-186, 10.7 and 16.9 % in PA-348, 24.4and 19.2 % in Renuka- 143, 5.0 and 9.8% in H-10, 23.1 and 14.5 % in PKV-hy-2, 19.5 and 27.8 % in H-8, 12.6 and 20.5 % in NHH-52, 23.2 and 23.6 % in BT-162, 20.2 and 27.0 % in LRA-5166, 14.2 and 25.2 % in Kaveri Kurnel, 20.0 and 22.0 % in Ankur-216, 11.1 and 17.0 % in Banni- 145 and it was 9.0 and 15.7 % in Ajeet-11. However, the present studies suggest that for pollen viability studies in different cotton varieties alternate and more promising media should be used. Pollen germination studies involve assessment of role of potassium nitrate, boric acid, calcium nitrate and magnesium sulphate, which are the stimulant for pollen germination and pollen tube growth [5, 6]. Apart from the role of these stimulants in *in-vitro* pollen germination, there was no response after using these stimulants during this investigation.

5. CONCLUSION

In vitro pollen germination was found to be maximum in sucrose solution of 30% and 40% concentration in all varieties. Cotton pollen has proved that the percentage of pollen germination in different concentration of Potassium Nitrate, Boric Acid, Calcium Nitrate and Magnesium Sulphate was found to be very less or nil. An assessment of the role of these stimulants for in vitro pollen germination showed meager response.

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Conflict of Interest

The authors declare that there is no conflict of interests regarding the publication of this paper.

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