



STUDIES OF POLLEN VIABILITY, IN SOME LOCAL AND USEFUL VARIETIES OF *Oryza sativa* L. (RICE)

V.K. Rewatkar

Department of Botany, Shri Dnyanesh Mahavidyalaya, Nawargaon, Distt:
 Chandrapur, 441223

Email- vasantirewatkar29@gmail.com

ABSTRACT:

Rice is the most important cereal as it contains protein 6.9%, fat 0.4%, carbohydrate 79.2%, mineral matter and other elements also. Realizing that, nearly half of the world's population depends on rice for their daily diet. In the hands of plant breeder's, pollen is the most powerful instrument in establishing new cultivators and improving existing ones. Pollen is not only a part of sexual reproduction process in the plant but a separate, metabolically active organism with half of the genetic compliment of the parent plant. The establishment of "pollen Bank" for the supply of viable pollen for mass scale hybridization in some advanced countries, is a striking example of the usefulness of pollen. In the present experiment some varieties of *Oryza sativa* L which are very useful in Eastern Vidarbha Zone, comprises of Chandrapur, Gadchiroli, Bhandara, Gondia and some part of Nagpur district were tested for pollen viability using TTC redox dye. Pollen material was collected at peak flowering period and subjected to following test of viability.

INTRODUCTION :

One of the major limitations in investigation on pollen is lack of a quick sample and dependable tests for determining viability. Staining with non-vital stains such as iodine in potassium iodide, acetocarmine and aniline blue in lacto phenol, which essentially access the content of the vegetative cell, are not dependable for viability test (1). From time to time several tests have been standardized but each test has some limitations and most of them do not give uniform results (2, 3). Topographical biochemical tests for pollen viability have been developed using several different dyes. The dye most commonly used in pollen testing is 2, 3, 5- triphenyl tetrazolium chloride (TTC) which is water soluble and easily applied. Tetrazolium test is based on the reduction of soluble colourless tetrazolium salt to reddish insoluble formazon in the presence of dehydrogenase enzyme. This is one of the few compounds, which is coloured in the redox state. Pollen viability of *Gossypium hirsutum* was studied with seven tetrazolium salts (4), in that all TTC, TTC red displayed the

greatest utility and were evaluated at different concentrations and for different time period and got positive result with the use of 2% and 4% solution of TTC and TTC red in 60% Sucrose solution after 6 hours of staining.

In the present work, three different varieties of *Oryza sativa* L such as *Ratna*, *White Luchai-112* and *Sindewahi-1* which are locally available, useful and high yielding were tested for pollen viability using TTC redox dye. The grains of these varieties are very thick having more starch and are used commonly for making Murmura (parched rice), Poha (beaten rice) and Lahi (parched paddy).

MATERIAL AND METHOD:

Pollen material of all the varieties was collected at peak flowering period subjected to following test of viability. 10% stock solution of the stain was prepared. It was diluted with 60% sucrose solution in the ratio 1:5 at the time of preparation of the slides. A drop of final solution was placed on the slide. Pollens from just dehisced anthers were dusted on its surface and cover glass was added. Slides were kept on

Petriplates lined with moist filter paper and kept in a dark at 35°C. Precaution of covering the Petriplate and the stock solution with black paper is taken as tetrazolium salts are easily reduced by light.

The proportion of pollen grains developed after 100-120 minutes by counts made with microscope using the low power objective. Coloured pollen grains were considered viable and the pollen grains without colour as non-viable. Percentages of coloured pollen grains were calculated.

RESULT & DISCUSSION

All the experiments were carried out at 25°C-30°C. the fresh pollen grains were collected just after dehiscence. The anthesis period of rice plant is at 11 AM. The data on pollen viability is given in Table. Amongst the three varieties, the highest pollen viability was recorded in *Ratna* – 92.24, *White Luchai-112*- 92.12% and *Sindewahi-1*- 91.28%.

CONCLUSION

In the present study TTC proved to be satisfactory in case of *Oryza sativa* L pollen. The viability of pollen grains by TTC was found to be in the range of 84.83 to 96.31. Viability should be considered as quite distinct from the germiability of pollen and the results cannot be correlated with germination percentage (5) or seed set data (6). Accordingly the staining capacity depends not on the viability but contents of pollen grains. Also self or cross incompatible pollen though viable may or may not germinate on stigma. The ability of pollen to grow or to respond to a particular *in vitro* or *in vivo* assay is dependent upon the inherent Chemistry of pollen studies (7). The Chemistry of

pollen provide not only insight into the mechanism of testing pollen for viability but provide an understanding of the metabolic factors facilitating growth and seed formation and a basis for interpreting nutritional experiments involving pollen and animal also.

REFERENCES :

- Heslop- Harrison J, Heslop- Harrison Y, Shivanna K.R. (1984) : The evolution of pollen quality and further appraisal of the fluorochromatic (FCR) test procedure- Theor Appl. Genet 67: 367-375
- Shivanna K.R and Johri B.M. (1985): The Angiosperm pollen, Structure and Function. Wiley Estern Limited, New Delhi- India.
- Shivanna K.R, Rangaswamy N.S. (1992): Pollen Biology : a laboratory manual, Springer, Berlin Heidelberg, New York.
- Heslop- Harrison J, Heslop- Harrison Y, Shivanna K.R. (1984) : The evolution of pollen quality and further appraisal of the fluorochromatic (FCR) test procedure- Theor Appl. Genet 67: 367-375
- Barrow J. R. (1983): Comparison among pollen viability measurement method in cotton, Crop Sci. 23 : 734- 736
- Stanley R. G. and Linsken H. F. (1974) : Pollen Biology and Biochemistry Management, Springer- Verlac, Berlin Heidelberg, New York Pp 145.
- Alexander M. P. (2009) : Differential staining of Aborted and Non aborted pollen, Stain technology, Vol. 44, issue- 3.

Table – 1 Pollen viability tested by TTC variety- *Ratna*

S. No.	Total no. of pollen grains	No. of viable pollen grains	No. of non-viable pollen grains	Viability%	S.D.	S.E.
1	331	316	15	95.46		
2	267	231	36	86.52		
3	407	392	15	96.31	4.31	± 0.93
4	523	458	65	87.57		
5	281	268	13	95.37		

Table – 1 Pollen viability tested by TTC- variety-*White Luchai-112*

S. No.	Total no. of pollen grains	No. of viable pollen grains	No. of non-viable pollen grains	Viability%	S.D.	S.E.
1	771	727	44	94.21		
2	342	321	21	98.85		
3	671	618	53	92.10	3.35	± 0.82
4	314	269	53	85.66		
5	436	413	23	94.72		

Table – 1 Pollen viability tested by TTC variety - *Sindewahi-1*

S. No.	Total no. of pollen grains	No. of viable pollen grains	No. of non-viable pollen grains	Viability%	S.D.	S.E.
1	882	789	93	89.45		
2	637	562	72	88.22		
3	236	211	25	89.40	3.16	± 0.79
4	561	532	29	94.65		
5	343	291	52	84.83		