California Avocado Society 1974 -5 Yearbook 58: 74-76

A STUDY OF THE VIABILITY OF AVOCADO POLLEN UNDER NATURAL CONDITIONS

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Introduction

The longevity, *i.e.* the time during which the pollen retains its viability, under natural conditions, is a matter of great interest in avocados, because of the occurrence of dichogamy.

Johri and Vasil (1961), who reviewed the literature of the physiology of pollen reported that, as a rule, pollen of most plants loses its viability soon after dehiscence of the anthers, especially where temperature and humidity are unusually high; occasionally viability may be retained for some time under natural conditions In *Hordeum* sp. (Anthony and Harlan, 1920) fertilization cannot be successful unless the pollen is transferred directly from the anther to the stigma. Pollen of *Paspalum dilatatum* did not show any germination 30 minutes after dehiscence of the anthers (Bennet, 1959). At New Delhi the pollen of *Solanum melongena* remained viable for only one day in summer (Pal and Singh, 1943). On the other hand pollen of certain fruit trees *[e.g.* apple, pear *(Pyrus* sp.) and plum], retains its viability for several weeks (Johri and Vasil, 1961).

Work by Schroeder (1942) indicated that the avocado pollen remains viable for several weeks when stored. At present, as far as is known, there is no available information concerning the viability of avocado pollen under natural conditions. For this reason this investigation was undertaken.

Materials and Methods

The study reported here was conducted in 1973 at the Field Station of the University of the West Indies, St. Augustine. Pollen from the cultivars ‘Simmonds’, 'Nishikawa C.' (from California) and 'Nishikawa H.**’** (from Hawaii) was collected in petri dishes and kept in shoe boxes under the trees. At intervals of 2, 4, 7½ , 24, 48, 76, 116 and 151 hours after collection pollen was tested *in vivo* for germination. The flowers to be used as sources of pollen and the flowers to be pollinated were bagged before their first opening. The pollen was applied to the stigma by direct contact of the stigmatic surface with the pollen grains in the petri dishes, immediately after emasculation of the flowers. Pistils were collected five hours after pollination and examined using the technique of Martin (1959). Callose fluorescence was observed with a dissecting microscope using a

long wave ultraviolet lamp (UVL-22) and/or a Vickers M41 Photo-plan fluorescence microscope, using an HBO 200 high pressure mercury lamp with a UV filter.

Results and Discussion

The present investigation showed that avocado pollen remained viable for at least 151 hours after dehiscence of the anthers, under natural conditions. Pollen germination and pollen tube growth occurred, but the percentage of germination could not be determined. No studies over a longer period were made. Minimum temperature during the experiment was about 69°F(±3°F) and maximum temperature 91 °F (±1°F). Relative Humidity at 9 a.m. was about 63 F(±8°F) and minimum Relative Humidity 57°F(±5°F).

The exine of the avocado pollen is thick (Figure 1). Johri and Vasil (1961) suggested three probable causes of loss of pollen viability; desiccation, utilization of reserve food and inactivation of enzymes. If desiccation is the main cause, then the thick exine might prolong viability of avocado pollen. Also these writers concluded that the pollen cannot withstand extreme variations in its environment. Such extremes do not occur in Trinidad.

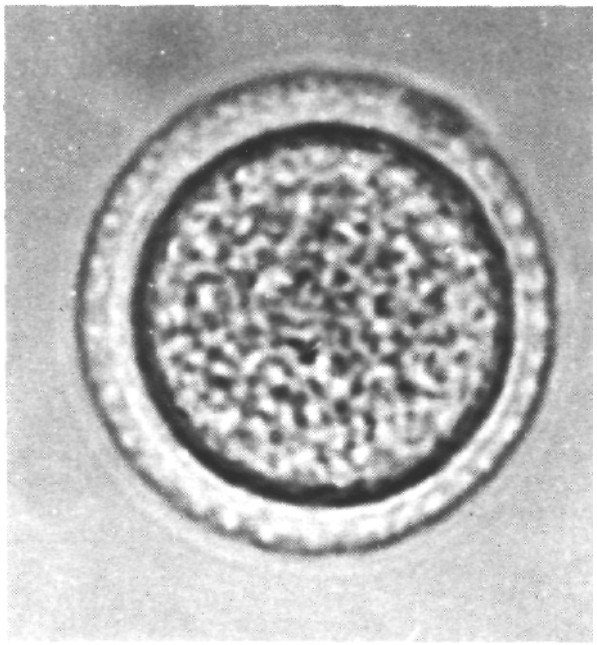

Figure 1. Avocado pollen grain.

The long viability of avocado pollen is a factor of considerable importance, especially when cultivars or single trees stand along and there is no overlapping in the opening of the two sets of flowers. In such instances, if insects are active, pollen grains may be carried from the stage II (*flowers open for their second period)* to the later stage I (*flowers open for their first period*) flowers and affect fertilization and subsequent fruit development.

Observations in 1973 at the Field Station of the University of the West Indies, St. Augustine, indicated that the flowers of the cultivar 'Pollock,' the most widespread cultivar in Trinidad, were subject to dichogamy; also there was no overlapping in the opening of the two sets of flowers (morning and afternoon). Despite this fact, trees standing alone set and mature fruits, the grate, majority of which are seeded. In view of these results, the viability of pollen under natural conditions would be a probable explanation for the fruitfulness of these trees.

SUMMARY

Under natural conditions in Trinidad, avocado pollen germination was tested *in vivo* at a range of times after collection using the technique of Martin (1959). It was found that the pollen remained viable for at least 151 hours after dehiscence of the anthers. The significance of this in crop production is discussed.

ACKNOWLEDGMENTS

I wish to thank Professor E. A. Tai, Dr. M. S. Sandhu and Mr. I. Hosein for helpful discussion.

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