The ultrastructure of pollen grain surface in allotetraploid petunia
(*Petunia hybrida hort. superbissima*) as revealed by scanning
electron microscopy

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Abstract

The ultrastructure of pollen grain surface in allotetraploid petunias was
analyzed by scanning electron microscopy. The pollen grain wall is develop-
ed into characteristic pattern of convolutions.

I. INTRODUCTION

Pollen grains of different plant species can be distinguished by their
specific wall patterns. Detailed examination of the pollen grain wall
surface ultrastructure is possible by scanning electron microscopy
(*Heslop-Harrison* 1974).

The present paper describes the attempt to characterize the surface
structure of pollen grains in allotetraploid petunias.

II. MATERIAL AND METHODS

Plants of allotetraploid petunias (*Petunia hybrida hort. superbissima*)
were grown in a greenhouse, and fully developed flowers were taken
for analysis. Freshly collected pollen grains were attached to the holders
with “Dotite” silver paint, dried, inserted into vacuum chamber, and
after rapid evacuation covered with carbon and gold layers.

The observations as well as the microphotograph were made with the
Jeol scanning electron microscope of the JSM-35 type, operating at
25 kV.
III. RESULTS AND DISCUSSION

The surface of the petunia pollen grain shows three or four distinct but shallow, meridianelly arranged furrows, reaching from one grain pole to the other (Fig. 1 a, b), which divide the pollen grain into three or four parts of equal size.

The grain walls develop the surface structure of the convolution type (Fig. 2a), which is characterized by regular diagonal crests, and furrows of different depths, or of irregular type, characterized by hills and holes of irregular sizes and shapes (Fig. 2 b).

Some grains are already swollen, and germ pores can be seen on them. The germ pores, being also three or four in number, are slightly protruding over the pollen grain surface (Fig. 3). The surface of the germ pores is smooth, thus contrasting with the patterned surface of the grains.

It is interesting to note the presence of minute undeveloped pollen grains which are still connected to the big, fully developed grains (Fig. 4).

In tetraploid petunias numerous unavailable pollen grains without cell content are observed. Such grains collapse during preparation for scanning electron microscopy (Fig. 5 a, b). Due to the collapse, the viable and unavailable pollen grains can easily be distinguished.

The above described structure of petunia pollen grain surface corresponds to the structure typical for highly developed dicotyledons (Woodhouse 1936). The described type of surface ultrastructure differs slightly from that observed by Heslop-Harrison (1974) for various plant species.

REFERENCES


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Fig. 1. Pollen grains of allotetraploid petunias: a) three furrows are visible on one grain and three germ pores on the other (1,000×); b) diagonal convolutions visible on the upper part of the grain (5,000×)
Fig. 2. view of grain wall surface: a) diagonal convolutions (37.000×); b) irregular pattern (57.000×)
Fig. 3. Close view of a germ pore (5.000×)

Fig. 4. Close view of a minute, underdeveloped pollen grain still attached to the normal one (5.000×)
Fig. 5. Collapsed unviable pollen grains being deprived of the cell content (a, b; 3.700×)
Ultrastruktura powierzchni ziarń pyłku u zawieratki allotetraploidalnej
(Petunia hybrida hort. superbissima)

Streszczenie

Powierzchnia dojrzałych ziarń pyłku u zawieratki allotetraploidalnej wyka-
zuje dwojakiego rodzaju strukturę: albo tworzy regularne pofaladowania poprzeczne,
albo jest ukształtowana w sposób nieregularny. Trzy lub cztery płytkie bruzdy
dzielą powierzchnię ziarna na trzy lub cztery jednakowej wielkości części. U ziarn
już nabrzmiałych widoczne są trzy lub cztery porusy o powierzchni gładkiej.

Opisany typ powierzchni mieści się w schemacie Woodehouse’a dla wyżej roz-
winiętych roślin dwuliściennych. Stanowi on też uzupełnienie opisów, uzyskanych
przez Heslop-Harrisona.