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Seed Coat Structure of *Pinus Koraiensis*

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Seed coat is a structure of considerable importance, because it forms the barrier between the embryo and its immediate environment. The most important property of the seed coat is its permeability to water and to gas.

For *Pinus Koraiensis* seed coat morphological and anatomical study, samples of seed coat were sectioned and fixed over night at 4^0C in 4% glutaraldehyde buffered with a phosphate buffer at a pH of 7.2. After rinsing three times in the buffer, samples were dehydrated in a graded ethanol series and dried in a DCP-1 Critical Point Dryer, then coated in a Hummer II Sputter Coater. A Hitachi S-405A Scanning Electron Microscope was used for observations.

The seed coat of *Pinus Koraiensis* has three distinct layers: the surface layer, the middle layer, and the inner layer (Fig. 1). The surface layer is formed by 3-4 layers of macrosclereids. The middle layer is the stony layer with 10-15 layers of brachysclereids. The inner layer composed of a few layers of parenchyma and forms a papery covering around the remnants of nucellus and female gametophyte. There are definite pores on the surface of the seeds. The pores run vertically through the surface and middle layers of seed coat. These pores may offer channels for water and gas exchange.

There is a wax and lipid coating layer on the surface layer of the seed coat (Fig 2). Entry of water into the seed is greatly influenced by the nature of the seed coat. Heavy deposit of wax and lipid on the surface may repel moisture because of their hydrophobic nature. The deposits also plug the pores and intercellular spaces on the seed coat.

On the surface, a net-like feature is often seen (Fig 3). This net appears to be a fungal net of hyphae. There were similar structure fund on P. elliottee[1]. Vest[2] demonstrated a symbiotic relationship between a fungus and the seeds. He suggested that the fungus grew on the seed coats scarifying them resulted in improved water and gas exchange and improved condition for germination.

The middle layer is thicker than that the surface layer and the density is very high. The secondary wall of the cells of the middle layer shows prominent pits (Fig 4). Because the thick secondary walls in the pit region were completely interrupted, the pits could function as channels for water and gas exchange.

References:

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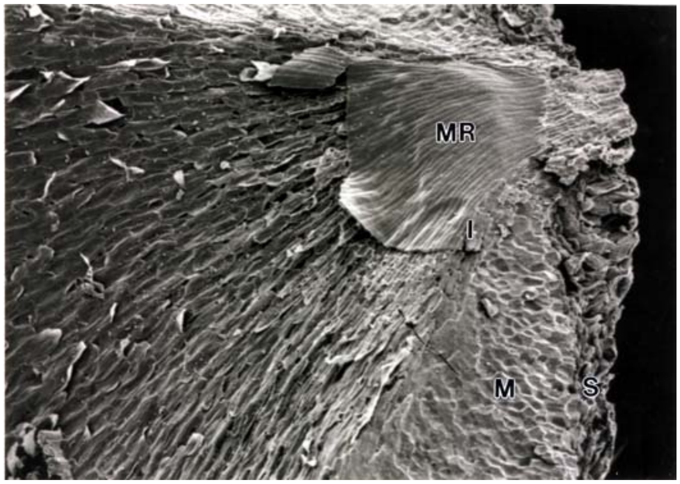

FIG 1. Seed coat of P. Koraiensis. Cross section shows three distinct layers: the surface layer (S), the middle layer (M). and the inner layer (I). MR, micropylar region. (x 50)

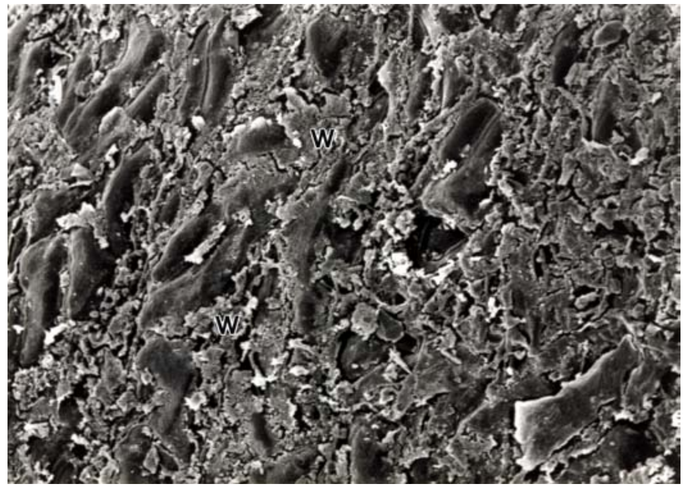

FIG 2. Surface view of P. Koraiensis seed. The wax and lipid (W) are distributed over the surface of the seed (x 150)

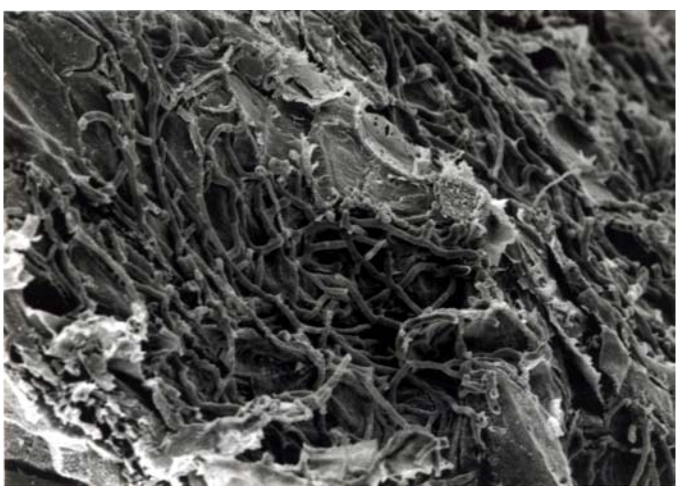

FIG 3. Surface view of P. Koraiensis seed. The net-like feature is shown. This net appears to be a fungal net of hyphae. (x 250)

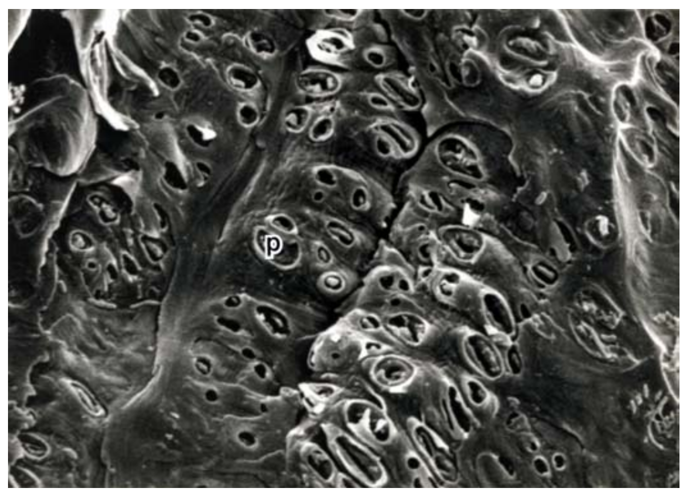

FIG 4. Cross section of middle layer of seed coat. The secondary wall of brachysclereids shows prominent pits (p). The thick secondary cell walls in the pit region were completely interrupted. (x 1500)