

WHY POLLEN SWELLS IN FRACTIONS OF A SECOND?

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Abstract

Pollen with singular (barley - *Hordeum vulgare* L.) or multiple (sesame - *Sesamus indicum* L. and pine - *Pinus elliottii*) apertures/furrows was hydrated with distilled water and it was found that upon hydration pollen swelled in fractions of a second. Pollen was stained with Macallum's staining solution and it was found that the potassium (K) existed only at the aperture/furrow areas disregard of number of apertures. Furthermore, energy dispersive x-ray analysis (EDX) verified staining results of K at the aperture/furrow areas of pollen. These results demonstrate that pollen swell instantly upon hydration. Although, there could be many factors (e.g. matric potential, hydraulic conductance of membranes etc) responsible for rapid swelling of pollen. However, these results suggest that there could be a relationship between K, located at the aperture/furrow area, and rapid swelling of pollen.

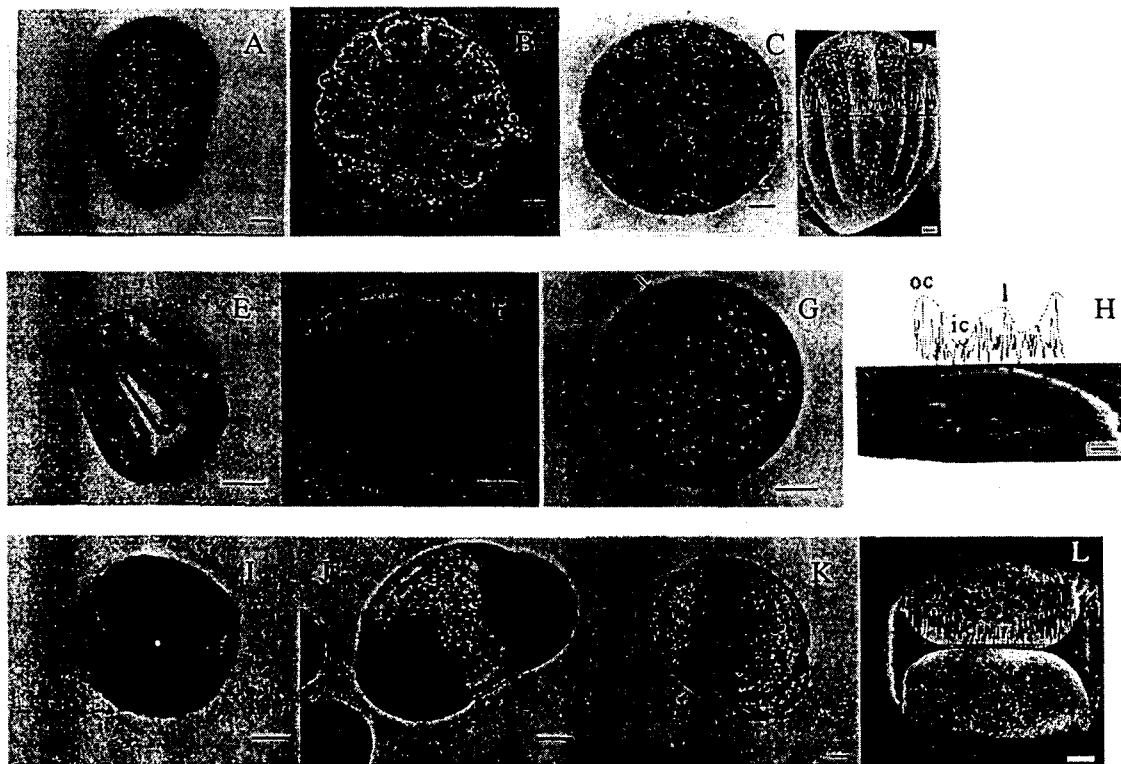


Fig. 1. Light micrographs and EDX spectrum with SEM micrographs of sesame (*Sesamus indicum* L.) (A-D), barley (*Hordeum vulgare* L. cv. Baegdong) (E-H) and pine (*Pinus elliottii*) (I-L) pollen. Pollen before hydration (A, E, I) i.e. dry pollen (bars: 5, 10 and 10 μ m respectively); after hydration (B, F, J) - rapidly swelled (bars: 5, 10 and 10 μ m respectively). Pollen stained with Macallum's solution (C, G, K). Arrowheads indicate the K staining (black stain). Potassium is concentrated at the aperture/furrow area of pollen. (Bars: 5, 10 and 10 μ m). The EDX spectrum of the aperture/furrow area of pollen (D, H, L). Lines show the chart of K peak after X-ray beam was passed across the aperture/furrow and pollen aperture/furrow is shown below the chart of K traces. Higher peaks indicate the concentrated areas of K at the furrow (f) areas of sesame (D) while lower peaks were observed between furrows. Bar: 2.5 μ m. (H) barley pollen aperture - indicating the corresponding K peak area at outer-circle (oc), lid like structure (l) and inner-circle (ic). Bar: 0.8 μ m. (L) the EDX spectrum of the furrow area of pine. Higher peaks indicate the concentrated areas of K at outer margins of furrow and while lower peaks were observed at the centre of furrow where two sacs sits close to each other. Bar: 10 μ m