

A Contribution to the Pollen Morphology of *Salix viminalis* L.¹

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Salix viminalis 의 花粉形態에 關한 研究¹

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ABSTRACT

The genus *Salix* is nowadays becoming increasingly important for both biomass energy production and the expanding paper industry. The enlarging plantations will however create some potential as well as problem. The great potential of genetical improvement as well as the prevention of pollen allergies requires knowledge about e.g. the pollen morphology of the most used *Salix* species. This study investigated the pollen morphology of *Salix viminalis* L. both on light microscope (LM) and scanning electron microscope (SEM).

Key words: *Salix*; pollen morphology.

要 約

버드나무屬은 最近 바이오매스 側面의 에너지 生産과 製紙産業 等に 그 重要性이 增加되고 있으며 遺傳的인 改良과 花粉 알레르기의 豫防 研究 等に 花粉形態의 調査가 要求되는 바 *Salix viminalis*의 花粉形態에 關하여 光學顯微鏡과 走査型 電子顯微鏡으로 調査하였다.

INTRODUCTION

The genus *Salix* is circumglobal genus with an increasing use in variety of industries, and especially in the paper industry. A species *Salix viminalis* has received a lot of attention for biomass production in the northern hemisphere (Siren, 1974). The Osier (*Salix viminalis*) is characterized by an extraordinarily fast growth rate, well fitted for short rotation period and intensive production. For breeding work, it is useful to know the pollen morphology for identifying the species and if pos-

sible some of the most prominent clones. In the literature there are some studies on pollen morphology of the genus *Salix* (Erdtman, 1952; Faegri, 1953; Rowley and Erdtman, 1969; Barth et al., 1975; Nilsson et al., 1977; Hesse, 1979). However the pollen morphology of the species *Salix viminalis* L. is less known. Lüdi (1950) and Straka (1952) have reported the pollen morphology of *Salix viminalis* L., but they used only light microscope (LM) in their investigation. This study investigated the structure, surface and exine etc. of pollen using both light microscope (LM) and scanning electron microscope (SEM).

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MATERIALS AND METHODS

Pollen was collected from 10 trees of *Salix viminalis* growing at Ultuna Station (Field No. 81-01), Sweden and treated by acetolysis. An Olympus BN-2 microscope equipped an apochromatic Oil-immersion objective (D. plan $\times 100 = \text{N.A. } 1.25$) and periplan eyepieces was used for the light microscopic study. The measurement for polar axis, equatorial diameter, sculpture pattern and exine thickness (100 pollen grains) were made at 1,000 magnification (Oil-immersion). The exine thickness was measured in equatorial view in the centre of mesocolpia. The pollen descriptions were made based on both light and scanning electron microscopical observations (LM, SEM). For scanning electron microscopy, acetolysed pollen grains were suspended in a drop of absolute alcohol, transferred to brass stubs and gold-palladium coated for 7 minutes, using a fine coat ION sputter JEC-1100. Scanning micrographs were taken with a Jeol JSM 25 S 11 microscope on 11 ford FP4 film. The terminology of pollen morphology follows mainly that of Erdtman (1969) and Pragłowski and Punt (1973).

RESULTS AND DISCUSSION

Pollen grains in monads, prolate, isopolar, radially symmetrical, 3-colporoidate (Plate 1. Fig. 1). Polar axis $22 \pm 1.7\mu\text{m}$, equatorial diameter $14 \pm 1.2\mu\text{m}$, P/E 157. Shape in polar view rounded to round triangular, in lateral view rounded to elliptic. Exine reticulate, muri not rarely wedged, exine approximately $2\mu\text{m}$ thick, sexine thicker than nexine. Apertures compound, colpi comparatively long (approximately $18\mu\text{m}$); width approximately $2\mu\text{m}$; Colpus membrane beset with coarse granules; Ora lolongate, circular to elliptic, approximately $2\mu\text{m}$ long (Plate 1. Fig. 3).

Lüdi (1950), and Straka (1952) have reported that the polar length of *Salix viminalis* pollen was $23.5\mu\text{m}$. In this investigation the polar length of

this species was $22 \pm 1.7\mu\text{m}$ on same measured method of former authors. The variation among pollen seems small. Faegri (1953) has reported that muri of *S. viminalis* pollen were either crooked or straight. Also, Faegri (1953) has reported that small size lumina was $1.5\mu\text{m}$ (*Salix reticulata*), and medium size $3\mu\text{m}$ (*S. lanata* and *S. glauca*) in diameter respectively. In this study the lumina size of *S. viminalis* was $0.2\text{-}0.1\mu\text{m}$ (Plate 1. Fig. 4), but the muri shapes of this species were same results as Faegri's (1953) report. Although both light microscope (LM) and scanning electron microscope (SEM) were used in this investigation, it is desirable to explore the potential of the transmission electron microscope (TEM) for more detailed exine structure studies.

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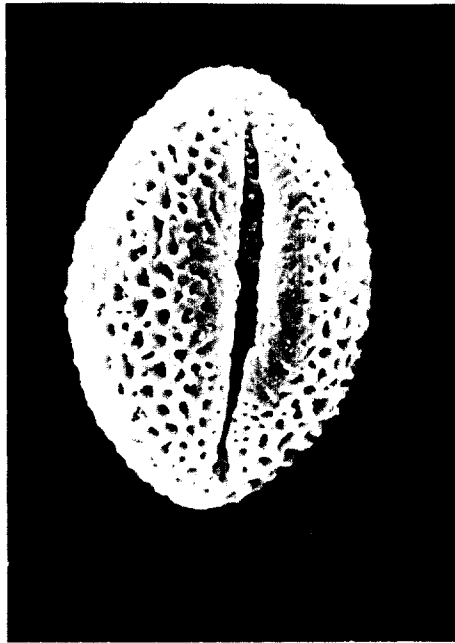
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Plate I. Scanning electron microscope (SEM) photographs of *Salix viminalis*.

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Fig. 1. Pollen grain in equatorial view. SEM X 4,000.

Fig. 2. Pollen grain in equatorial view, showing part of colpus. SEM X 3,900.

Fig. 3. Part of pore with colpus, showing colpus membrane beset with coarse granules. SEM X 6,000.

Fig. 4. Part of exine structure, showing reticulate. SEM X 9,000.

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