PALYNOLOGICAL STUDIES OF THE GENUS TETRATAENIUM (APIACEAE) FROM IRAN

M. Yousefzadi, D. Azizian, A. Sonboli & A. R. Mehrabian


The pollen morphology of Tetratenium lasiopetalum and T. nephrophyllum was studied by SEM and LM. The results confirmed the stenopalynous characteristic of the family Apiaceae. The palynological observations revealed that pollen grains of two studied species of Tetratenium are prolate in shape and posses tricolporate aperture. The exine sculpturing of both species are rugulate. Therefore, T. lasiopetalum and T. nephrophyllum are similar in palynological characters and could be included in subrectangular pollen type as classified by Cerceau – Larrival.

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Introduction

The genus Tetratenium (DC.) Manden. (Syn.: Heracleum L. sect. Tetratenium DC.) as a member of tribe Peucedanaceae and family Apiaceae is represented in Flora Iranica area by five perennial species, two of which grow in Iran (Mandenova 1987). T. lasiopetalum (Boiss.) Manden. (Syn.: Heracleum lasiopetalum Boiss.) is distributed in southwestern parts of Iran, while T. nephrophyllum (Leute) Manden., an endemic species to Iran, occurs in western and northwestern provinces (Azerbaijan, Kurdistan and Lurestan). In traditional medicine, leaves and fruits of Heracleum and Tetratenium species are used as antiseptic, carminative, digestive and a flavoring agent and spice for foods as well.

The common stenopalynous type of pollen has been reported for the Apiaceae (Erdtman 1952). According to Cerceau–Larrival (1971) Apiaceae family has been divided into five subfamilies and 38 tribes based on pollen morphology along with inflorescence, fruit and vegetative characters. From comprehensive palynological studies on over 2000 species of Apiaceae five principal pollen types have been characterized (Cerceau – Larrival & Roland – Heydacher 1976). In addition, there have been some reports on the palynological studies of Apiaceae by several authors (Nair & Kapour 1973; Tawoda 1982; Hebeda 1985; Al-Eisawi & Jury 1988). The pollen morphology of two species of Diplotaenia (Apiaceae) from Iran has recently been reported (Azizian et al., 2003). The literature survey revealed that the genus Tetratenium has not been considered for previous investigation on account of its pollen morphology.

Materials and Methods

The fully grown flowers of T. lasiopetalum and T. nephrophyllum were collected at full flowering stage
from their natural habitats. The voucher specimens of the samples were deposited at the herbarium of Research Institute of Applied Science, ACECR, Shahid Beheshti University, Tehran, Iran.

The locality and voucher specimen references are presented in table 1. The pollen materials for LM studies were acetolyzed as recommended by Erdtman (1960). For scanning electron microscopy observation unacetolyzed pollen grains were dusted onto stubs and coated with gold using the TXA – 840 SEM. The mean of about ten measurements for pollen grain size (pollen axis, P, and equatorial diameter, E,) were considered for each sample. In general the terminology of Erdtman (1969) and Cerceau – Larrival and Roland – Heydacher (1976) was followed.

Table 1. Materials used for pollen morphology of the genus Tetrataenium.

<table>
<thead>
<tr>
<th>Species</th>
<th>Locality</th>
<th>Voucher no.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tetrataenium lasiopetalum</td>
<td>Lorestan: Azna, Oshtorankuh, around Gahar lake, 2500 m</td>
<td>AS-684</td>
</tr>
<tr>
<td>Tetrataenium nephrophyllum</td>
<td>West Azerbaijan: Takab, Takht-e Soleiman, Belghies mountain, 2500 m</td>
<td>AS-908</td>
</tr>
</tbody>
</table>

Table 2. Summary of pollen morphological data of Tetrataenium species (measurement in µm).

<table>
<thead>
<tr>
<th>Taxa</th>
<th>Character</th>
<th>Polar length (P)</th>
<th>Equatorial width (E)</th>
<th>P/E Colpus length</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Min</td>
<td>Mean</td>
<td>Max</td>
</tr>
<tr>
<td>T. lasiopetalum</td>
<td></td>
<td>35</td>
<td>38.2</td>
<td>41</td>
</tr>
<tr>
<td>T. nephrophyllum</td>
<td></td>
<td>34</td>
<td>37.4</td>
<td>40</td>
</tr>
</tbody>
</table>

Results and Discussion
The pollen grain characters of Tetrataenium lasiopetalum and T. nephrophyllum are presented in table 2. The average size of pollen grains was from 37.4-38.2 µm in polar length and 17.5-19.3 µm in equatorial width (table, 2). The analysis of SEM micrographs of two studied species confirmed the stenopalynous characteristic of the family Apiaceae. The palynological observations revealed that pollen grains of two studied species of Tetrataenium are prolate in shape and possess tricolporte aperture (Figs. 1 & 2, a & c). The exine sculpturing of both species are rugulate (Figs. 1 & 2, b & d). Therefore, T. lasiopetalum and T. nephrophyllum are similar in palynological characters and could be included in subrectangular pollen type as classified by Cerceau – Larival and Roland – Heydacher (1976).

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References
Fig. 1. Pollen grain of *Tetrataenium lasiopetalum*. a & b) equatorial view, scale bar = 10 µm. c & d) ornamentation of regulate sculpture, scale bar = 1µm.

Fig. 2. Pollen grains of *Tetrataenium nephrophyllum*. a & b) equatorial view, scale bar = 10 µm. c & d) ornamentation of regulate sculpture.