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Pollen Grain morphology of *Parrotia persica* (Hamamelidaceae) an Endemic Species from the Hyrcanian forest

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ABSTRACT

Persian iron wood (Parrotia persica) is a unique and endemic tree species in the Hyrcanian forest. We used light and scanning electron microscopy to evaluate the pollen-grain morphology of the species from Iran. The findings recorded prolate – spheroidal, tricolpate and medium size pollen grain for the species. The outer layer of the exine covered with mesh lumina with finely verrucae as an irregular reticulum.

Key words: Pollen grain, *P. persica*, Iran.

INTRODUCTION

Parrotia persica C.A. Meyer (Persian Iron wood) is one of the two species of *Parrotia* genus from Hamamelidaceae family. This is an endemic species in the Hyrcanian forest (north of Iran) that occurs naturally from sea level to over 900 m a.s.l. on the mountain ranges of Alborz. This deciduous, slow-growing tree grows 40 feet high and has a smooth gray, flaking bark, like the plane tree (*Platanus*). On the other hand, the foliage is very attractive and colorful especially in the fall [1, 2, 3, 4]. Unfortunately, cold period at the end of the Tertiary period destroyed many main habitats of the species in Azerbaijan, Georgia and Turkey so that today only fossils of the species are found in those areas. Fortunately one of the few natural habitats of the species is in the northern forests of Iran [5, 6] Of course [6] reported a small population of *P. persica* in the Azerbaijan and Caucasian mountains. Forest managers neglect the species because has little value as a timber tree Nevertheless, rural communities used the wood for fuel so genetic erosion of the species is likely. Until now, Iranian botanists have not provided any basic and useful

information about the biology of *P.pesica* in the Hyrcanian forest such information is important for the conservation the species. In the current research, we studied the pollen morphology of *P. persica* form the Hyrcanian forest and compared our results with those Bińka et al. [7] who studied on fossil and live pollen grain of the species in Poland. Surely the current results provide valuable information for botanists and paleontologists.

MATERIALS AND METHODS

In this research, Pollen was collected from wild populations of *P. persica* in the Hyrcanian forest. The pollen grains were prepared for scanning electron microscopy (SEM) and light microscopy (LM) by the standard methods by Wodehouse [9] and Acetolysis by Erdtman [8]. For scanning electron microscopy (SEM) studies, pollen grains were first treated with 70% alcohol and then dried before mounting on stubs with gold. The photomicrographs were taken with XL30 Philips Scanning Electron Microscope, at 15-25 KV in Tarbiat Modares University. We used the pollen glossary of Michael Hesse et al. (2010) [10].

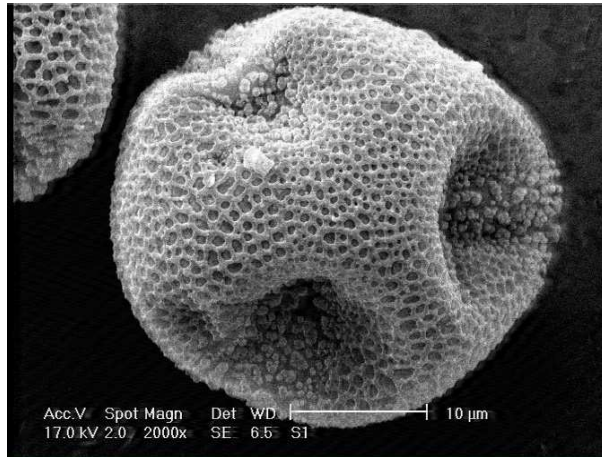
RESULTS

General pollen grain shape according to assign shape classes by (Токарев 2002) is prolate – spheroidal (Table 1).

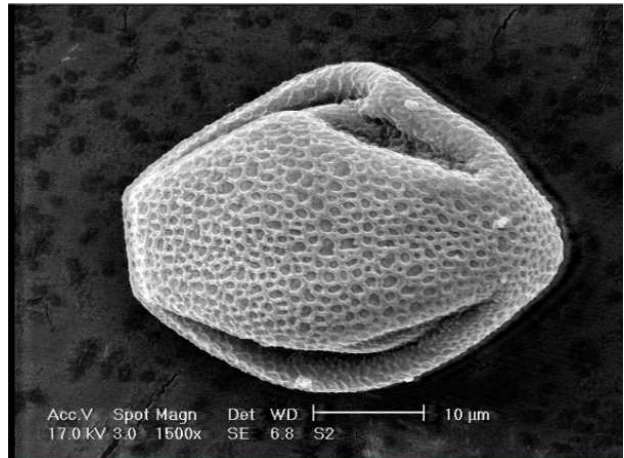
Table 1. Pollen characteristics of *Parrotia persica*

polar axis	equatorial axis	P/E	shape	(porate)
42/59 ± 3/53	36/46 ± 2/35	1/17	prolate – spheroidal	(triporate)

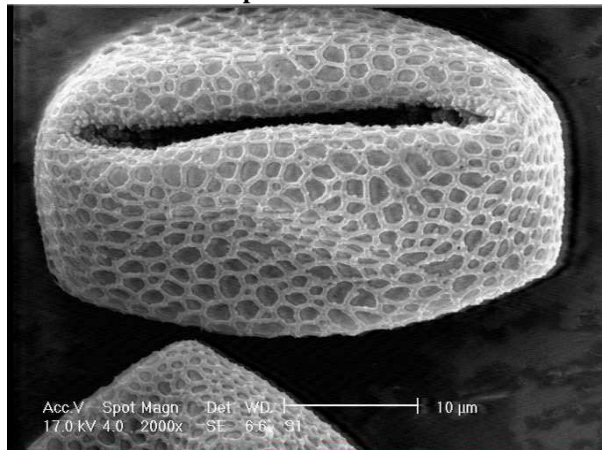
Also the size of pollen based on the length of the longest pollen axis has been suggested (Erdtman1946): very small spore/pollen ($\leq 10\mu$), small (10-25 μ), medium size (25-50 μ), large (50-100 μ), very large (100-200 μ), gigantic ($\geq 200\mu$), is medium (34-48). The ranges of pollen size is 34 to 48/22 μm in polar axis and from 32 to 41/5 μm in equatorial axis. The grain has 3 narrow and medium apertures (colpate) so the pollen is tricolpate. the exine is rather thin that thickens near the poles. Sculptural elements in the outer layer of the exine are irregular and present a reticulum. In fact the reticulum has two different seemingly covering irregularly mesh Lumina with finely verrucate. The size of the lumina ranged from 7 to 154 μm while density of them is 106 per 100 μm^2 . Density of verrucate is 154 per 100 μm^2 . Photos of pollen *Parrotia persica* is shown in Fig 1.



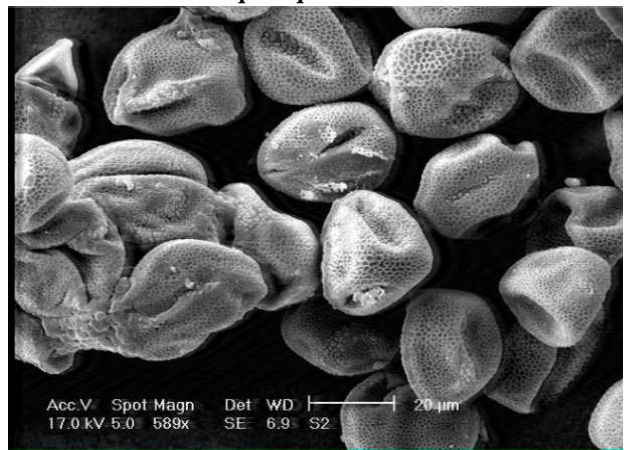
polar view



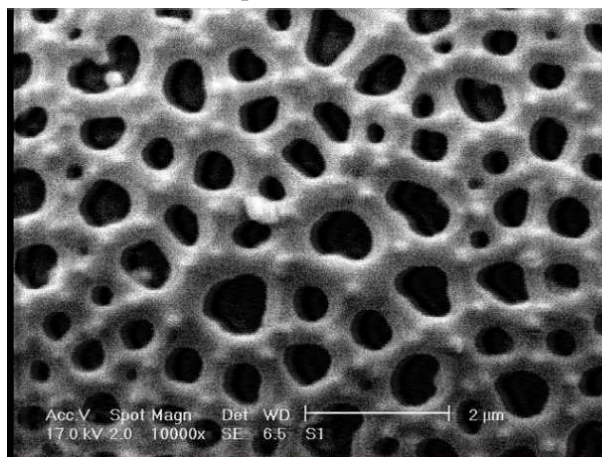
Oblique equatorial view



equatorial view



outline, pollen infoldings, irregular



lumina and, muri with small granules



Polar view of tricolpate

Figure 1: SEM and LE photos of pollen *Parrotia persica* form Hyrcanian forest

DISCUSSION

Hyrceanian forest ecosystem is considered to be one of the most important natural deciduous forests in the world. Today, these forests are being devastated by human activities. So there have been many plantation establishments with endemic species in degraded forests of this area [15], so this is necessary find diversity of tree in this forest. Hamamelid pollen has been reported by some researchers [11, 13, 14, 12] but before the current research there has been no information about the pollen morphology of *P. persica* in Hyrcanian forest. The pollen of *P. persica* is the prolate – spheroidal in shape and tricolpate. [13] Reported the grains of *Parrotia* to be rarely dicolpate, tetracolpate, or syncolpate. Recently [7], Polish paleobotanists, studied pollen morphology of the live and fossil specimens of the species. They observed spherical or oblate pollen grains with tricolpate, very rarely tetracolpate or porate structure. We did not observe any pollen grain with four colpate. There are clear differences between our results and those of Binka [7], so our results are useful for the paleontologists.

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