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A COMPARISON OF POLLEN GRAINS OF *POTENTILLA RECTA* L. (ROSACEAE) GROUPS *A, B* & *C* IN TURKEY

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Potentilla L. (Rosaceae) is represented by 59 species in Turkey (Tübitak, 2005). It is, however, difficult to identify some of its members at the species and subspecies levels and *P. recta* L. is one of them. This species is an extremely variable polyploid and includes various samples resembling morphologically and linking to each other. Peşmen (1972) grouped *P. recta* into *A*, *B* & *C* based upon some differences in sepal, petal and leaf anatomy. In the present study the pollen grains of *P. recta* groups *A*, *B* & *C* were examined and compared using light microscope (LM), scanning electron microscope (SEM) and transmission electron microscope (TEM) to elucidate their taxonomic position at species or subspecies level.

The Wodehouse (1935, W) and Erdtman (1960, Acetolysis, A) methods were used to prepare slides of pollen grains for LM study where different pollen measurements were recorded under a Leitz-Wetzlar microscope (×16; ×100). The measurements of each character were taken until a Gauss Curve was obtained. In addition, at least 30 pollen grains from each group were measured for 1) the length of exine and intine from the slides prepared with the W method and 2) the length of exine from the slides prepared with the A method. The photographs were taken with an Olympus C-35 AD-4 type camera attached on an Olympus BH 2 microscope. For the SEM study, the unacetolysed pollen grains were directly placed on stubs, covered with gold and their photographs were taken with a JSM electron microscope. Skvarla (1966) was followed to examine the acetolysed pollen grains under TEM. In the TEM micrographs, the tectum, columella, foot layer, and endexine were measured at least 5 different points and their means were taken.

The major pollen grain features of groups *A*, *B* & *C* of *P. recta* are given in Tables 1 and 2 and depicted in Figs. 1-3. In all groups, pollen grains are monad, isopolar, radially symmetric and tricolporate. Although there are variations among the groups according to the pollen shape (Table 2), but they are roughly prolate. The amb shape is inter semiangular. The ornamentation is suprastriate-microperforate. The liras lie parallel to the colpus. The exine is subtectate. The intratectal columellae that form tectum are distinct, small, sometimes bifurcated and thin. The infratectal columellae are distinct, long, bifurcated. There are also foramina on the columella. The foot layer is not continuous.

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Table 1. Comparative pollen morphology of the groups *A*, *B* & *C* of *Potentilla recta* according to the LM measurements showing mean ± standard deviation and range (in parentheses) in µm. P = Polar axis length; E = Equatorial axis length; L = Amb diameter.

Group	Method	P	E	L	Exine		Intine		Colpus		Pore	
					Polar	Equatorial	Polar	Equatorial	Length	Width	Length	Width
A	W	22.25 ± 3.67 (16.64-28.08)	21.20 ± 5.36 (11.44-28.08)	25.93 ± 1.27 (22.88-29.12)	1.21 ± 0.21 (0.78-1.56)	1.13 ± 0.24 (0.52-1.56)	0.52 ± 0.14 (0.26-0.78)	0.48 ± 0.15 (0.26-1.04)	14.21 ± 2.08 (12.48-16.64)	4.68 ± 2.23 (2.08-8.32)	4.82 ± 2.02 (2.08-10.40)	5.49 ± 2.23 (3.12-10.04)
	A	35.07 ± 4.02 (22.88-44.72)	25.95 ± 2.57 (20.80-32.24)	28.28 ± 1.48 (26.00-30.16)	2.25 ± 0.29 (1.56-3.12)	1.91 ± 0.23 (1.30-2.34)	-	-	29.41 ± 2.81 (23.92-35.36)	4.79 ± 1.25 (3.12-8.32)	7.46 ± 1.58 (4.16-11.44)	7.90 ± 1.45 (6.24-10.40)
B	W	24.11 ± 3.34 (17.68-31.20)	19.43 ± 5.18 (12.48-27.04)	27.09 ± 1.85 (22.88-30.16)	1.17 ± 0.14 (1.04-1.30)	1.14 ± 0.26 (0.52-1.82)	0.52 ± 0.14 (0.26-1.04)	0.51 ± 0.17 (0.26-0.78)	21.95 ± 2.66 (18.72-26.00)	5.32 ± 1.21 (3.12-8.32)	8.13 ± 3.40 (4.16-14.56)	12.22 ± 1.50 (10.40-13.52)
	A	39.09 ± 4.90 (29.12-50.96)	27.09 ± 2.45 (19.76-31.20)	not measured	1.90 ± 0.23 (1.30-2.34)	1.69 ± 0.26 (1.04-2.34)	-	-	35.32 ± 4.04 (24.96-44.72)	5.28 ± 1.62 (2.08-10.40)	7.90 ± 1.95 (5.20-11.44)	not measured
C	W	19.79 ± 0.32 (16.64-23.92)	14.43 ± 0.33 (11.44-18.72)	22.70 ± 0.27 (19.76-26.00)	0.97 ± 0.07 (0.78-1.30)	0.83 ± 0.05 (0.52-1.30)	0.62 ± 0.04 (0.52-0.78)	0.59 ± 0.02 (0.52-0.78)	16.45 ± 0.53 (14.56-18.72)	3.59 ± 0.16 (2.08-5.20)	7.75 ± 0.22 (5.20-9.36)	4.54 ± 0.41 (3.12-8.32)
	A	25.95 ± 0.44 (20.80-32.24)	19.71 ± 0.27 (16.64-23.92)	24.96 ± 0.57 (23.92-26.00)	1.07 ± 0.02 (0.78-1.30)	1.00 ± 0.02 (0.78-1.30)	-	-	19.68 ± 0.49 (14.56-26.00)	4.86 ± 0.17 (4.16-7.28)	8.32 ± 0.00 (8.32)	6.02 ± 0.21 (4.16-7.28)

Table 2. Comparative pollen morphology of the groups *A*, *B* & *C* * of *Potentilla recta* according to the TEM measurements in mm.

Group	Pollen Shape	Microperforation		Intratectal columellae		Infratectal columellae		Foot Layer	Endexine Width	
		Number	Diameter	Length	Width	Length	Width	Width	In general	Under aperture
A	Prolate to prolate spheroid	60	0.02-0.05	0.07-0.32	0.05-0.14	0.14-0.55	0.13-0.28	0.05-0.14	0.07	0.36
B	Prolate-subprolate	70	0.02-0.05	0.14-0.29	0.03-0.10	0.28-1.00	0.06-0.28	0.07-0.28	0.05	0.41

* For C, pollen shape is prolate; other features were not measured.

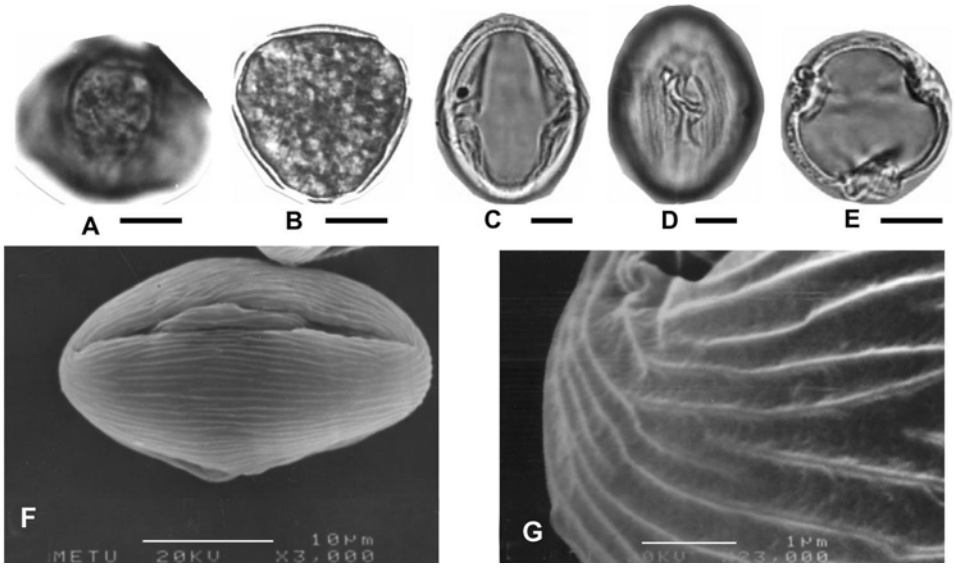

Fig. 1. LM (A-E) and SEM (F-G) micrographs of *Potentilla recta* Group *A* pollen grains. A. Pore (W); B. Amb shape in polar view (W); C. Pore in equatorial view (A); D. Colpus in equatorial view (A); E. Exine structure and aperture in polar view (A) (Bar = 10 μm); F. Equatorial view, ornamentation and aperture; G. Ornamentation in polar axis.

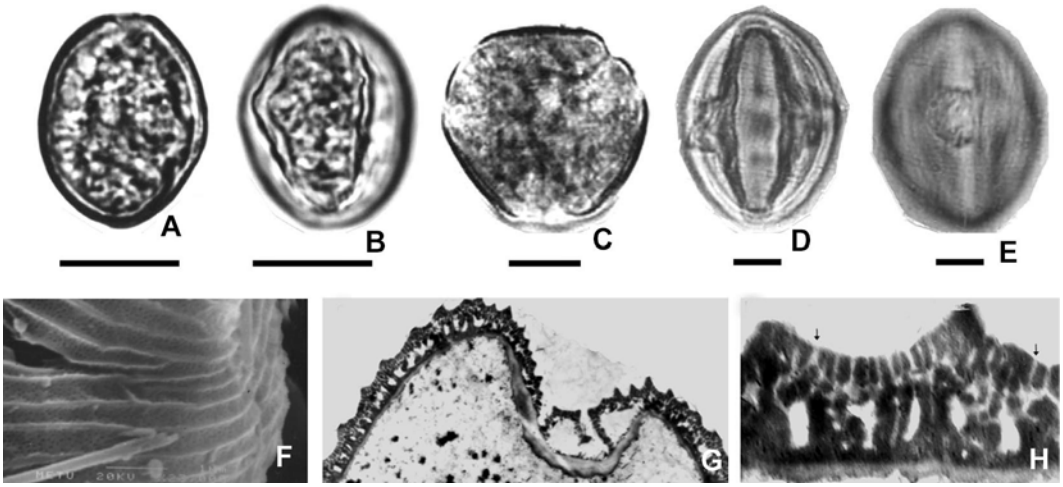

Fig. 2. LM (A-E), SEM (F) and TEM (G, H) micrographs of *Potentilla recta* Group *B* pollen grains. A, B. Exine structure and aperture in equatorial view (W); C. Amb shape in polar view (W); D, E. Exine structure and aperture in equatorial view (A) (Bar = 10 μm); F. Microperforate ornamentation in polar axis; G. General structure of exine structure in a section from the aperture region; H. Exine structure in a section from mesocolpium area (arrows show that exine structure is subtectate).

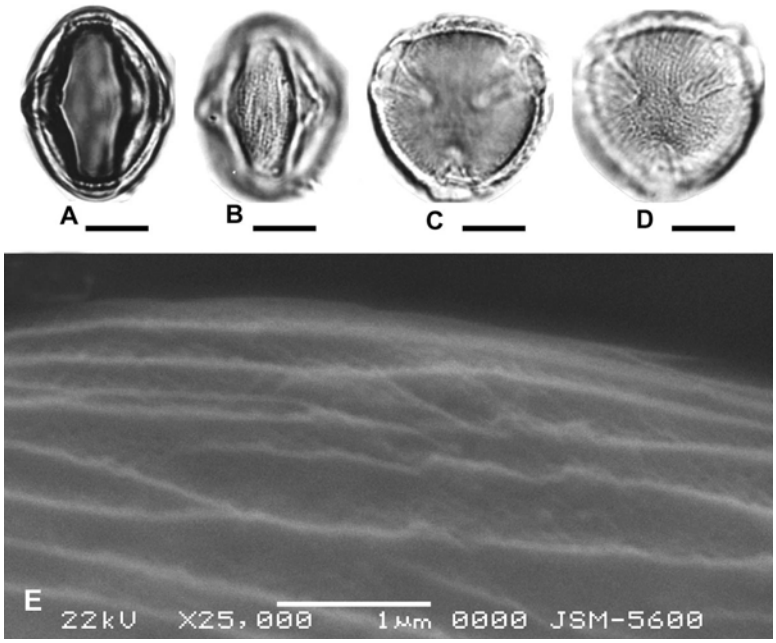

Fig. 3. LM (A-D) and SEM (E) micrographs of *Potentilla recta* Group *C* pollen grains. A, B. Exine structure and aperture in equatorial view (A); C, D. Exine structure, aperture and amb shape in polar view (A) (Bar = 10 µm); E. Ornamentation in mesocolpium.

The endexine is discontinuous. It is thicker under the aperture. The edge of the colpus is straight and the colpus ends are acute. The operculum is present. The ornamentation is striate. The pore is lalongate.

Based on the data on the pollen grains, all the three groups seem to be similar in regard of the morphological features, thus cannot be classified into separate taxa.

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