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Palynomorphological characterization of some species of selected genera of family Rhamnaceae

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The present study was confined to pollen morphology of some species of *family* Rhamnaceae. It was found that pollen characters (that is, shape, surface of exine and pollen morphology) P/E ratio were considered as important and were used as tools in the taxonomy of these species. The present study shows that the flora of the selected species is a stable one. Pollen morphology varies among these species very considerably. However, genetic diversity and molecular studies may also be helpful in this regard. It was concluded from this research that palynological data is very important not only for taxonomists but also for other scientists working in related disciplines of pure and applied sciences.

Key words: Palynology, Rhamnaceae, Exine, Morphology.

Palynology is a science of pollen grain and spores. It is particularly related with the study of taxonomy, paleobotany, ethnobotany, genetic and evolutions studies, pollination and climatic changes and environment. Systematists and taxonomists are concerned to evolution, classification and identification of floras of various regions and groups. Like other disciplines pollen grains have an important part in the modern issues of plant taxonomy (Bashir & Khan, 2003). Archeologists in Europe depended on fossil pollen records to estimate the date of the cultural horizons at their sites. Iversen (1941) showed that pollen data could be used not only to interpret the date of cultural occupations, but also to document the clearing of ancient forests by the slash and burn method and the planting of Europe's first cereal cultigens.

Rhamnaceae is a stenopalynous family. Pollen grains are generally free, radially symmetrical, isopolar, colporate. Shape of pollen grains are sub-prolate or oblate-spheroidal rarely prolate. Sexine thicker or as thick as exine. Tectum striate to striate-rugulate or rugulate to reticulate often psilate. Pollen morphology of 11 species representing 5 genera of the family Rhamnaceae from Pakistan have been examined by light and scanning electron microscope. (Perveen and Qaiser, 2005).

Punt *et al.* (2003) introduce two pollen types. *Rhamnus catharticus* L. type easily recognizable by its distinct triangular shape in polar view, oblate shape in equatorial

view, the thick nexine and the faint microreticulate or reticulate ornamentation, Frangula aluns Mill. Type is well characterized by its distinct triangular outline in polar view with straight or even concave sides.

Consistent with the general morphological pattern of the family Rhamnaceae, the pollen grains of *Puliuriis* are uniformly isopolar, radially symmetrical. 3-(zono)-colporate and angulaperturate (Schirerend, 1996). Papagiannes (1974) examined the pollen of many genera of family Rhamnaceae by electron microscope. El-Ghazaly (1991) studied pollen morphology of the family Rhamnaceae from Qatar. Punt & Marks (1995) examined palynology of some North West European species of the family Rhamnaceae. Literature on pollen morphology of the Rhamnaceae is relatively abundant and descriptions as pollen morphology of family Rhamnaceae has also been examined by Wang (1962), Aykut *et al*. (1971), Huang (1972), Shimarkura (1973), Roa & Shukla (1975), Lobreau-Callen (1976), Markgraf & Antoni (1978), Moore & Webb (1978) and Schirarend & Kohler (1993).

As the pollen grains do not show any special features most of the descriptions concur with each other. However, where necessary, the relevant literature is reviewed under the comments of the pollen types.

Methodology

Palynological work was confined to pollen morphology. For pollen morphology pollen material of preserved herbarium specimens were used. Dried flowers from the 10 taxa were taken and polleniferous material (anthers) was removed. Then kept in acetic acid for softening and was used to prepare slides by using glycernie jelly.

Flowers from dry and fresh specimens were kept in diluted acetic acid in petri plates for about 10-15 minute. Then anthers were removed from the flowers by using dissecting microscope and placed on a clean glass slide. With the help of dissecting needle, the pollen grains were crushed in 45% acetic acid to release pollen grains on the slide. Anther wall material was removed with needle, while excess of acetic acid was removed with tissue paper. Pollen was stained with safranin glycerine jelly. Then cover slip was placed on it. Three to five slides of each species were prepared. The prepared slides were studied under the light microscope. Micro-photographs were taken by using CCD digital camera (Model: DK 5000) fitted Leica light microscope (Model: DM 1000).

Results and Discussion

Pollen size and shape vary from species to species and genus to genus within a family Rhamnaceae. Quantitative and qualitative characters including shape in polar and equatorial view, P/E ratio, number of colpi etc shown in table 1 and in Plates from A to V.

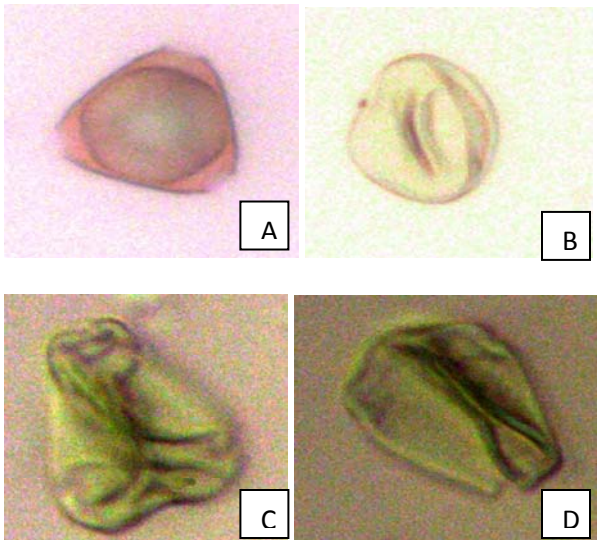

Plate A. Ziziphus *spina-crista* polar view, B. equatorial view, Plate C. Ziziphus *jujuba* Polar view, D. equatorial view

Table 1. Qualitative and Quantitative characters of pollens of family Rhamnaceae

Taxa	Shape in polar view	Polar Diameter µm	Shape in equatorial view	Equatorial diameter µm	Type	P/E ratio	Exine thickness µm	Colpi L/W µm	
***Z.spina-christi* (L.)**	Subangular	18.5(20-16)	Oblate-spheroidal	26.25(25-28)	monad	0.74	1.25	7.5(8-4)	8(9.5-6)
***Z.oxyphylla* Edgew**	Subangular	21.75 (20-25)	spheroidal	20.5 (19-22)	monad	1.06	0.83(0.625-1.875)	4.37(4.37-5)	7.08(6.25-7.5)
***Z.mauritiana* Lam.**	Angular-semiangular	23.75(22.5-25)	Suboblate-prolate	23(22.5-25)	monad	1.032	1.25(1-1.50)	0.625	2.5
***Z.nummularia* (Burm.f)**	semiangular	23.33(22.5-25)	Oblate-spheroidal	22.5(22-25)	monad	1.036	1.56(1.25-1.875	4.79(4.37-5)	1.25
***Z.jujuba* Mill**	Angular-Subangular-Rectangular	23.75(20-25)	Oblate-spheroidal	24.68(23.75-25)	monad	0.96	0.97(0.62-1.37)	7.70(7.5-8.12)	6.71(4.37-10)
***H. lanceolatus* Wall**	Angular	27.5(26-25)	Subprolate	24.37(23.75-25)	monad	1.13	0.56(0.5-6.25)	7.70(7.5-8.13)	6.71(4.37-10)
***S.brandrethiana* Atchison, J. Linn.**	Semiangular-semiangular	13.(13.5-10)	Oblate-spheroidal	10(12-8)	Monad-dyad	1.20	1	0.10	0.15
***S. thezanus* (L.) Borgn.**	Angular-Subangular	12.5	spheroidal	11.66(10-12.5)	triad	1.072	1(0.875-1.25)	2.5	3.33
***R.pentapomia* Parker.**	Angular	18.5(18-20)	Oblate-spheroidal	18(16.5-19)	monad	1.027	1.04(0.625-1.25)	1.25	3.33(2.5-5)
***R.. triquetra* (Wall.)**	Angular-Subangular	16.57(15-18.75)	Oblate-spheroidal	16.25(15-16.25)	Dyad-triad	1.02	1.04(0.75-1.25)	2.5	5
Z.sativa	Subangular	24(24.5-23)	Oblate-spheroidal	22(23-20)	Momad	1.09	1.25	4(3.45-4.57)	6.5(4.37-9)

Plate E. Ziziphus *mauritiana* Polar view, F. equatorial view;
Plate G. Ziziphus *numularia* polar view, H. equatorial view

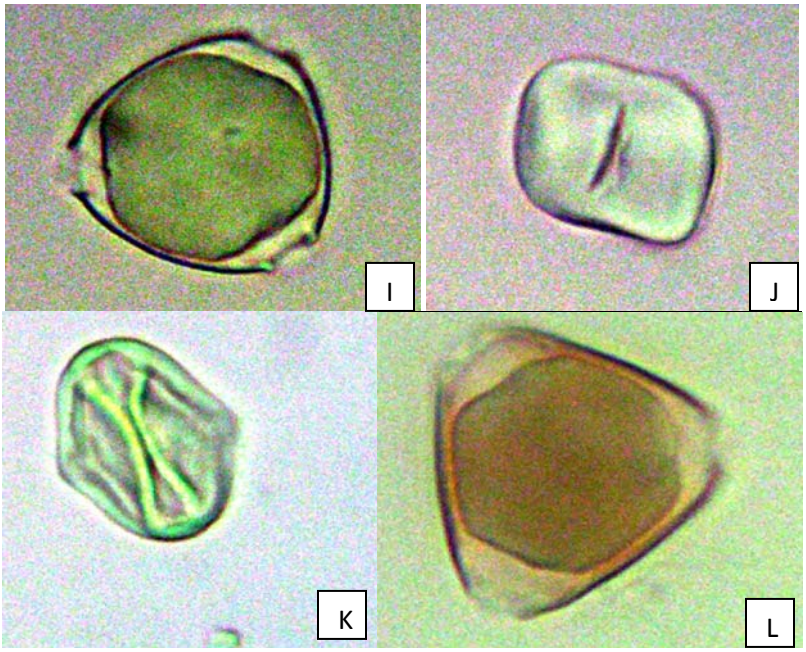

Plate I. Ziziphus *oxyphylla* polar view, J. equatorial view
Plate K. Ziziphus *sativa* polar view, L. equatorial view

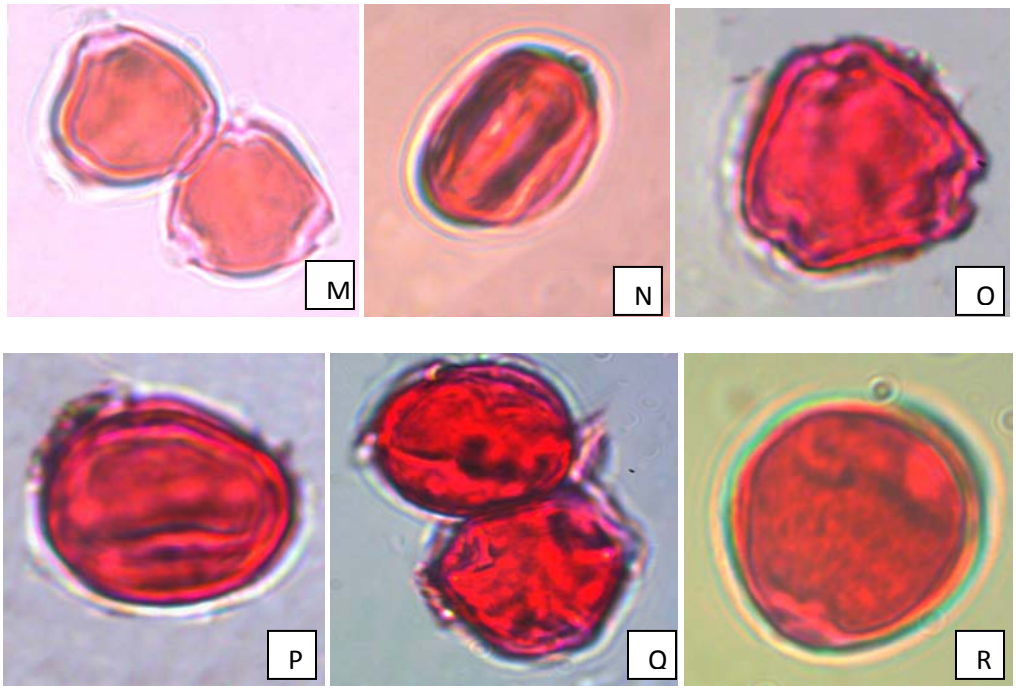

Plate M. Sageratia *brandrethiana* polar view, N. equatorial view
Plate O. Sageratia *thezanis* polar view, P. equatorial view
Plate Q. Rhamnus *triquetra* polar view, R. equatorial view

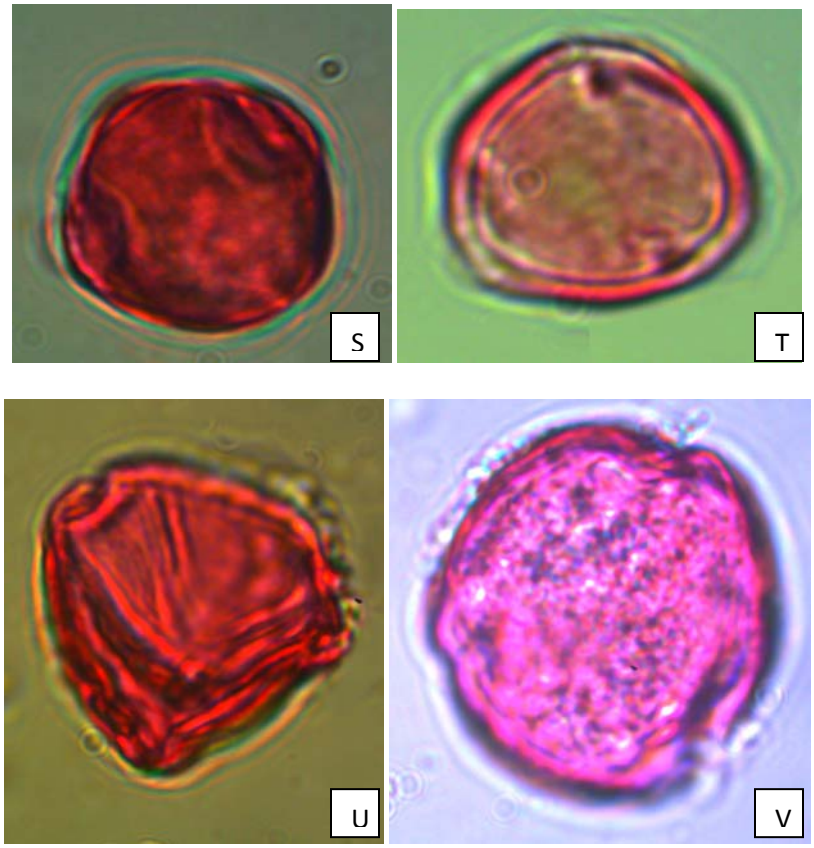

Plate S. Rhamnus *pentopomica* polar view, T. equatorial view
Plate U. Halinus *lanceolatus* polar view, V. equatorial view

In present study, an account was made, which was confined to the detailed palynological studies of pollen morphology of family *Rhamnaceae*. *Rhamnaceae* is a stenopalynous family. Pollen grains are generally free, radially symmetrical, isopolar, colporate.Shape of pollen grains are sub-prolate or oblate-spheroidal rarely prolate. Sexine thicker than or as thick as nexine. Tectum striate to striate-rugulate or rugulate to reticulate often psilate (Perveen and Qaiser, 2005). *Rhamnaceae* is a stenopalynous family (Erdtman, 1952). Pollen data is based on 11species representing 4 genera. Pollen grains generally isopolar, tricolporate or with striate or striate-rugulate or reticulate often psilate. However, the little variation is found in the exine ornamentation and shape class (Perveen and Qaiser 2005). In *Rhamnaceae* finely striate-rugulate tectum is found (Aftab and Perveen, 2006).

Conclusion

Diversity in pollen morphology has made such studies a valuable taxonomic tool. It is concluded from this research that palynological data is very important not only for taxonomists but also for related disciplines of pure and applied sciences, while studying plant taxonomy, has proved useful in dealing critical and disputed taxonomic problems. Further studies have to be made on different aspects with more new technologies.

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