

Pollen Morphology of Three Species of *Quercus* (Family Fagaceae)

SYED TARIQ SHAH¹, HABIB AHMAD[†] AND ROSHAN ZAMIR

Nuclear Institute for Food and Agriculture (NIFA), P.O. Box. 446, Peshawar, Pakistan

[†]Hazara University Mansehra, NWFP

¹Corresponding author's e-mail: stariq81@yahoo.com

ABSTRACT

Pollen morphology of three species of *Quercus* was observed under light microscope. Pollen grains of all species are tri-colporate, rounded, reticulate-fine with spaced rods exine sculptures. Mean pollen size for *Q.ballota*, *Q.dilatata*, *Q.incana* were 30.6, 27.8, 35.6 μm , respectively.

Key Words: Pollen grain; Fagaceae; Pollen morphology; Tri-colporate; Rounded

INTRODUCTION

Fagaceae is a small family comprising of 8 genera and 900 species, found mostly in the temperate regions of the new and old worlds. In Pakistan this family is represented by 2 genera; *Castana* and *Quercus* (Nasir, 1976). *Quercus* is represented by six species in Pakistan. *Q. robour* is the only introduced species, while others are wild in distribution in the northern temperate mountains of the country.

Quercus is important genus of temperate regions in Pakistan. The wood is durable, tough, attractively grained and is widely used for timber purposes; it is especially valued in shipbuilding and construction for flooring, furniture, railroad ties, barrels, tool handles, and veneers. The bark of *Quercus* spp. is dried and used for medicinal purposes. The bark is a rich source of tannin, and used for tanning leather. Acorns are used for making flour or roasted for acorn coffee. The primary wood used to make barrels for ageing wine. It is hard and watertight but, perhaps more importantly, it imparts phenolics such as tannins and important flavour compounds to wine (Nasir, 1976).

All the famous authorities i.e. Hutchinson (1973), Takhtajan (1969, 1980), Cronquist (1981), Thorne (1983) and Dahlgren (1983) placed the family Fagaceae under the order Fagales. Objective of this study was to determine the pollen morphology in three available species of *Quercus*.

MATERIALS AND METHODS

Male catkins of *Quercus dilatata* Royle, *Quercus incana* Roxb, *Quercus ballota* Griff, were collected from Marghuzar and Chail (Madyan) of Swat valley. Pollens preparations were made according to the method described by Sawyer (1981). The pollen grains were mounted in warm stained and unstained jelly. Then observations were made with a Nikon Type-2 microscope, under (E40, 0.65) and oil

immersion (E100, 1.25) using 10 x eye piece. The measurements were based on 30 reading from each specimen and the pollen grains diameter was measured. The terminology used in accordance with Sawyer (1981), Kremp (1965), Faegri and Iversen (1964), Walker and Doyle (1975).

Description of pollen types

Pollen type 1: *Quercus dilatata* Royle.

Pollen Class: Rounded
Apertures: Ecto-aperture colpi long narrow
Exine sculpture: Spaced rods
Pollen surface: Reticulate fine
Size: 27.77 μm

Pollen type 2: *Quercus incana* Roxb.

Pollen class: Tri-colporate
Shape: Rounded
Apertures: Ecto-aperture colpi long narrow
Exine: Spaced-rods
Pollen surface: Reticulate-fine
Size: 35.36 μm

Pollen type 3: *Quercus ballota* Griff.

Pollen class: Rounded
Apertures: Ecto-aperture colpi long narrow
Exine: spaced-rods
Pollen surface: Reticulate-fine
Size: 30.55 μm

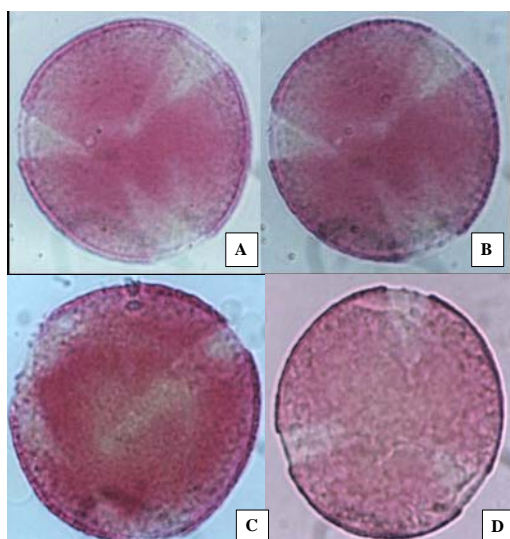
RESULTS AND DISCUSSIONS

General pollen character of the family Fagaceae showed radically symmetrical, rounded, tri-colporate and reticulate-fine pollen with spaced rods exine sculptures (Fig 1). Pollen grains of *Quercus dilatata*, *Q. incana* and *Q. ballota* are characterized by rounded, tri-colporate, reticulate-fine with spaced-rods exine sculptures. Variation in pollen size was evident in species. Means pollen size for *Quercus dilatata*, *Q. incana* and *Q. ballota* is 27.8, 35.6 and 30.6 μm respectively (Table I).

Table I .Mean for pollen size (μm)

Species	Plants					Means
	P1	P2	P3	P4	P5	
<i>Quercus incana</i> Roxb	37.857	32.767	37.227	34.080	34.850	35.356 A
<i>Quercus ballota</i> Griff	31.53	30.660	30.100	29.540	31.290	30.549 B
<i>Quercus dilatata</i> Royle	28.843	27.380	28.650	27.937	26.050	27.772 C

Fig. 1. Pollen of *Quercus dilatata*: Tri-colporate pollen, showing reticulate-fine surface, X1000 (A) Spaced rods exine, X1000 (B). *Quercus incana*: Tri-colporate pollen, showing spaced rods with reticulate-fine surface X1000 (C). *Quercus ballota*: Tri-colporate, pollen X1000 (D).



These findings are in conformity with to the results obtained by Erdtman (1952) and Weber (1998), who reported that the family Fagaceae has tri-colporate pollen. The results are in line with the findings of Weber (1998) who reported that pollen size in *Quercus* ranges from 25 to 40 μm . The findings of this study are important with taxonomic standpoint

REFERENCES

- Cronquist, A., 1981. *The Intergrated System of Classification of Flowering Plant*. Columbia Univ.Press, New York.
- Dahlgren, R., 1983 General aspects of angiosperm evolution and macrosysematic. *Nordic J. Bot.*, 3: 119–49
- Erdtman, G., 1952. *Pollen Morphology and Plant Taxonomy*. Angiosperm. Chronica Botonica Co., Waltham, Massachusetts.
- Faegri, K. and J. Iversen, 1964. *Text book of pollen Analysis*. Munksgaard, Copenhagen.
- Hutchinson, J., 1973. *Families of Flowering Plant*. 3rd Etd. Clarendon. Oxford.
- Kremp, G.O.W., 1965. *Encyclopaedia of Pollen Morphology*, Univ.Arizona Press, Tuscon.
- Nasir, Y., 1976. Fagaceae. In: Nasir, E. and S.I. Ali, (eds.). *Flora of Pakistan*. pp. 3–8
- Sawyer, R., 1981. *Pollen identification for Beekeepers*. Cardiff, U.K: University College Cardiff Press.
- Takhtajan, A., 1969. Flowering plants (Origin and dispersal). Oliver and Boyd, Edinburgh.
- Takhtajan, A., 1980. Outline of the classification of flowering plants (Magnoliophyta). *Bot. Rev.*, 46: 225–359
- Thorne, R.F., 1983. Proposed new realignments in the angiosperm. *Nordic J. Bot.*, 3: 85–117
- Walker, J.W. and J.A. Doyle, 1975. The basis of Angiosperm phylogeny: Palynology. *Ann. Mo. Bot. Gard.*, 62: 666–723
- Weber, R.W., 1998. Pollen Identification. *Ann. Allergy, Asthma Immunol.*, 80: 145

(Received 05 May 2005; Accepted 12 August 2005)