# Venation Pattern In Genus *Vitis* Linn.

A.P. Dixit and R.H. Shete*

*Department of Botany, K.V. Pendharkar College of Arts, Science & Commerce, Dombivli-421 203.*

**Department of Biological Sciences, R.J. College, Ghatkopar, Mumbai-400 086.*

Dixit, A.P. & Shete, R.H. 2000. Venation pattern in genus *Vitis* Linn. *Geophytology* **29** (1&2): 25-29.

Venation pattern in 8 species of genus *Vitis* is described. These are *Vitis amurensis* Rupz., *Vitis bracteolata* Wall., *Vitis capriolata* Don., *Vitis coignetiae* Pulliant., *Vitis labrusca* Linn., *Vitis lanata* Roxb., *Vitis reticulata* Thwaites and *Vitis vinifera* Linn. The species studied can be diagnosed on the basis of, basic venation pattern, nature of primary vein, secondary vein pattern and its divergence angle, angle of origin of tertiary veins, presence or absence of percurrents and areole development. Key to the separation of species based on these characters is provided.

***Key-words*** - Venation, *Vitis*

## INTRODUCTION

THE family Vitaceae is represented in fossil records in Deccan Intertrappean beds of India (Late Cretaceous or Early Tertiary period; Prakash & Dayal 1963). Its main genus *Vitis* Linn. has been split into as many as eight genera based on floral biology. Venation details have now been recogrised as one of the important tools in taxonomy lending helping hand in identification of fossil leaf impressions. Paucity of literature of venation patterns in the family prompted us to investigate the details in the members of Vitaceae. The present communication is a part of this wider problem and describes venation details of eight species of *Vitis* (*sensu-stricto*).

## MATERIAL AND METHOD

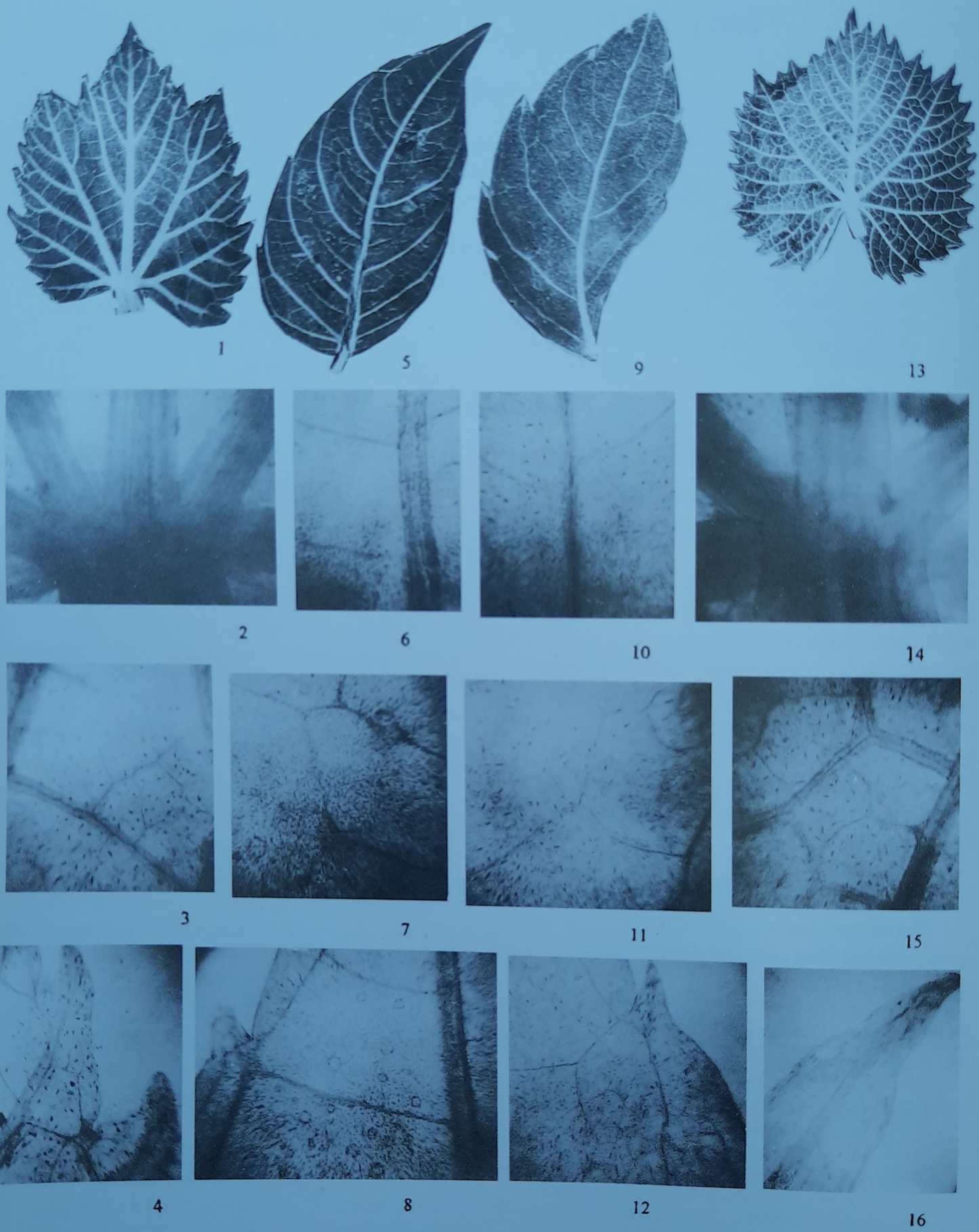
The mature leaf samples of the species studied were collected from different sources as shown in the table:

| Name of species | Place of Collection |
|---|---|
| *Vitis amurensis* Rupz. | Oxford University garden in United Kingdom. |
| *V. bracteolata* Wall. | MACS (Maharashtra Association for the Cultivation of Science) Pune, Herbarium number - 1266, Cherrapunji, Assam. |
| *V. capriolata* Don. | MACS (Maharashtra Association for the Cultivation of Science) Pune, Herbarium number - 1268, Dharmashala Kangra. |
| *V. coignetiae* Pulliant | Oxford University garden in United Kingdom. |
| *V. labrusca* Linn | — do — |
| *V. lanata* Roxb. | MACS (Maharashtra Association for the Cultivation of Science) Pune, Herbarium, Khasia hills, Assam. |
| *V. reticulata* Thwaites | Castle rock, Karnataka. |
| *V. vinifera* Linn. | Bharat Nagar, Nagpur, Maharashtra. |

The pressed dried leaves were cleared in Sodium hypo-chlorite, stained with safranin and mounted in glycerine jelly for observation. The terminology of Hickey (1973, 79) has been employed in describing venation details. The primary vein (1°) has been classified into massive, stout, moderate as per procedure of Dilcher (1974).

## OBSERVATION

Amongst studied species, *Vitis amurensis, V. coignetiae, V. labrusca, V. lanata* and *V. vinifera* have simple leaves. The lamina in them is membranous, symmetrical, ovate-orbicular, 3-lobed with acuminate apex, cordate, symmetrical/rarely asymmetrical base and irregularly spaced serrate to dentate margin. *V. bracteolata, V. capriolata, V. reticulata* have compound leaves. The lamina in them is subcariaceous/membranous, asymmetrical, ovate, lanceolate or broadly elliptic-ovate with acuminate/acute apex, obtuse to acute asymmetric base and serrate or obscurely denticulate margin. In both simple and compound leaf organisation, the tooth architecture is nonglandular in *V. amurensis, V. bracteolata, V. capriolata, V. reticulata* and *V. vinifera* while glandular in *V. coignetiae, V. labrusca* and *V. lanata*. The apical termination of tooth is simple.




**Figures 1-16.** Cleared portion of lamina : 1-4. *Vitis amurensis*, 5-8. *V. bracteolata*, 9-12. *V. capriolata*, 13-16. *V. coignetiae*; (Figs 1 and 5 x 2.2, 9x3.6, 13x1.2, Figs 2-4, 6-8, 10-12, 14-16 x 25).

*V. amurensis* (Figs 1-4); *V. coignetiae* (Figs 13-16); *V. lanata* (Figs 20-22); and *V. vinifera* (Figs 26-28) having simple leaves exhibit Actinodromous type of venation with 5 primary veins (1°). In them the veins could be clearly differentiated into primaries, secondaries, tertiaries, quaternaries, quinternaries and subsequent orders. The primaries are straight or curved and vary in their thickness; the central one being always thicker than the rest. Basal lateral primary vein is unbranched in all except *V. coignetiae*. Secondry veins (2°) are thick and curved uniformly. The angle of divergence is acute moderate and uniform in *V. coignetiae, V. labrusca* and *V. vinifera* while in *V. ammurensis* and *V. lanata* it is acute narrow; further the angle of origin of tertiaries (3°) exmedially and admedially is RO/RR/AR in *V. labrusca*, OR/RR/AR in *V. lanata*, AR/RR/AA in *V. coingnetiae*, AA/RR/AR in *V. amurensis* and *V. vinifera*. Percurrents are alternate in *V. amurensis*, *V. coignetiae* and *V. vinifera* while opposite in *V. labrusca* and *V. lanata*. Quaternary (4°) Quinternary veins (5°) are thin, relatively randomly oriented. Marginal ultimate venation is incomplete and areoles are imperfectly developed in all species. Highest vein order is 6° in *V. amurensis., V. congnetiae* and *V. vinifera* while in *V. labrusca* and *V. lanata* it is 5°.

*Vitis bracteolata* (Figs 5-8); *V. capriolata* (Figs 9-12) and *V. reticulata* (Figs 23-25) having compound leaves exhibit Pinnate type of major venation; pinnate camptodromous eucamptodromous in *V. reticulata* and pinnate craspedodromous, semicraspedodromous in *V. bracteolata* and *V. capriolata*. The primary veins (1°) are massive, unbranched and curved. Secondary veins (2°) are thick and curved uniformly. The angle of divergence of secondary veins (2°) is acute moderate and nearly uniform, however in *V. capriolata* it is more acute in one half of lamina than the other. Intersecondary veins are prominently seen in *V. bracteolata* and *V. capriolata*. Angle of origin of tertiaries (3°) exmedially and admedially is AR/RR in *V. bracteolata*, RR/RO/RA in *V. capriolata* and AO/RO/RR in *V. reticulata*. Percurrents are absent in all. Quaternary (4°) and Quinternary veins (5°) are thin and relatively randomly oriented in *V. bractelota* and *V. capriolata* while they are orthogonal in *V. reticulata*. Marginal ultimate venation is looped in all. Highest vein order is 6° in *V. bracteolata* and *V. capriolata* while in *V. reticulata* it is 7°. Areoles are imperfectly developed in *V. bracteolata* and *V. reticulata*, with incompletely closed meshes in *V. capriolata*.

## DISCUSSION AND CONCLUSION

The venation pattern in all simple leaved investigated species is Actinodromous with 5-primary veins (1°), while species with compound leaves show pinnate types, pinnate craspedodromous in *V. bracteolata*, *V. capriolata* and pinnate camptodromous in *V. reticulata*.

The investigated species can be dignosed on the basis of basic venation patterns, nature of primary vein, secondary vein pattern and its divergence angle, angle of origin of tertiary veins, presence or absence of percurrents and their arrangement, quaternary and quinternary veins, highest vein order and areole development. Key to the separation of the species based on these characters is as follows:

***Key to species***

A Pinnate

B Craspedodromous, semicraspedodromous

C Angle of divergence of secondary veins is uniform, areole development imperfect.....V. bracteolata.

CC Angle of divergence of secondary veins is more acute on one half of lamina than the other, areole development is incompletely closed meshes.....*V. capriolata*.

BB Camptodromous eucamptodromous..... *V. reticulata*.

AA Actinodromous; primary veins-5

D Basal lateral primary vein branched.....*V. coignetiae*

DD Basal laternal primary vein unbranched.

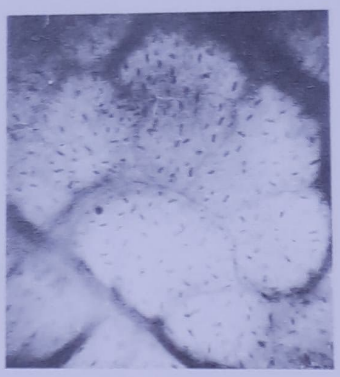
E Angle of origin of tertiary veins exmedially and admedially is

$E_1$ RO/RR/AR——————*V. labrusca*

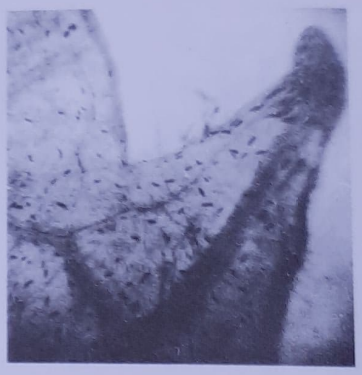
$E_2$ OR/RR/AR—————— *V. lanata*

$E_3$ AA/RR/AR——————*V. amurensis* & *V. vinifera*

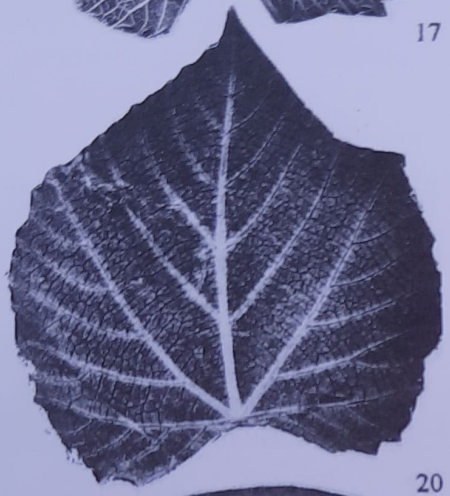
17



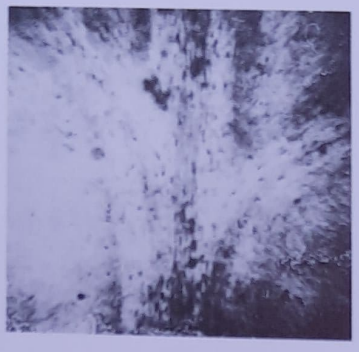
18



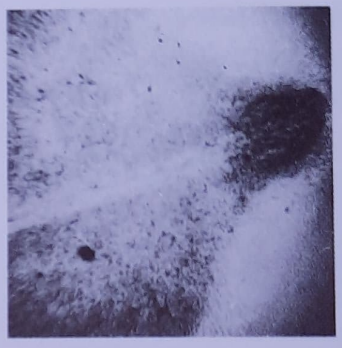
19



20

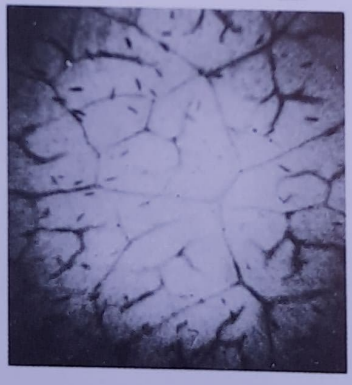


21

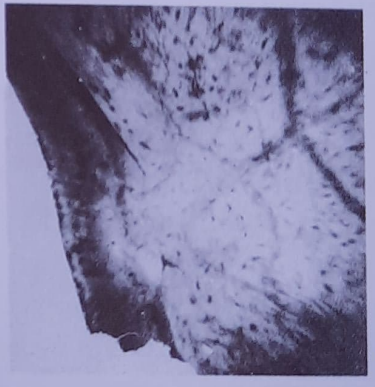


22

23

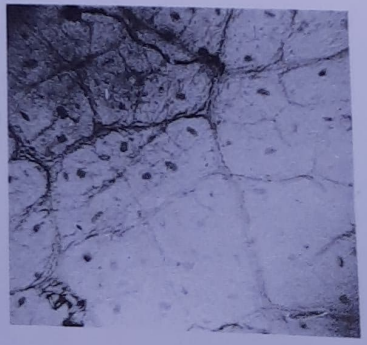


24



25

26



27

28

**Figures 17-28.** Cleared portion of lamina : 17-19. *V. labrusca*, 20-22. *V. lanata*, 23-25. *V. reticulata*, 26-28. *V. vinifera,* (Figs 17, 20, 23, 26 x 1; Figs 18, 19, 21, 22, 24, 25, 27 and 28 x 25).

F Percurrents predominately opposite.....*V. amurensis.*

FF Percurrents predominately alternate..... *V. vinifera*

## ACKNOWLEDGEMENT

The authors are thankful to Professor A.R. Kulkarni for his valuable suggestions and kind help in the preparation of the manuscript.

## REFERENCES

Dilcher DL 1974. Approaches to the identification of leaf remains. *Bot. Rev.* **40** : 1-85.

Ferguson DK 1971. The Miocene flora of Kreuzau, Western Germany. 1. The leaf remains. Verb. Kon. Ned. *Akad. wet. Afd. Natuurk*, **60** (1): 1-297.

Foster AS 1936. Leaf differentiation in angiosperms. *Bot. Rev.*, 2: 349-372.

Foster AS 1952. Foliar venation in angiosperms from an ontogenic stand point. *Am. J. Bot.*, **39** : 752-766.

Hall JP & Melville C 1951. Veinlet termination number A new character for the determination of leaves. *J. Pharm. Pharmac.* **3**: 934-942.

Hall JP & Melville C 1954. Veinlet termination number, some further observations, *J.Pharm. Pharmac.* **3**: 934-941.

Hickey LJ 1973. Classification of architecture of dicotyledonous leaves. *Am. J. Bot.*, **60** : 1: 17-33.

Hickey LJ 1979. A revised classification of architecture of dicotyledonous leaves. In *Anatomy of Dicotyledons*. (eds) C.R. Metcalfe & Chalk, vol. 1, : 25-39.

Krusmann G 1960. *Handbuch der Laubae Holze I & II*. Berlin.

Lucic PC 1970. *Detailed leaf venation studies of selected species of Acer.* M.A. thesis, University of California, Berkeley.

Mädler K & Straus A 1971. Em system der blattformen mit spezieller and anwendung fur die bestimung Neogener blattreste (Miozan and Philozan). *Bot.J.* **90**: 562-574.

Moutan JA 1966. Sur la systematique foliare en plaeobotanique. *Hull, de la ser. Bot. Fr.*, **113**: 492-502.

Moutan JA 1967. Architecture de la nervation foliare. *92 Congress national des societies savantes, strasbourg at colmar, III*: 165-176.

Prakash U & Dayal R 1963. Fossil woods resembling *Elaeocarpus* and *Leea* from the Deccan Intertrappean beds of Mahurzari near Nagpur. *Paleobotanist*. **13** (1): 17-24.

Stace CA 1965. Cuticular studies as an aid to plant taxonomy. *Hull. Brit. Mus. Bot.*, **4**(1) : 1-78.

Walther H 1972 Studien Uber tertiare Acer mitleleuropas *Abh. Staatle. Mus. Mineral. Geol. Dresden.* **19**: 1-309.

Wolfe JA 1959. *Tertiary Juglandaceae of Western-North America.* Master's thesis in Paleontology in graduate division of the University of California, Berkeley.

*(Received 17.09.1998; Accepted 12.10.1999)*