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Foliar epidermal pattern analyses in some accessions of *Zanthoxylum armatum*

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SUMMARY

In the present investigation four accessions of the medicinal plant *Zanthoxylum armatum* of family Rutaceae were procured from various altitudes of Garhwal and were subjected to detailed and critical analyses of the foliar epidermal characteristics. For this work parameters like number of stomata and epidermal cells per mm^2, length and breadth of stomata, pore area, guard cell index, pore area index and total pore area were analyzed. To the best of knowledge, the foliar epidermal work has been done for the first time. The plants in Garhwal were found to be dioecious at most places and monoecious were found rarely. The plant had imparipinnately compound leaf and the leaflets were hypostomatic. The distinct subsidiary cells were not found. The female plants were having more values of number of stomata and epidermal cells, mean pore area, pore area index and total pore area. In male plants the mean length and breadth of stomata were found to be more than female plants. The monoecious plants were found to have more mean number of stomata and epidermal cells per mm^2 than the dioecious plants, though they had nearly equal values of other parameters.

Key words : Foliar epidermal pattern analyses, *Zanthoxylum armatum*.

The genus *Zanthoxylum armatum* commonly known as timroo, tejbal or tumbru is a member of family Rutaceae. The plant is highly medicinal and is used by local people in tooth diseases (Kala *et al.*, 2005). It is found as forest undergrowth and in hot valleys up to 1800 meters in the Himalayas. It is an evergreen or deciduous shrub to large tree. The plant is dioecious and rarely monoecious. The plant has been mostly explored for the biochemical constituents present in the stem and seeds (Kalia *et al.*, 1999). In the present attempt, the foliar epidermal patterns in different accessions of the plant has been analyzed in detail.

MATERIALS AND METHODS

The mature leaves of *Z. armatum* were collected from the four sites (Table 1) at varying altitudes of Garhwal Himalayas in the day time and fixed in FAA.

The A-1 was monoecious while other three accessions A-2, A-3 and A-4 were dioecious. The middle portion of the fixed leaves of about $1cm^2$ were placed in 1:1 hydrogen peroxide and glacial acetic acid solution and kept in oven at 60°C. The adaxial and abaxial surfaces were separated out carefully. The epidermis was stained in 1% safranin, washed with water and mounted in 4% glycerine. The number of stomata and epidermal cells were calculated in X45 and size of stomata and pore area were measured in X100. For pore area camera lucida drawings were used. The photomicrographs were taken from temporary preparations.

For the present study the stomata were defined as the structures comprising slits guarded by two guard cells each. Following epidermal parameters were explored:

1. Number of stomata and epidermal cells per mm^2,
2. Guard cell index (GCI),
3. Size (length and breadth) of stomata (µm),
4. Area of stomatal pore (μm^2),
5. Pore area index (PAI) and
6. Total pore area per mm^2 (TPA).

The TPA is defined as the per cent of the total area of the pores per mm^2.

The GCI, PAI and TPA were calculated with the help of following formulae:

$$GCI = \frac{\text{Number of guard cells in stomata per mm}^2}{\text{(Number of guard cells+subsidiary cells+ epidermal cells) per mm}^2} \times 100$$

$$PAI = \frac{\text{Mean pore area } (\mu m^2)}{\text{Mean length x breadth of stomata } (\mu m)} \times 100$$

Table 1 : Details of sites of material collection

Accession No.	Site	Altitude	Sex
A-1	Devtoli village, Karanprayag	775m asl	M
A-2	Gwar village, Pokhri	800m asl	D
A-3	Semi village, Pokhri	900m asl	D
A-4	Kumud village, Joshimath	1650m asl	D

asl=above sea level, M=monoecious, D=dioecious

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