

HALOPHYTIC ROOTS FROM THE DECCAN INTERTRAPPEAN BEDS OF MADHYA PRADESH

Many small as well as large roots have been observed in a section of a chert-block collected from the village Mohgaon Kalan in Chhindwara district, M. P., India. There are many small roots of varying diameters of 1 mm to 8 mm. Some of them showing lateral roots, originating from the pericycle. Small roots are well preserved and show all the structural details, i.e. distinct epidermis, well-developed cortex and stele (Pl. 1, Fig. 1).

Epidermis is single layered and parenchymatous. Root hairs have not been observed. The cortex is distinct and characteristically lacunar throughout. It is divisible into three distinct zones : outer, middle and inner. Middle cortex has large air chambers separated by parenchymatous septa (Pl. 1, Fig. 2). Inner cortex round the endodermis and outer cortex below the epidermis are parenchymatous with small intercellular spaces. Thus, the entire cortex is modified into aerenchymatous tissue, suggesting the affinities of this root with that of a hydrophyte. Endodermis is well preserved showing barrel-shaped cells with casparian thickenings. Pericycle is distinct only in small roots. In small roots, there are a few xylem elements which are radially arranged. There are 2 to 6 xylem arches arranged radially, and protoxylem is exarch. Xylem and phloem are alternately arranged. The xylem elements are separated by thick-walled cells. In the centre, there is small parenchymatous pith. In mature root the pith is usually large, and contains some lignified cells scattered in it (Pl. 1, Fig. 3).

Mature roots show secondary tissue with pith and cortex (Pl. 1, Fig. 3). Secondary xylem has rather frequent vessels, arranged solitary, or in pairs. Xylem rays are 1-3-cells wide. There are large number of wood fibres. Secondary phloem has not been observed. The secondary cortex consists of 4 or 5 layers of cells.

The petrified fossil roots have been compared with the roots of a large number of extant hydrophytic families (METCALFE & CHALK, 1950), and also with fossil roots described earlier (CHITALEY, 1968a, b ; CHITALEY *et al.*, 1970 ; VERMA, 1974). These compare closely to the root of halophytic plants, like those of Rhizophoraceae, Sonneratiaceae and Acanthaceae (METCALFE & CHALK, 1950). A closer examination reveals that the roots reported are closely comparable with the roots of *Acanthus ilicifolius* Linn., a halophytic plant belonging to the family Acanthaceae (MULLAN, 1932) in all cellular details, i.e. in the structure of primary cortex, pith and the secondary tissue.

In India the genus occurs all along the sea coast, from Malabar Coast to Ceylon and from the Sunderban to Malacca under estuarine conditions (HOOKER, 1885). Occurrence of fossil halophytic roots in Deccan Intertrappean beds exposed at Mohgaon Kalan in Chhindwara District of Madhya Pradesh, further substantiates the claim of the presence of marine conditions at Mohgaon Kalan during the early Eocene time.

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B. S. TRIVEDI, C. L. VERMA AND S. K. BAJPAI
Botany Department, Lucknow University, Lucknow

EXPLANATION OF PLATE 1

1. Cross section of a small root showing epidermis, cortex and position of primary xylem, $\times 15$.
2. A part of the cortex showing air spaces separated by parenchymatous septa, $\times 25$.
3. Cross section of a mature root showing secondary tissue, $\times 10$.

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