

FURTHER OBSERVATIONS ON THE ROOTS OF *CYCLANTHODENDRON SAHNII* (RODE) SAHNI & SURANGE

B. D. SHARMA & O. P. SUTHAR

Department of Botany, University of Jodhpur, Jodhpur 342 001, India

Abstract

Young and old roots of *Cyclanthodendron sahnii* from Mohgaonkalan, Madhya Pradesh have been described with more observations. In young roots middle cortex is partly aerenchymatous while in an older root it has large air spaces. Rootlets arise solitary or in groups. Resemblances of *Hygorhizos deccani* Trivedi *et al.* with an old root of *Cyclanthodendron sahnii* are discussed.

Introduction

Rode (1933) described a new species of *Palmoxylon sahnii* from Mohagonkalan in the Deccan Intertraps, which was later transferred to *Cyclanthodendron sahnii* by Sahni and Surange (1944, 1953) and described in detail. Ramanujam (1959) added further to its anatomy and discussed the affinities of this taxon. Recently, Trivedi *et al.* (1985) have described a root collected from Mohgaonkalan under a new taxon *Hygorhizos deccani* belonging probably to the Gramineae. In anatomical features it resembles the typical root of *C. sahnii* (Rhode) Sahni & Surange (1953).

Description

There are two specimens in our collection ranging in size from 15 × 12 and 8 × 6 cm. To get maximum anatomical details sections have been cut through different faces. In all sections roots are seen cut in cross section, oblique and longitudinal planes as these were produced in large number from the basal portion of the stem. The roots originated from the central as well as peripheral bundles of the stem. The anatomy is variable in young and old roots. A young root (Pl. 1, fig. 1) has a wide cortex differentiated into outer parenchymatous, middle partly aerenchymatous and inner parenchymatous portions. Epiblema is one cell thick made up of narrow, thin-walled, brick-like cells. The outer cortex is 6 to 8 cells wide, made up of small squarish, closely packed parenchyma arranged in rows or lines (Pl. 5, fig. 2). In middle cortex beginning of cortical cavities in the peripheral portion are visible while the inner portion has thin-walled, loosely arranged parenchyma (Pl. 1, fig. 2). As the root matures the air cavities gradually increase in size by dissolution of parenchyma (Pl. 1, fig. 4) and the inner cellular portion reduces so much so that in an old root the middle cortex becomes wide and purely aerenchymatous. The inner cortex is made up of regularly arranged narrow, thin-walled cells (Pl. 1, fig. 3).

In a mature root (Pl. 1, fig. 5) the outer cortex is 6 to 9 cells wide with a ring of sclerenchyma in its inner portion (Pl. 1, fig. 6) to provide mechanical strength. The middle cortex is wide and aerenchymatous except 1-3 layers of parenchyma adjoining outer cortex and 1-3 layers of cells laying adjacent to inner cortex (Pl. 1, fig. 5). The inner cortex is more or less similar to that of the young root.

The vascular zone is distinct and occupies the central portion of the root (Pl. 1, figs. 1, 5). Endodermis is one cell wide with thickenings on the radial walls (Pl. 1, fig. 3). The pith is wide sclerenchymatous with 9 to 14 radial vascular bundles in its peripheral portion (Pl. 1, figs. 3, 5). Each bundle has an exarch protoxylem point. Sometimes, one or two metaxylem vessels are present little inner to the normally placed bundles (Pl. 1, fig. 1). The lateral walls of the tracheids and vessels are provided with annular, spiral or scalariform pittings (Pl. 1, fig. 8). The vessels have end walls, partly oblique with scalariform pittings. Phloem is radial and poorly preserved. In some of the roots, rootlets (Pl. 1, fig. 9) are seen originating solitary. In a cross section, a rootlet shows a narrow ring of outer cortex and a wide inner cortex surrounding a small central vascular tissue.

Discussion

It is clear from the above description that the extinct plant *Cyclanthodendron sahnii* had a clumped habit producing large number of young and old roots from the basal portion of stem as suggested by Sahnii and Surange (1953). The roots show wide variations in anatomy specially in the structure of middle cortex. It becomes large and aerenchymatous in mature roots while in young roots the aerenchyma is either poorly represented or may be absent. Similarly, the occurrence of 1-2 cell thick sclerenchyma ring in the inner portion of outer cortex was associated with the formation of air cavities in the middle cortex. It originated to provide mechanical strength to the root. The rootlets helped in addition to absorption, the purpose of binding or fixing, as they originated at right angles to the roots, solitary or in bunches.

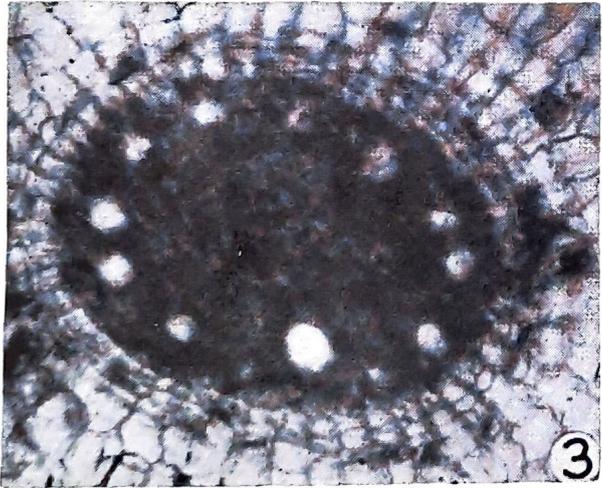
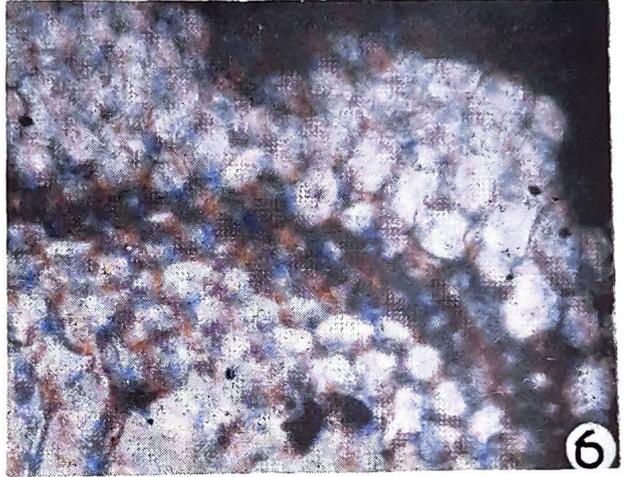
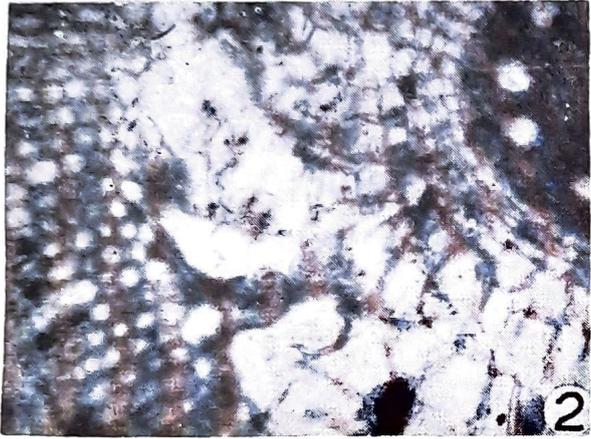
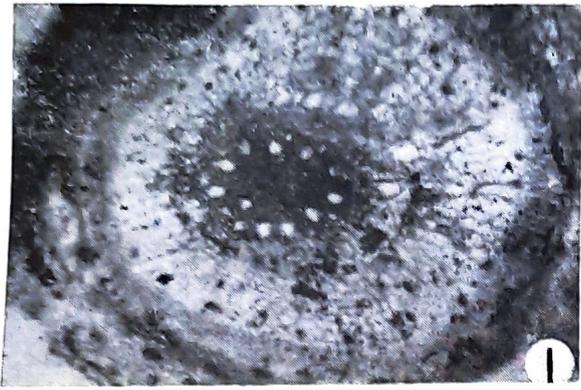
The old roots of *Cyclanthodendron sahnii* resembles recently described graminaceous root *Hygrorhizos deccani* by Trivedi *et al.* (1985) except some minor differences in the number of vascular bundles and nature of pith. In the latter there are 8-10 radial, exarch bundles surrounding a small and sclerenchymatous pith. Pericycle is well-preserved while in the former there are 9-15 bundles and a large pith. The nature of cortex is more or less identical in both kinds of roots.

References

- RAMANUJAM, C. G. K. (1959). A further contribution to the structure and affinities of *Cyclanthodendron sahnii* from the Deccan Intertrappean Series of India. *J. Indian bot. Soc.*, **38** : 254-267.
- RODE, K. P. (1933). Petrified palms from the Deccan Intertrappean beds-II. *Palmoxylon sahnii* sp. nov. *Q. Jl geol. Min. metall. Soc. India*, **5** : 105-114.
- SAHNII, B. & SURANGE, K. R. (1944). A silicified member of the Cyclanthaceae from the Tertiary of Deccan. *Nature, Lond.*, **154** : 114.
- SAHNII, B. & SURANGE, K. R. (1953). On the structure and affinities of *Cyclanthodendron sahnii* (Rode) Sahnii & Surange from the Deccan Intertrappean Series. *Palaeobotanist*, **2** : 93-100.
- TRIVEDI, B. S., SRIVASTAVA, R. K. & BAJPAI, S. K. (1985). *Hygrorhizos deccani* gen. et sp. nov. from the Deccan Intertrappean beds of Mohgaonkalan (M. P.), India. *Geophytology*, **15** : 137-140.

Explanation of Plate

1. Cross section of a young root showing non-aerenchymatous middle cortex X 18.
2. Cross section of another young root with partial aerenchyma in middle cortex. X 60.
3. Same : Vascular zone and surrounding inner cortex. X 60.



4. Cross section of a little mature root with air cavities in the outer portion of middle cortex. X 24.
5. Cross section of two old roots with aerenchymatous middle cortex. X 18.
6. Cross section showing outer cortex with a ring of sclerenchyma. X 72.
7. A whorl of rootlets in longitudinal section. X 48.
8. A vessel element with scalariform pittings. X 400.
9. A number of rootlets cut in cross section. X 18.