

WOOD ANATOMY OF *BUXUS* MADAGASCARICA BAILL.

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SUMMARY

The secondary xylem of *Buxus madagascariensis* Baill. subsp. *xerophila* H. Perr., endemic to Madagascar, is described. A comparison has been made between the wood anatomy of this species and that of several other representatives of the genus *Buxus* together with some *Notobuxus* species studied by CARLQUIST (1982) and RECORD & GARRATT (1925).

The vessel and tracheid lumina are relatively small; also the vessel-member length is small whereas the number of bars per perforation plate is relatively large. Rates of xylem sap flow are likely to be low.

1. INTRODUCTION

The small family *Buxaceae* consists of evergreen shrubs, trees or rarely herbs and has a wide wood anatomical range (METCALFE & CHALK 1950) from strongly primitive (*Sarcococca* and *Styloceras*) to moderately specialized, or even highly specialized (in *Simmondsia*). Several species from different ecological areas were the basis of the study by CARLQUIST (1982). Also RECORD & GARRATT (1925) gave wood anatomical descriptions of several *Buxaceae* species. The only species from Madagascar was not investigated.

2. MATERIALS AND METHODS

Wood samples of *Buxus madagascariensis* Baill. subsp. *xerophila* H. Perr. were collected by the author in 1978 (V. and O. number 1206), 5 km west of Fort-Dauphin in a very dry, thorny, xerophyllous scrub forest on sandy soil in the surroundings of the air strip. The shrub was 2 m high with a dbh of 4 cm; herbarium vouchers were collected as well.

The samples were immediately fixed in FAA. Anatomical features were studied in transverse, radial and tangential sections and macerations. All sections were embedded in Kaiser's gelatin-glycerin. Means and ranges of the different characters are based on at least twenty-five individual measurements. In the wood description quantitative data are given as mean values between extremes.

3. RESULTS

The secondary xylem of *Buxus madagascariensis* subsp. *xerophila* is characterized

by a regular structure. Vessels, rays and axial parenchyma are evenly distributed in a ground tissue of fibre-tracheids. Besides, the mutual differences in dimensions of vessels, rays and axial parenchyma areas are very small. Growth rings very indistinct to absent. Wood diffuse-porous.

Vessels on the average 130 per square mm, almost exclusively solitary; usually in contact with axial parenchyma or fibre-tracheids, only for about 30% with rays; nearly isodiametric in cross sections; tangential diameter (20–)30(–50) μm ; walls 1.5–2 μm thick. Vessel-member length including tails (260–)390(–590) μm ; perforations scalariform with (22–)27(–40) bars in very oblique to almost vertical end walls; bars often in contact with each other (reticulate). Vessel-tracheid pits bordered, opposite to alternate, horizontal diameter 2–3 μm ; vessel-ray and vessel-parenchyma pits half-bordered, horizontal diameter 3–5 μm , sometimes with coalescent apertures.

Fibre-tracheids (400–)680(–1020) μm long, average diameter 16 μm (radial 18.8, tangential 13.6 μm), wall thickness 7 μm (radial 8.3, tangential 5.6 μm); inter-tracheid pits bordered, for the greater part confined to the tangential walls, horizontal diameter 2–3 μm .

Parenchyma scanty diffuse and unilaterally paratracheal (abaxial) aliform; strands of four cells, about 420 μm long.

Rays (1–)1.3(–2)-seriate, height (60–)200(–380) μm , (11–)14(–16) per tangential mm; uniseriate rays twice as many as the biseriate ones, usually homocellular composed of erect cells, average height 160 μm ; biseriate rays heterocellular with short uniseriate tails, average height 240 μm ; longitudinal, radial and tangential dimensions of procumbent cells 15, 50 and 15 μm respectively, of square cells 35, 35 and 15 μm and of erect cells 55, 30 and 15 μm . Conjugation tubes up to 15 μm long connecting the tangential walls of erect cells frequently present.

Crystals absent.

4. DISCUSSION

Our investigations of the wood sample of *B. madagascariensis* from Fort-Dauphin, compared with the *Buxus* and *Notobuxus* species studied by CARLQUIST (1982) and RECORD & GARRATT (1925), show the following.

B. madagascariensis has the smallest total vessel and tracheid (as a water conductive system subsidiary to the vessels) lumina area (the mean vessel- and tracheid diameters are about average or somewhat smaller, but the number of vessels per square mm is very low, whereas the mean tracheid wall thickness is the highest). It has the greatest number of bars per perforation plate of vessel-member elements with the shortest mean length. Also the mean tracheid length is rather short. This means that many obstructions exist in the (vertical) water conducting system. Rates of xylem sap flow are likely to be low.

Furthermore the comparison reveals that the mean height of the multiseriate rays is about average, whereas that of the uniseriate ones is high. The average ray width is the smallest.

Whether *B. madagascarica* is more adapted to xeric conditions than the other *Buxus* and *Notobuxus* species cannot be said using tendencies, mainly concerning vessel characters, given both by CARLQUIST (1975, 1982) and BAAS et al. (1983).

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