# *Heritiera fomes* Buch.-Ham.

M.K. HOSSAIN and M.Z.U. NIZAM
Institute of Forestry and Environmental Sciences
Chittagong University, Bangladesh

## STERCULIACEAE (STERCULIA FAMILY)

*Heritiera minor* Roxb

Jekanazo, pinlekanazo, sunder, sundri (Troup 1921, Gamble 1922)

*Heritiera fomes* is found in almost all the tropical swamp areas of the world (Zabala 1990b). The tree grows in the Sunderban forests of the Ganges-Brahmaputra Delta in Bangladesh and West Bengal of India, the coasts of Chittagong in Bangladesh, and Arakan (a province of Myanmar), ascending the rivers within tidal limits (Troup 1921). In low-lying areas, undergrowth density varies, being sometimes thick and nearly impenetrable with *Nipa fructicans* Thunb., *Phoenix paludosa* L., *Hibiscus tiliaceus* L., *Pandanus odoratissimus* L.f., *Acanthus ilicifolius* L., *Derris sinuata* Benth. ex Thwaites, and *Acrostichum aureum* L. (Troup 1921).

*Heritiera fomes* is of moderate size in the Sunderbans, attaining larger dimensions in Myanmar (Troup 1921, Zabala 1990b). At one time, some trees in the Sunderbans were 2 m in girth but, because large trees have been heavily harvested, trees over 1 m in girth are no longer common. Height ranges from 15 to 25 m and d.b.h. from 2.5 to 38 cm depending on site quality (Curtis 1993). A gregarious evergreen tree, *H. fomes* has a buttressed stem and gray, longitudinally cracked bark. The dark green leaves have short petioles and are grouped toward the ends of the branches. The species starts producing pueumatophores at 3 years of age. The species grows in regions with a warm equable climate of 7.22 °C to 37.78 °C and heavy annual rainfall of 1600 mm to 5334 mm (Troup 1921, Zabala 1990b).

*Heritiera fomes* thrives on clayey soil and in areas situated between the banks of rivers and the low depressions of saucer-shaped islands (Alim 1979). In the Sunderbans, it is the climax species in newly formed inlands with sweet, brackish, and saline water. It is dominant in the slightly saline and moderately saline zone (Zabala 1990b), and thrives in a well-drained soil inundated by tidal water of a low degree of salinity (Khan 1977).

The wood is very hard and close-grained; the sapwood is pale; the heartwood is dark red; and the pores are moderate sized to large, often oval and subdivided into compartments (Gamble 1922). The wood can be used for bridge and house construction, boat-launch building, electric and telephone utility poles, bodies of buses and trucks, anchor logs, scaffolding, pilings, house posts, handles of tools, fuel wood for cooking and burning bricks, flooring, and paneling.

*Heritiera fomes* flowers in March and April (Rahman 1982). The flowers are unisexual and arranged in panicles (Zabala 1990b). The fruit carpels are 3.81 to 5.08 cm long and 2.54 to 3.81 cm broad; they fall to the ground when they ripen in July and August (Troup 1921). The seeds ripen in June and July (Alim 1979, Das 1979, Hasan and Howlader 1979, Rahman 1982). The tree seeds well and no periodicity has been observed (Hasan and Howlader 1970). The seeds should be collected in July and can be sown directly. Clean seeds average 44 to 53 per kg (Choudhury 1979).

Germination is hypogeous and occurs soon after the carpels fall. Seeds germinate in 7 to 10 days with germination slower during the dry season (Alim 1979). Seeds are removed from pregermination beds when the hypocotyl and numerous roots appear. The pregerminated seeds are sown by dibbling, keeping the epicotyl above the ground (Das 1979). Seedlings can be planted in areas where the soil is considered mature and in areas of intermediate level that are inundated 8 to 9 days in a month during the spring tide. Seedlings will develop vigorously in nurseries that remain submerged for 100 to 200 minutes during each 24-hour period.

Direct sowing of seeds gives the best results (Das 1979, Hasan and Howlader 1979). Initial seedling development is very rapid and seedlings may reach about 0.7 m in 1 month; however, the growth rate then becomes very slow and numerous seedlings die before full establishment (Das and Siddiqi 1985). The taproot may penetrate the ground up to a depth of

18 to 20 cm. One-year-old seedlings planted in areas where the rate of siltation is too high should be spaced at 1.22 by 1.22 m.

## ADDITIONAL INFORMATION

*Heritiera fomes* grows best far away from the high strip along the canals (Troup 1921). It grows very poorly in strongly saline zones, where it will deteriorate rapidly and die off (Zabala 1990b). The species does not prefer regular inundation (Troup 1921) and is classified as medium-to-high submersion tolerant (Hasan and Howlader 1979). *Heritiera fomes* prefers higher ground that is inundated only 4 to 5 days during the spring tide period. The tree should not be grown on sites where water stagnates or on high land that is never inundated (Alim 1979). It is a moderate light demander, enduring more shade in youth than it does later (Alim 1979, Troup 1921). In dense forests of *H. fomes,* undergrowth is practically absent. Natural regeneration appears more successful under moderate cover than where the canopy is too open. Heavy cover, especially matted twining or vines and weeds, as well as shade also hinder natural regeneration (Das and Siddiqi 1985, Zabala 1990b).

The thick, fleshy cotyledons remain within the fibrous wall of the carpel. The stout radical appears first, and the petioles of the cotyledons meanwhile elongate to enable the plumule to emerge. The plumule soon appears, the young shoot elongating and arching until free, when it straightens (Troup 1921).

The roots do not penetrate deeply, but spread laterally not far below the surface, sending up numerous blind suckers or pneumatophores (Zabala 1990b). Coppice reproduction is poor where the trees show the best development and most vigorous growth, as in fresh water forests. Where the growth and development of the tree is poor in the saline soil of salt water forests and on dried ground, coppice growth is vigorous, possibly because the tree expends less energy producing suckers on drier ground (Troup 1921). Das and Siddiqi (1985) report that judicious thinning increases the rate of growth: 12 cm diameter in the best plot in a fresh water area, versus 5.3 cm diameter in the worst plot in a salt water area.

Top dying of *H. fomes* was reported in the Sunderbans working plan (Curtis 1993). Sporadic or patchy occurrence of top dying was noted even earlier (Troup 1921). Top dying of *H. fomes* appears as a decline and dieback of the foliage and twigs in part of the crown. In older trees, one or more of the major branches may die out and dry first. Cracked perennial gall cankers are often associated with dead branches. These top-dying trees are also attacked by borers and wood decay fungi. Cankers are generally more pronounced in mature trees, but are also seen in younger ones (Rahman 1988). Possible causes of top dying are complex and include: (1) reduced fresh water discharge through the Sunderbans as a result of upstream diversion of water by damming and increasing use of ground water for agricultural and industrial purposes; (2) reduced nutrient supply in the Sunderbans (Chowdhury 1984, Imam 1982, Snedaker and others 1977); (3) increased salinity due to reduced fresh water flush (Hannan 1981); (4) a moratorium on felling in the Sunderbans (Rahman 1988); (5) root rot pathogens; and (6) a change in depth and duration of flooding (Rahman 1988). Gibson (1975) recommended that all trees showing early signs of top dying should be felled to clean the area and to ensure maximum utilization of the diseased crop before it is destroyed by insects and rot fungi.

In this species, silvicultural systems produce a girth limit of 1.07 m, and the felling cycle is 20 years. Volume production is about 3 to 5 $m^3$ per ha per year (Zabala 1990b).