Azadirachta indica A. Juss

AVTAR SINGH and P.K. RALHAN
Department of Forestry and Natural Resources
Punjab Agricultural University, India

MELIACEAE (MAHOGANY FAMILY)

Melia azadirachta Linn., *Melia indica* (A. Juss). Brand, *Melia parviflora* Moon.

Amargoseira Arishta, Azadirac de I'Inde, baypay, bevu, dawoon-nambu, grossblaettiger zedrach, Indian lilac, kaybevu, margosa tree, margosier, margousier, neem, nim, nimba, nimmi, nimuri, sado, tamaka

Of the two species in the genus, *A. indica* is native to India. Normally found in the Indian subcontinent (Pakistan, India, Bangladesh, Myanamar), the tree is cultivated throughout Southeast Asia, Australia, Africa, many countries in Central and South America, the Caribbean, Puerto Rico, Virgin Islands, Haiti, and the Plains of Arafat (Hegde 1992).

Azadirachta indica is a moderate-to-large tree that grows 80 cm in the first year. With its stout, short stem, the tree reaches 12 to 15 m in height (rarely 25 m) and 1.8 to 2.5 m d.b.h. It grows on dry, stony, clayey, and shallow soils having a pH range of 5.0 to 8.5. Although it can grow on calcareous soils (pH 8.5), the species develops best on soils with a pH of 6.2. Found at elevations from 50 m to 1500 m, *A. indica* grows best where annual rainfall averages 450 to 1150 mm.

A highly esteemed tree, *A. indica* oil derivatives are used in agriculture, public health, medicine, toiletries, cosmetics, and livestock production and health. The timber seasons well even when sawed wet and has a specific gravity of 0.83. Wood is medium-to-coarse in texture, easy to work by hand or machine, and durable; but it does not take polish well. It is used for furniture, carts, axles, yokes, naves, fellos, boards, panels, cabinets, bottoms of drawers, packing cases, ornamental ceilings, oars, oil-mills, cigar boxes, carved images, toys, drums, and agricultural implements as well as in ship and boat building. Chests made of this wood are pest proof (Anonymous 1993). The species has limited ornamental use.

Flowering occurs January through May, depending on the latitude. Maximum flowering during April and May is related to high temperatures and low rainfall (Anonymous 1993). The floral parts rise acropetally (Guardamma 1956). Inflorescence is long, slender, axillary or terminal panicles with abundant white, or pale-yellow, fragrant flowers that are 0.3 to 0.4 cm across. Fruits are smooth, green, ellipsoidal drupes, 1.2 to 1.8 cm long, and 1.0 cm wide that turn yellow to brown when ripe. The seeds ripen June through August (Dwivedi 1980). A single tree of 10 to 12 years may produce 5 to 8 kg of seeds annually, while fully grown trees 20 years or older produce 30 kg of seeds. *Azadirachta indica* seeds are ovoid or spherically pointed apically with a thin testa. The seed is exarillate with a small adaxial sacrotesta (Pennington and Styles 1975). The hilum is not well marked. Seeds generally fall during rainy season and lose viability within 2 to 3 weeks (not truly recalcitrant seeds). The brown seeds are 1 cm in length and 4 to 5 mm wide. Larvae bore into seeds and certain thrips attack the flowers; the seeds are usually avoided by the desert locust (Joshi 1980).

Fruits should be collected when the drupes turn yellowish green on the trees. They may be collected by hand or machine. Collected fruits should be processed as soon as possible to ensure viability (Suri and Mehrotra 1996). Once the fleshy part of the drupe is removed, the stone is washed (not soaked) in clean water, spread in one layer, and dried in shade for 5 to 10 days. Seeds average 3,330 per kg (Singh 1994). Seeds should be stored in well-aerated containers at room temperature. Seeds stored at 15 °C retain viability up to 6 months, with germination falling from an initial 60 percent to 15 percent. Seeds with endocarps show 42 percent germination after 5 years of storage at 4 °C (Suri and Mehrotra 1996). Germination differs for ovoid or spherical (Aiyadurai 1959) seeds.

Direct sowing includes dibbling in bushes, broadcast sowing, and sowing in lines, mounds, ridges, trenches, sunken beds, or circular saucers (Chaturvedi 1993). Seeds should be sowed in nursery beds in drills 15 cm apart; the seeds should be placed 2.5 cm apart in the lines and lightly covered with

soil. Germinating seedlings are vulnerable to moisture stress and bird and insect damage. Seedlings may be pricked out to 15 by 15 cm when about 2 months old (Chaturvedi 1993). Beds should be watered sparingly, weeded, hoed, and protected against frost (Kadambi 1959). Containerized stock should be grown in full sun. Polyethylene bags filled with F.Y.M. and soil in a 1:1 ratio are used for raising planting stock. Each bag is seeded with two seeds or one germinated seedling pricked out from a seedling bed. Whether seeds are sowed directly or transplanted, success is relative to nursery protection.

1cm