

# *Pinus leiophylla* Schiede ex Schltdl. & Cham.

JAVIER LÓPEZ-UPTON  
Especialidad Forestal del Colegio de Postgraduados  
México

## PINACEAE (PINE FAMILY)

*P. leiophylla* Schiede and Dieppe; *P. gracilis* Roezl (Farjon 1984)

Ocote, ocote prieto, pino chino, smooth-leaved pine (Perry 1991, Martínez 1948)

*Pinus leiophylla* is native to Mexico, extending from Chihuahua in northwestern Mexico southward along the Sierra Madre Occidental into Oaxaca and along the Volcanic Axis in central Mexico (Martínez 1948, Perry 1991). *Pinus leiophylla* rarely forms pure stands; associate species are *P. engelmannii* Carrière, *P. arizonica* Engelm., *P. teocote*, *P. lumholtzii* B.L. Rob. & Fernald, *Juniperus* sp., and *Quercus* sp. in north Mexico, and *P. montezumae* Lamb., *P. ayacahuite*, *P. pseudostrobus*, *P. michoacana*, *P. patula* Schiede & Deppe ex Schltdl. & Cham., *P. oaxacana* Mirov, *Abies religiosa*, *A. guatemalensis*, *Quercus* sp., *Arbutus* sp., and several hardwood species in central Mexico (Eguiluz-Piedra 1978, Perry 1991).

*Pinus leiophylla* grows at a moderate rate to 20 to 30 m in height, occasionally reaching 35 m, and 35 to 80 cm d.b.h. (Perry 1991). It will grow on marginal sites or areas covered by volcanic rock, but the best trees grow on deep, well-drained soils of volcanic origin (Martínez 1948). The tree grows at elevations from 1600 to 3000 m but is most often found between 2200 and 2750 m. The species grows in temperate to temperate-warmer climates, where temperatures drop to freezing during the coldest winter months (Perry 1991). It is found where temperatures range from -15 to 38 °C and annual rainfall from May to October is 700 to 1500 mm (Eguiluz-Piedra 1978).

The wood is relatively dense, heavy, and hard, and very resinous with a pale brown heartwood. Wood specific gravity is 0.44 to 0.51 (Echenique-Manrique and Díaz-Gómez 1969, Murillo 1988, Zobel 1965). It is used for general construction, railway ties, and fuelwood (Eguiluz-Piedra 1978, Perry 1991).

*Pinus leiophylla* begins reproducing at 5 to 6 years and flowers from February through April (Jasso-Mata and Jiménez-Casas 1994, Jasso-Mata and others 1995, Patiño-Valera 1973). Cones are ovoid to ovoid-conical, symmetrical, and reflexed. When fresh they are a lustrous or yellowish

brown, 4 to 8 cm, and 3.5 cm thick when closed. The cones are borne singly or, most often, in groups of two, three, and four on stout peduncles 5 to 15 mm long (Carbajal and McVaugh 1992, Martínez 1948, Perry 1991). Cones mature in the third year and are persistent for 2 to 3 years (Martínez 1948). Cone scales are 5 to 8 mm wide, thin, stiff, strong, and not flexible; the apophysis is flat but somewhat thickened along the apical margin; and the umbo is dorsal, and generally flat to depressed (Perry 1991). Seeds disperse from December through February when the purplish brown cones are ripe. The number of sound seeds per cone is 11 to 18, with a mean of 13. The percentage of sound seeds (per cone) is 15 to 20 percent, while that of empty seeds is 17 to 43 percent (Aldrete and López-Upton 1993). In one natural—but not pure—stand in eastern México, Delgado (1994) found 9 sound seeds out of 53 potential seeds per cone, seed efficiency of 17 percent, and 95-percent germination. Seeds are grayish to black, 3 to 4.5 mm long, and about 3 mm wide; the seed wing is yellowish, articulate, 10 to 17 mm long, and 5 to 8 mm wide (Carbajal and McVaugh 1992, Martínez 1948, Perry 1991).

To achieve 95-percent germination, cones should be collected from mid-December through mid-February (Aldrete and López-Upton 1993). Cones are collected from the tree using pole-mounted pruners and cutters. Cones are dried by exposing them to the sun for 1 to 2 weeks; however, they must be protected from rainfall during the drying process. Seeds are removed from cones by shaking in a large mechanical tumbler or shaker, or in a small manual shaker for small lots. Seeds are dewinged by rubbing or flailing, cleaned by air screen or floating in water, and should be dried before storage. Care must be used in processing with mechanical dewingers to avoid damaging the seeds. Seeds average 85,000 per kg (Perry 1991). Seeds must be stored in dry, cool (4 °C), and airtight conditions.

Seed pretreatment involves soaking overnight in water before sowing. Seeds must be sowed at a depth of 1 cm, in a light, sterile medium that provides good aeration and moisture. The best sowing time is May to July with 65 to 72 percent emergence (Catalán-Sánchez 1987). Germination of 62 percent (Patiño-Valera 1973) increases to 95 percent when the seeds are cleaned. Seeds are sowed in seedbeds at densities from 12,000 to 15,000 per m<sup>2</sup> or 300 g per m<sup>2</sup> (Zamora-Serrano and others 1993). A temperature of 20 to 30 °C will provide acceptable results for germination. Seedlings are susceptible to damping off. Thus, substrata must be sterile or watering with a fungicide may be needed. The ectomycorrhizal fungi *Pisolithus tinctorius* (Pers.) Coker et Couch improves seedling field performance (Marx 1975).

#### ADDITIONAL INFORMATION

This species produces epicormic shoots on the trunk and is able to sprout from the root collar (Perry 1991).

*Pinus leiophylla* consistently produces a moderate cone crop every year, but the interval between large cone crops is 3 to 5 years (Zamora-Serrano and others 1993). Cones are susceptible to the fungus *Caecoma conigenum* Heds. et Hunt (Martínez 1948, Perry 1991). Important insect pests are *Conophthorus conicolens* Wood, which can destroy 16 to 60 percent of conelets, cones, and seeds, and *Leptoglossus occidentalis* Heidemann. Other cone pests include *Conotrachelus neomexicanus* Fall, *Dioryctria erythropasa* (Dyar), *D. pinicolella* Amsel, *Apolychrosis synchysis* Pogue, *A. ambogonium* Pogue, and *Megastigmus* sp. (Cibrián-Tovar and others 1995, Delgado 1994).

