

Pinus montezumae Lamb.

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PINACEAE (PINE FAMILY)

Pinus occidentalis, *P. devoniana*, *P. russeliana*, *P. macrophylla*, *P. filifolia*, *P. sinclairii*, *P. grenvilleae*, *P. gordoniana*, *P. winchesteriana*, *P. rudis*, *P. ehrenbergii*, *P. lindleyana*, *P. donnell-smithii* (Eguiluz 1978; Shaw 1909, 1914). At present, the complete taxonomic group referred as *Pinus montezumae* includes the typic species *Pinus montezumae* Lamb., as well as two more variants described as *Pinus montezumae* var. *Lindleyi*, and *Pinus montezumae* form *macrocarpa* (Eguiluz 1978, Loock 1950, Martínez 1948, Mirov 1967, Perry 1991)

Chalmaite blanco, juncia, montezuma pine, ocote, ocote escobetón, pino, pino blanco, pino de moctezuma, pino real, rough-branched Mexican pine (Eguiluz 1977, 1978; Perry 1991)

Pinus montezumae thrives on the slopes and in the valleys of the Great Cross Range in Mexico which extends from Colima State on the Pacific Coast through Veracruz State on the Gulf of Mexico. The species extends north toward the Sierra Madre Occidental, reaching Durango State and the Sierra Madre Oriental up to Coahuila State (Martínez 1948, Perry 1991) and south to Guatemala and El Salvador (Mirov 1967).

Pinus montezumae is a large pine that reaches 20 to 25 m in height and 30 to 80 cm d.b.h. It grows under a variety of conditions at mean temperatures from 10 to 24 °C and elevations from 1150 to 3150 m. However, the best growing conditions for this species are volcanic soils at 2500 m.

Pinus montezumae can be found growing in pure stands or associated with other pine species such as *P. pseudostrobus*, *P. rudis*, *P. hartwegii*, *P. leiophylla*, *P. douglasiana*, *P. michoacana*, *P. lawsonii* Roehl. ex Gordon, and *P. ayacahuite*, and several hardwood species (Eguiluz 1978, Rzedowski 1983). The species crosses naturally with some of its associated species forming many hybrids (Hernández 1967, Jasso 1982, Perry 1991).

Pinus montezumae is one of the most important timber species in Mexico. Its wood is hard, heavy, and resinous with a density of 0.74 kg per m³ (Eguiluz 1978); the color varies from yellowish white in the sapwood to light brown in the heartwood (Perry 1991). It is used for rough timber, hewn timber, plywood, firewood, pulp and in construction (Eguiluz 1978, Rzedowski 1983).

Flowering occurs February through April; pollen dispersion, in March and April occasionally extending until May. Male flowers form bud-terminal groups varying from one to

five flowers per bud. Female flowers are produced in lateral or subterminal buds. The buds are solitary or form groups of two or three (Jasso 1982). Cones develop and mature during the fall of the same year, in November and December and occasionally in winter (Niembro 1979, Patiño 1973, Pérez 1988). The cones of *Pinus montezumae* vary from long ovoid to conical-ovoid or conoid. They are slightly asymmetric and curved, 8.5 to 15 cm long, and 7 to 10 cm wide after opening. They are lustrous, arranged in pairs or groups of three, and extended or slightly hanging on short peduncles 10 to 15 mm long. The numerous cone scales are thick, hard, stiff, 25 to 35 mm long, and 13 to 17 mm wide; the umbo dorsal is slightly raised. The cones have a mean fresh weight of 135 g and mean dry weight of 88 g, with an average of 144 seeds per cone; only 52 percent of these are fully filled seeds (Musálem 1984). Seeds are slightly triangular, small, dark brown, 6 to 7 mm long, and about 3 to 4 mm wide with an articulated, pale brown seed wing about 20 mm long and 7 mm wide (Martínez 1948, Perry 1991). Acosta and Musálem (1986) found that dispersion occurs from early February to late June. The maximum dispersion of fully filled seeds occurs during mid-March, when more than 50 percent of the fully filled seeds dispersed can be obtained. Most of the high-quality seeds are dispersed within 25 m of the seed tree, dispersing at about 104,000 seeds per ha; seed quality decreases with the distance of dispersion in open growth conditions (Acosta 1986).

Generally, *Pinus montezumae* produces good cone crops every 5 or 6 years; occasionally two good crops are produced in successive years. The best time to collect mature cones is

from early December through mid-January (Ramírez 1985). Collected cones are dried in the sun for a few days; the seeds can then be easily extracted by hand. Clean seeds average 46,000 per kg (Patiño 1973). Seeds should be stored in large metal cans at temperatures near 4 °C.

The most common pregermination treatment involves

soaking the seeds during the 24 hours before sowing. Seeds can be sown at a depth of 0.5 to 2.0 cm (Carrillo 1986, Galván and Martínez 1985). The average time for germination is 20.9 days with a germination rate of 65 percent (Caballero 1966). Seedlings are susceptible to damping-off; consequently, a fungicide should be applied (Galván and Martínez 1985).

2 cm



1 cm



2 cm

