Abies guatemalensis Rehder

ANA LUCRECIA E. DE MACVEAN
Herbario, Instituto de Investigaciones
Universidad del Valle de Guatemala

PINACEAE (PINE FAMILY)

Abies tacanensis Lundell, *A. guatemalensis* var. *tacanensis* (Lundell) Martínez

Abeto de Guatemala, Guatemalan fir, pacachaque, parchac, pashaque fir (Asociación Becaria Guatemalteca 1995), pinabete (Williams 1981), romerillo (Asociación Becaria Guatemalteca 1995)

Abies guatemalensis is native to the highlands of Mexico, Guatemala, the Santa Barbara Mountains in Honduras, and has also been reported by A. Molina (Escuela Panamericana El Zamorano) from El Salvador (Williams 1981). This species has the southernmost range for its genus (Donahue and others 1985). It grows in wet, high forests in the Guatemalan provinces of Quiché, Chichicastenango, Totonicapán, Sololá, Huehuetenango, Quetzaltenango, San Marcos, Jalapa; and in the Mexican states of Chiapas, Oaxaca, and Guerrero (Asociación Becaria Guatemalteca 1995) associated primarily with *Pinus ayacahuite* C. Ehrenb. ex Schltdl., *P. rudis* Endl., and *Cupressus lusitanica* (Perry 1991). Its distribution is limited by altitudinal requirements and human predation.

This fir is an evergreen tree reaching heights up to 45 m with a grayish trunk almost 1 m d.b.h. or larger. Leaves are linear, spirally arranged, solitary, lustrous light green above, and usually silvery beneath. In general, *Abies* forests in Mexico and Guatemala require a mean annual rainfall above 1000 mm in deep, well-drained soils of volcanic origin (Rzedowski 1981) with a moderate pH of 5.4 to 5.7 (Donahue and others 1985).

This handsome fir has been used for decades as a Christmas tree. Since 1973, *A. guatemalensis* has been listed in Appendix I of the Convention of International Trade of Endangered Species (CITES), and data obtained from the U.S. Department of the Interior (1979) lists *A. guatemalensis* as a threatened gymnosperm. Remaining stands are now protected, and cutting for any purpose is prohibited. Its timber is soft with a specific gravity of about 0.32 to 0.37. Despite protective legislation, the wood is still used for construction, firewood, and charcoal (Donahue and others 1985).

Although not well documented, the solitary flowers appear in May and June. The staminate strobili appear from buds of the previous season and are borne on the undersides of the lower crown branches in the axils of the leaves. Ovulate cones are erect and composed of many bracts, each subtending a large scale with two inverted basal ovules (Harlow and Harrar 1969). All species of *Abies* are monoecious (Dallimore and Jackson 1974). The erect cones are subsessile, cylindrical, and up to 12 cm long and 5 cm wide. The bracts are cuneate obovate, shorter than the cone scales, and concealed by them. The scales are broader than they are long, with external puberulous margins (Dallimore and Jackson 1974). The seeds are light brown, up to 8 or 10 mm long; the wings are 15 mm long and 1.5 mm wide (Dallimore and Jackson 1974).

Closed cones are collected from November through January (Donahue and others 1985). Due to cone disintegration, the best time to collect is when the cone scales are maturing, which can be noted in the field as a change of color from green to deep green or purplish green and the appearance of resin drops, easily seen with binoculars (Donahue and others 1985). Because the cones are collected before maturation, they should be kept shaded for 8 weeks in burlap bags to maximize percentage viability. After treatment, the seeds are extracted carefully. Seed collection is good in alternate years. Resin pocket breakage may lead to fungal attack, reducing percentage viability. After wing removal, seeds are exposed to direct sunlight for 6 hours to reduce water content to 8 percent, which improves long-term storage (Donahue and others 1985). *Abies guatemalensis* seeds collected from Mexico average about 42,000 per kg while those from Guatemala average 35,000 per kg.

Like most *Abies*, the germination rate is poor (Donahue and others 1985, Dvorak and Donahue 1992, U.S. Department of Agriculture 1974). Percentage germination of fresh seeds is

15 percent, and after 1 year of cold storage (3 to 5 °C) drops to 2 percent. Cold and humid stratification improves the viability to 30 percent (Donahue and others 1985). Seed stratification on moist blotter paper at 4 °C for 40 days and application of gibberellic acid at 200 ppm (mg per L) proved to be the most effective treatment of *A. guatemalensis* to improve germination from 17 percent (no treatment) to 37 percent (Salazar 1991). A 40-day stratification period alone produced a higher total germination than 0, 20, or 60 days (Dvorak and Donahue 1992).

The seeds are planted in April and May in shallow trays containing rich organic soil. Seedlings may be grown in either full sun or 50-percent shade and should be protected from heavy rains. Transplants to individual bags should be made 4 to 6 weeks after sowing. After 2 years, *A. guatemalensis* is ready for outplanting. Trees can be severely infested by bark beetles (*Dendroctonus* spp.) (Donahue and others 1985) and seeds can be attacked by seed wasps (*Megastigmus* spp.) (Donahue and others 1985, Hiratsuka and others 1995).