

Ethnobotanical notes on *Pinus strobus* var. *chiapensis*

Pinus strobus var. *chiapensis* Martínez (= *Pinus chiapensis* (Mart.) Andresen, Pinaceae) is one of the most important forest resources in the montane, humid and subtropical areas of southern Mexico and northern Guatemala. Because of the quality of its wood, this tree is widely appreciated as timber and is planted in several parts of the world, including South Africa, Colombia and Venezuela. Yet, the ethnobotany of this tree in its native Mexico and Guatemala is little known. This note summarizes the vernacular nomenclature and major uses of this tree gathered from interviews

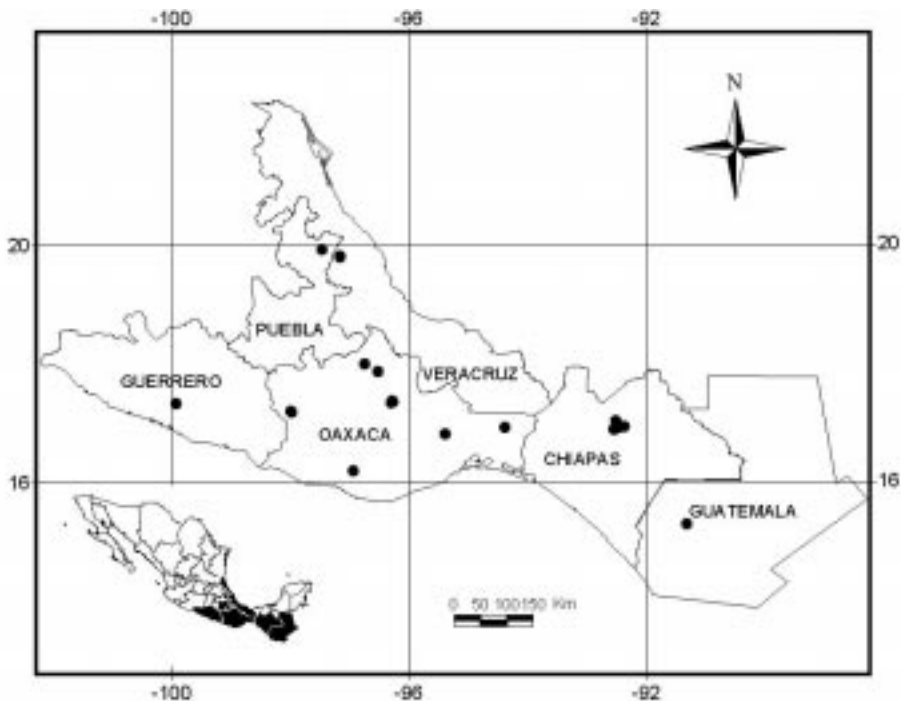


Fig. 1. Collect and interview sites of *Pinus strobus* var. *chiapensis*. Because of the scale of the map, some localities were depicted as a single dot (Map by R.Rivera).

with campesinos made during 24 trips to southern Mexico and Guatemala mountains during 1994-1999, including the entire range of the plant (fig. 1)

Description

Pinus strobus var. *chiapensis* is a haploxyton pine and a variety of the Eastern White Pine of Canada and United States (taxonomic nomenclature follows Farjon and Styles, 1997). In natural conditions, adult trees usually are 30-40 m height and 30-35 cm diameter at breast height (dbh) but old individuals may reach 50 m height and 130 cm dbh (del Castillo *et al.*, 1995). The bark is smooth, greenish gray on young trees, and rough and grayish brown on the lower stems of mature trees. The leaves are thin and flexible, 5 - 14 cm long, occur in groups of 5 needles, and are grouped toward the end of the branches. The cones are resinous, 6 - 18 cm long, and borne on slender peduncles, 2 - 5 cm long. The seeds are winged and dark brown. The wood is light, soft, creamy white, with slightly darker heartwood (Perry, 1991). *Pinus strobus* var. *chiapensis* is endemic to southern Mexico (states of Chiapas, Oaxaca, Puebla, Veracruz and Guerrero) and Guatemala (department of Huehuetenango). This tree grows in moist forests with an average yearly rainfall and temperature of 1500-2000 mm and 20 - 22 °C, at frost-free localities, between 250 - 2300 m altitude, usually on steep slopes and acidic soils (del Castillo *et al.*, 1995).

Because of its relative high growth rate, the quality of its wood and the potential of value-added products, *P. strobus* var. *chiapensis* has been considered for reforestation and plantations by The Central America and Mexico Coniferous Resources (CAMCORE). For these purposes, this organization has conducted ongoing studies with experimental plantations in several countries of Latin America and Africa (Endo, 1994; Vásquez and Dvorak, 1996). In Mexico, however, many of the natural stands of this pine are fragmented or severely reduced. For this reason, this species is classified as vulnerable by the International Union for the Conservation of Nature (Farjon and Page, 1999), and as one that requires "special protection" by the environmental agency of the Mexican Government (Secretaría de Medio Ambiente y Recursos Naturales, 2002).

Vernacular names. We found that all ethnic groups along the range of *P. strobus* var. *chiapensis* recognize and give vernacular names to this tree, suggesting a long tradition of usage. The local names given to this species vary depending on the locality and the local language of the people. The following ethnic groups have vernacular names to identify *P. strobus* var. *chiapensis*: Canjobals, Chatinos, Chinantecs, Cuicatecs, Mazatecs, Mixes, Mixtecs, Triquis, Tzeltals, Tzotziles, Zapotecs and Zoques. It is also common to find that, at the same locality, two names, one native and one Spanish, are given to this tree (Table 1). We also found minor variants of the name and the phonetics between neighboring localities, and

Table 1. Vernacular names of *Pinus strobus* var. *Chiapensis*

Local name ¹	Language	Locality	Region/state
Acalocote	Nahuatl	Paixtepec, Papalocuautila, Zapotitlán	Eje Neovolcánico, Veracruz
Acalocote ²	Nahuatl	Apulco, Zacapoaxtla	Sierra Norte de Puebla, Puebla
Ocote ³	Nahuatl	Tlacomulteno	Sierra Norte de Puebla, Puebla
Ayacahuite- vidrioso	Nahuatl Spanish	Hierba Buena, Vextla	Sierra Madre del Sur, Guerrero
Qui tye tyii	Chatino	Lachao	Sierra Madre del Sur, Oaxaca.
Pino gretado	Spanish	Lachao	Sierra Madre del Sur, Oaxaca.
Ayahuite, acahuite	Nahuatl	Los Coatlán	Sierra Madre del Sur, Oaxaca.
Pino gretado	Spanish	Los Coatlán	Sierra Madre del Sur, Oaxaca.
Du yu sha ña á	Mixtec	San Pedro Chayuco	Mixteca. Oaxaca
Ocote	Nahuatl	San Pedro Chayuco	Mixteca, Oaxaca
Pino hembra	Spanish	San Pedro Chayuco	Mixteca , Oaxaca
Shu chun ah chun rachia	Triqui	San Juan Copala	Mixteca, Oaxaca
Madera de chinito	Spanish	San Juan Copala	Mixteca, Oaxaca
Ocote	Nahuatl	San Juan Copala	Mixteca, Oaxaca
Ya qui va	Cuicatec	Cuyamecalco	La Cañada, Oaxaca
A ma caa(l)	Chinantec	San Pedro Tlatepuzco, San Felipe Usila	Sierra Norte, Oaxaca
Ya ni chá	Mazatec	San Juan Chiquihuitlán	Sierra Norte, Oaxaca
Ocote	Nahuatl	San Juan Chiquihuitlán	Sierra Norte, Oaxaca
Su yu do	Zapotec	Tanetze	Sierra Norte, Oaxaca
Ya yieri do	Zapotec	Tanetze	Sierra Norte, Oaxaca
Ya guieri do	Zapotec	San Juan Yaé	Sierra Norte, Oaxaca
Ya guir do	Zapotec	Santiago Yagallo	Sierra Norte, Oaxaca
Junch	Mixe	Santiago Zacatepec	Sierra Norte, Oaxaca
Pinocote	Spanish	Santiago Zacatepec	Sierra Norte, Oaxaca
Kuj'ushz	Mixe	San Pedro Ocotepéc. Juquila Mixe	Sierra Norte, Oaxaca
Kuj'ushz	Mixe	Quetzaltepec	Sierra Norte, Oaxaca
Guier do	Zapotec	Guevea de Humboldt	Tehuantepec Isthmus, Oaxaca
Pino	Spanish	Guevea de Humboldt	Tehuantepec Isthmus, Oaxaca

Table 1, *continue*

Local name ¹	Language	Locality	Region/state
Huaa chin Oaxaca	Zoque	Santiago Tutla (Bajo Mixe)	Tehuantepec Isthmus,
Huaa chin	Zoque	Santa María Chimalapa	Tehuantepec Isthmus, Oaxaca
Pinabeto	Spanish	Cintalapa ⁴ , Pueblo Nuevo ⁵	Sierra Atravesada, Altos de Chiapas, Chiapas
Pinabeto	Spanish	San Cayetano, Zinacantán, Larrainzar	Altos de Chiapas, Chiapas
Ayacahuite ⁶	Nahuatl	Jitotol	Altos de Chiapas, Chiapas
Tona tzin	Zoque	San Cayetano, Zinacantán, Larrainzar	Altos de Chiapas, Chiapas
Tono tzin	Zoque	Tapalapa ⁵	Altos de Chiapas, Chiapas
Cuc'toj	Tzotzil	San Cayetano, Zinacantán,	Altos de Chiapas, Chiapas
K'isis'taj	Tzeltal	Tenejapa Larrainzar	Altos de Chiapas, Chiapas
Uc'taj	Canjober	Santa Cruz Barillas	Cuchumatanes, Departamento de Huehuetenango, Guatemala
Pinabet	Spanish	Santa Cruz Barillas	Cuchumatanes, Departamento de Huehuetenango, Guatemala

¹ Names in native languages (boldface type) are written using Spanish letters and, therefore, the phonetics is only approximate.

^{2, 3, 4, 5, 6} Names were taken from herbarium specimens: 2, Xavier Madrigal and L. Vela without number, also in Martínez (1979); 3, G. Toriz 613, Campos and Tenorio; 4, Xavier Madrigal without number; 5, M. Martínez (1979); 6, Agustín May Nah 256

this difference usually increased with the distance. This suggests that, in such cases, localities are rather isolated. For instance, at the Zapotec region of El Rincón, Sierra Juárez, Oaxaca, *P. strobus* var. *chiapensis* is known as *ya yier do*, *ya guieri do* or *ya guir do*. Nearby ethnic groups may also influence the name given to this pine. In the Low Mixe Region, the local name is the same as that used by Zoque Indians from the nearby region of Chimalapas.

Native ethnic names appear to be specific to *P. strobus* var. *chiapensis* and our informants had no trouble in distinguishing this tree from other coexisting species of pine, for which they usually have a different name. For instance, *P. ayacahuite* Ehr., the closest coexisting relative to *P. strobus* var. *chiapensis*, is called *A ma ñaua* in Chinantec. But *P. ayacahuite* has larger female cones (20–30 cm), and usually grows at a higher altitude (above the frost line). Local names tend to be replaced by Spanish names, as is the case of *madera de chinito*; or, less commonly, by Nahuatl names, such as *ayacahuite* and *ocote*; a mixture of Nahuatl and Spanish words, such

as *pinocote*; or compound names derived from both Nahuatl and Spanish words, such as *ayacahuite vidrioso*. Nahuatl and Spanish names, instead, tend to be generic. *Pinocote* or *ocote* are common names given to resinous pines. *Ayacahuite* is a common name for *P. ayacahuite*.

Uses. Wood is the main product of *Pinus strobus* var. *chiapensis*. This tree has been greatly appreciated because of the large size of the stem. Evidence of this goes back to the Colonial Period in Mexico where logs, apparently of this tree, were used for shipbuilding. The demand for spare masts and spars was high during the early 18th century, when war and hurricanes in the Gulf of Mexico caused frequent damages to the Spanish fleet. Searching for trees that meet the needs for ship repairing and building led to a series of expeditions in southern Mexico and the discovery of gigantic pines in the mountains surrounding Santa María Chimalapa, in the Tehuantepec Isthmus (De Béthencourt Massieu, 1960). For such purposes, pine trees from these mountains were cut down extensively, starting in 1731. Logs were floated down the El Corte River, in Chimalapas, to Coatzacoalcos port, and shipped, via Veracruz, to the dockyards of Havana. Indeed, the river El Corte (The Felling) was named after the logging activities practiced in the Chimalapas region. The continuous logging for 17 years depleted the pine stands in this region and exploitation ceased in 1747-48 (De Béthencourt Massieu, 1960). We do not know for sure which species of pine was exploited. However, *Pinus strobus* var. *chiapensis* is the most likely candidate, as it grows in this locality where it is the largest species of pine. Currently, it is not uncommon to find individuals 48 m high in the forests of Chimalapas away from towns. *Pinus oocarpa* (Schiede) ex Schlechtdl. could be another possibility, since it also grows in the Chimalapas. However, it is not as tall as *P. strobus* var. *chiapensis* and grows in the driest part of this region, away from humid areas near the rivers.

Currently, *P. strobus* var. *chiapensis* is virtually absent in the vicinity of Santa María Chimalapa; most trees of this species have been cut down. However, it is still possible to find the species in moist forests away from towns. Loggers use chainsaws to cut the logs in boards in the field and bring the boards on mules for selling in Santa María. Because of the longer distances to find a tree, and the expenses for animal and chainsaw rental, the exploitation of this pine is no longer profitable in Santa María. Other high-priced species, such as *caoba* or mahogany (*Swietenia macrophylla* King, Meliaceae) and *cedro* (*Cedrela odorata* L. Meliaceae), are still exploited. However, given current exploitation trends, it is likely that such activities will not persist, unless a serious reforestation program is started.

Today, construction lumber is an important product of *P. strobus* var. *chiapensis*. It is used mainly for domestic purposes, throughout its range, by the local people. Commercial exploitation of this tree is restricted in Mexico, but we have detected furtive logging for commercial purposes occasionally in this country. In Guatemala, the wood is commonly exploited and milled. The timber is considered to be of intermediate quality between those of *caoba* and *cedro*, regarded as fine woods, and

cheap low-quality timber, locally called *maderas tropicales corrientes*, derived from tropical trees, such as *Ceiba pentandra* (L.) Gaertn., *Lonchocarpus castilloi* Standl., *Terminalia amazonia* (J.F. Gmel) Exell, and *Vochysia guatemalensis* Donn.-Sm. The wood of this pine is appreciated because of its lightness and light color. We found that the specific gravity at green volume was 0.31-0.35, estimated as in Fleischer *et al.* (1984). These estimates lie in the lowest part of the range reported for commercial trees (see Fleischer *et al.*, 1984). Because of the large size, the logs are commonly used as beams in roofs of rural houses and buildings.

The wood is also commonly used for furniture manufacturing, and may be preferred over that of other coexisting species of pine such as *P. patula* Loock, by being lighter and easier to work with. However, some carpenters find the wood of *P. strobus* var. *chiapensis* brittle. Indeed, the adjective "vidrioso" (glassy) is given to this pine in some regions because of this characteristic of the wood (Table 1). In Chiapas, byproducts of the milling of the lumber, such as bark pieces and small pieces of wood, are called *costera*, and are used as beds in henhouses and pigpens. Branches are used for fencing in Guatemala. Finally, the wood was also sold as a source of pulp for industrial papermaking, before commercial exploitation was restricted, in places such as Tanetze de Zaragoza, Sierra Juárez, Oaxaca.

When burning, the wood of *P. strobus* var. *chiapensis* does not last as long as that of oaks or other hardwoods. Such woods, however, are not as common as this pine near towns in humid montane and mid-elevation forests in the sierras of southern Mexico and Guatemala. Hence, the use of this pine as firewood for cooking, particularly the branches, is not rare in rural towns through the range of this species.

The cones of *P. strobus* var. *chiapensis* are rich in resin. Because of this, people in some rural towns of southern Mexico use the cones for starting fires for cooking. We were told that, in the past, the cones were used as torches either in houses or during nocturnal walks in the woods. They were sold in the lowlands of Usila, Sierra Norte de Oaxaca, for this purpose. Currently, with the generalized access to electricity, this use has disappeared. In Chiapas and Guatemala, an incision is made in the main stem of the trees to let the resin ooze out. This procedure is called "ocotear". The resin is collected and used mainly as a fuel source.

The resin from the stem is also used as an ointment in wounds and bone fractures. The resin is gently applied to the wounded area. Then, a cloth or paper bandage is bound tightly over the whole area so that the pressure is maintained. It is said that such treatment reduces the time for healing. A similar treatment is given for backaches and is also successfully applied to wounds of domestic animals.

The species is used as a shade tree in orchards near houses, in coffee plantations and in induced grasslands. In tropical ranches in Veracruz, near Zapotitlán, and in San Cayetano, Chiapas, this pine is used as a living fence.

Despite the relevance of this tree to humans, we did not detect any serious attempt to preserve this tree. Occasionally, people protect saplings by surrounding them with cuttings of thorny branches as in induced grasslands originally occupied by woods (Cuchumatanes, Guatemala); plant saplings in the woods (San Cayetano,

Chiapas); establish small orchards for replanting (El Rincón, Oaxaca), plant trees successfully as living fences (Zapotitlán, Veracruz), or just leave uncut some trees in induced pastures as shade trees (Xochitlán, Puebla, and Santa Cruz Barillas, Guatemala). However, through its entire range, the forest area originally occupied by *P. strobus* var. *chiapensis* is being cut down for growing corn, coffee plantations, or for establishing pastures for cattle, drastically reducing the populations. Indeed, in many localities in Guatemala (*e.g.*, Santa Cruz Barillas), Chiapas (*e.g.*, San Cayetano, see also Zamora and Velasco, 1977; Martínez-Carrasco, 1998); Puebla (*e.g.*, Apulco, Zacapoaxtla), Oaxaca, (*e.g.*, San Juan Copala, Mixteca region, and Escolapa, Chimalapas), the populations have been severely reduced to few individuals with little to no regeneration.

Paradoxically, human activities have also induced the establishment of secondary forest dominated by this species. In the Sierra Norte mountain range, Oaxaca, lands originally occupied by montane cloud forest, which have been cleared for growing corn and later abandoned, develop secondary forests dominated by this pine (del Castillo, 1996; Blanco Macías, 2001; Cordova and del Castillo, 2001). However, secondary forests are also destroyed by the expansion of grasslands and croplands (del Castillo, 1996). An additional cause of destruction is the introduction of exotic species, such as *Casuarina equisetifolia* L. and *Cupressus lusitanica* Miller for wood extraction in forests dominated by *P. strobus* var. *chiapensis* (Santa Cruz Barillas, Guatemala). Thus, extinction is the most likely outcome unless a plan of reforestation or habitat preservation is implemented.

In conclusion, *Pinus strobus* var. *chiapensis* is a well-known species throughout its range. Twelve ethnic groups have specific nomenclature to identify this species, and use also Spanish, or Nahuatl-derived names, which are usually, more generic. This pine was used for papermaking and, during colonial times, probably for shipbuilding. Today this species is commonly used for construction lumber, furniture manufacturing, firewood, as a shade tree, or even for medicinal purposes. The large bole size, and low specific gravity of the wood are appreciated. However, throughout its range, conservation practices are minimal or do not exist at all. Because of this, and changes in land use, this species is disappearing in many areas of its range implying important biological and economical losses. Therefore, more attention needs to be paid to this species in its native range to preserve this valuable resource.

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Literature cited

- BLANCO MACÍAS, A. 2001. *Análisis sucesional del bosque mesófilo de montaña en el Rincón, Sierra Norte de Oaxaca*. Tesis, Escuela Nacional de Estudios Profesionales Iztacala, Universidad Nacional Autónoma de México, Estado de México, 60 p.
- CORDOVA, J. AND R. F. DEL CASTILLO. 2001. Changes in epiphyte cover in three chronosequences in a tropical montane cloud forest in Mexico. *In*: G. Gottsberger and S. Liede (eds.) Life forms and dynamics in tropical forests. *Dissertationes Botanicae* 346:79-94.
- DE BÉTHENCOURT MASSIEU, A. 1960. Arboladuras de Santa María Chimalapa, Tehuantepec en las construcciones navales indianas 1730-1750. *Revista de Indias* 20: 65-101.
- DEL CASTILLO, R. F. 1996. Aspectos autoecológicos de *Pinus chiapensis*. *Memorias del Segundo Coloquio Regional de Investigación, Ciencias Exactas y Naturales*, Universidad Autónoma del Estado de México, Facultad de Ciencias, Toluca, Estado de México, México. pp. 63-68.
- DEL CASTILLO, R. F., S. ACOSTA AND N. SÁNCHEZ-VARGAS. 1995. *Estudio ecológico preliminar de Pinus chiapensis en el estado de Oaxaca*. Informe técnico. Secretaría de Desarrollo Social y Centro Interdisciplinario de Investigación para el Desarrollo Integral Regional, Instituto Politécnico Nacional, Oaxaca, Oaxaca. 160 p.
- ENDO, M. 1994. CAMCORE: twelve years of contribution to reforestation in the Andean region of Colombia. *Forest Ecology and Management* 63: 219-233.
- FARJON, A. AND C. N. PAGE (COMPILERS). 1999. *Conifers. Status survey and conservation Action plan*. IUCN/SSC Conifer Specialist Group. IUCN, Gland (Switzerland) and Cambridge (UK). 121 p.
- FARJON, A. AND B. T. STYLES. 1997. *Pinus* (Pinaceae). Organization for Flora Neotropica. New York Botanical Garden, New York. 450 p.
- FLEISCHER, H.C., E.H. BULGRIN, J. P DANIELSON, D. F. FAHEY, R. C. KOEPPEN, J. H. MCGOVERN AND J. I. ZERBE. 1984. Forest products utilization. *In*: K.F. Wenger (ed.) *Forestry handbook*, 2nd. edition. Wiley, New York, pp. 565-635.
- MARTÍNEZ, M. 1979. Catálogo de nombres vulgares y científicos, Fondo de Cultura Económica, México D.F. 1247 p.
- MARTÍNEZ-CARRASCO, N. 1998. Atributos poblacionales y reproductivos de *Pinus chiapensis* en Chiapas, México. *Anales del Instituto de Biología, Universidad Nacional Autónoma de México, Serie Botánica* 69:119-134.
- PERRY, J. P. 1991. *The pines of Mexico and Central America*. Timber, Portland, Oregon. 231 p.
- SECRETARÍA DE MEDIO AMBIENTE Y RECURSOS NATURALES. 2002. Norma Oficial Mexicana NOM-059-ECOL-2001. Protección Ambiental especies nativas de México de flora y fauna silvestres- Categorías de riesgo y especificaciones para su inclusión, exclusión o cambio- Lista de especies en riesgo. *Diario Oficial de la Federación*, México, 6 de marzo, pp.1-85.
- VÁSQUEZ, J. AND W. S. DVORAK. 1996. Trends in variances and heritabilities with stand development of tropical pines. *Canadian Journal of Forest Research* 26: 1473-1480.

ZAMORA, C. AND V. VELASCO. 1977. *Pinus strobus* var. *chiapensis*, una especie en peligro de extinción en el Estado de Chiapas. *Ciencia Forestal (México)*. 2: 3-18.

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