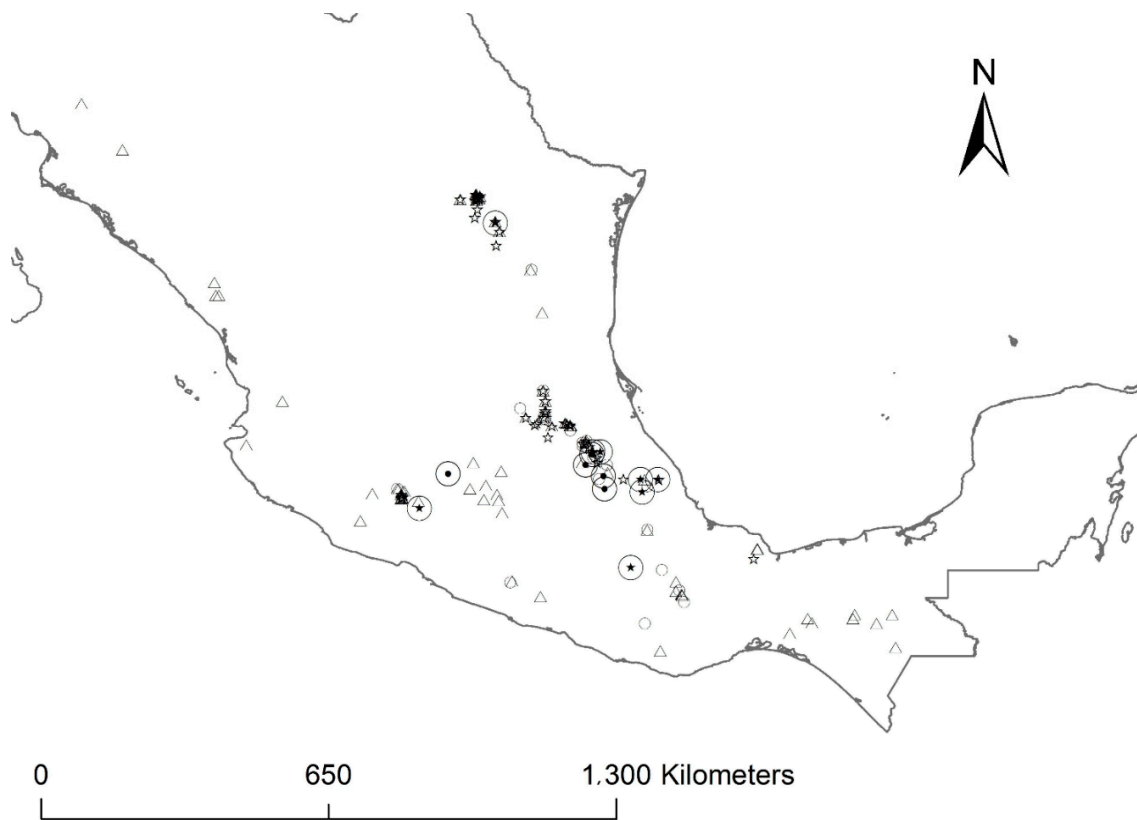


Online Supplementary Material



**Figure S1.** Location of populations selected for genetic diversity (triangles), provenance tests (stars) and progeny tests (circles), and location of tests sites for provenances (big circle with filled star inside) and progenies (big circle with filled star inside) for the four selected pines (for details see [1]).

**Table S1.** General climatic and edaphic patterns of target species.

Species	General characteristics of the populations
<i>P. greggii</i>	<p>Trees from the northern populations occur in degraded stands on shallow calcareous soils with pH 6.8 to 7.7 [2]. These populations exist at elevations from 1900 to 2600 m with annual rainfall between 650 and 750 mm. The southern populations of <i>P. greggii</i> occur in stands on predominantly acidic soils with pH 4.2 to 6.1 [3]. Trees in these populations are found at elevations of 1250 to 2380 m and receive between 1465 to 2380 mm of annual precipitation [3,4].</p>
<i>P. oocarpa</i>	<p>This species occurs from 350 to 2500 m elevation in Mexico and Central America but reaches its best development between 1200 to 1800 m. Along the northwest coast of Mexico it occurs in areas with as little as 600 to 800 mm of annual rainfall. In southern and eastern Mexico and most of Central America it generally occurs in areas of 1000 to 1500 mm of annual precipitation with dry seasons of up to 5 months. In some locations where <i>Pinus oocarpa</i> is most often found on shallow, sandy clay soils of moderate soil acidity (pH 4.0 to 6.5) that are well drained [5].</p>
<i>P. patula</i>	<p>The specie grows on fertile, well-drained soils on mountain ridges and slopes in cloud forest environments at elevations between 1490 and 3100 m but is most common between 2100 and 2800 m [6]. It generally occupies sites that receive between 1000 and 2000 mm of annual precipitation with distinct dry seasons of up to 4 months [7].</p>
<i>P. pseudostrobus</i>	<p>The species grows at elevations from 1600 to 3250 m, but the best stands are found at 2500 m on deep volcanic soils [8]. This tree can also be found in swallow and calcareous soils. This pine grows in temperate to temperate-warmer climates, where temperatures may drop to freezing during the coldest winter months. The species is found where temperatures range from -9 to 40 °C and annual rainfall from May to October is 600 to 2000 mm [6,9].</p>

**Table S2.** Physiographic Provinces (PS) and Germplasm Transfer Zones (GTZ) [10].

<b>PS</b>	<b>Name</b>	<b>Code GTZ</b>
I	Península de Baja California	I.1, I.2
II	Llanura Sonorense	II.1, II.2
III	Sierra Madre Occidental	III.1, III.2, III.3, III.4
IV	Sierras y Llanuras del Norte	IV.1, IV.2
V	Sierra Madre Oriental	V.1, V.2, V.3
VI	Grandes Llanuras de Norteamérica	VI.1
VII	Llanura Costera del Pacífico	VII.1, VII.2
VIII	Llanura Costera del Golfo Norte	VIII.1, VIII.2, VIII.3, VIII.4
IX	Mesa del Centro	IX.1, IX.2
X	Eje Neovolcánico	X.1, X.2, X.3
XI	Península de Yucatán	XI.1, XI.2, XI.3
XII	Sierra Madre del Sur	XII.1, XII.2, XII.3, XII.4, XII.5
XIII	Llanura Costera del Golfo Sur	XIII.1, XIII.2, XIII.3
XIV	Sierras de Chiapas y Guatemala	XIV.1, XIV.2, XIV.3
XV	Cordillera Centroamericana	XV.1, XV.2, XV.3

**Table S3.** Minimum requirements for genetic conservation units [11].

Requirement	Description
Species	<p>The species has been recognized as target tree species for conservation.</p> <p>There is one of the following conservation purposes for the unit:</p> <p>Purpose 1: maintain genetic diversity in large tree populations</p> <p>Purpose 2: conserve specific adaptive or other traits in marginal or scattered tree populations</p> <p>Purpose 3: conserve rare or endangered tree species with populations consisting of a small number of remaining individuals</p>
Population size	<p>This requirement depends on the conservation objective. The number of trees is verified based on NFLI data:</p> <p>Objective 1: If the unit is to maintain genetic diversity of species, the conservation unit must consists of 500 or more reproducing trees.</p> <p>Objective 2: If the unit is to conserve specific adaptive or other traits in marginal or scattered tree populations, the unit must harbor a minimum of 50 reproducing trees.</p> <p>Objective 3: If the unit is to conserve remaining populations of rare or endangered species, it must harbor a minimum of 15 unrelated reproducing trees.</p>
Management	<p>Forest management is applied for target species within the unit for:</p> <p>Purpose 1: ensure the continued existence of tree populations.</p> <p>Purpose 2: provide favorable conditions for growth and natural regeneration</p>
Monitoring	<p>Regeneration success is assessed every five or ten years, and to update the management plan</p> <p>Monitoring the units to evaluate their objective status.</p>

**Table S4.** Proposed Conservation Units for *P. greggii*, *P. oocarpa*, *P. patula* and *P. pseudostrabus*.

Genetic zone	Purpose	Protected area	Locality	State
<i>P. greggii</i>				
V.3	C1a	C.A.D.N.R. 026 Bajo Río San Juan	Puerto San Juan	Coahuila
V.3	C1a	Sierra Gorda	Valle Verde	Querétaro
V.3	C1a	Los Mármoles	El Piñón	Hidalgo
X.3	C3a	Z.P.F.T.C.C. de los ríos Valle de Bravo, Malcatepec, Tilostoc y Temascaltepec	Valle de Bravo	Edo. México
<i>P. oocarpa</i>				
III.2	C2b	-	Chinipas	Chihuahua
III.3	C2b	-	Mesa de los Leales	Chihuahua
III.3	C3a	La Michilía	Suchil	Durango
III.4	C2b	-	Duraznito Picachos	Durango
III.4	C3a	C.A.D.N.R. 043 Estado de Nayarit	La Yesca	Nayarit
V.3	C2b	-	Chinameca	Hidalgo
X.1	C2b	-	Ocotes Altos	Nayarit
X.1	C3a	La Primavera	Zapopán	Jalisco
X.2	C1b	-	Matanguarán	Michoacán
X.3	C2a	Z.P.F.T.C.C. de los ríos Valle de Bravo, Malcatepec, Tilostoc y Temascaltepec	Valle de Bravo	Edo. México
XII.1	C2b	-	EL Tuito	Jalisco
XII.1	C3a	Sierra de Manantlán	Cuatitlán de García Barragán	Jalisco
XII.2	C2b	-	El Durazno	Jalisco
XII.2	C3b	-	Tumbiscatio	Michoacán
XII.3	C2b	-	Tenería	Edo. México
XII.3	C2b	-	El Campanario	Guerrero
XII.4	C2b	-	San Sebastián Coatlán	Oaxaca
XII.5	C3b	-	Santa María Aolepec	Oaxaca
XIV.1	C2b	-	La Florida	Chiapas
XIV.1	C2b	-	La Tinitaria	Chiapas
XIV.2	C3b	-	Altamirano	Chiapas
XV.1	C2b	-	El Júcaro	Oaxaca
XV.1	C3a	El Triunfo	Siltepec	Chiapas
<i>P. patula</i>				
V.3	C2b	-	El Cielo	Tamaulipas
V.3	C1a	Los Mármoles	Zimapan	Hidalgo
X.3	C1a	Z.P.F.V. la Cuenca Hidrográfica del Río Necaxa	Axochitlán	Hidalgo
X.3	C2b	-	Cruz Blanca	Veracruz
XII.3	C2b	-	Yextla	Guerrero
XII.4	C1b	-	El Tlacuache	Oaxaca
XII.5	C1b	-	Corralitla	Veracruz
XII.5	C2b	-	Santiago Comaltepec	Oaxaca
<i>P. pseudostrabus</i>				
III.2	C3b	-	Sinaloa	Sinaloa
III.3	C3b	-	Badiraguato	Sinaloa
V.3	C3a	Cumbres de Monterrey	Santiago	Nuevo León
V.3	C3a	El Potosí	Rio averde	San Luis Potosí
VIII.3	C3b	-	San Carlos	Tamaulipas
X.1	C3a	C.A.D.N.R. 043 Estado de Nayarit	Atenguillo	Jalisco
X.2	C1b	-	Nuevo San Juan Parangaricutiro	Michoacán
X.3	C2a	Z.P.F.T.C.C. de los ríos Valle de Bravo, Malcatepec, Tilostoc y Temascaltepec	Malcatepec	Edo. México
X.3	C3a	La Montaña Malinche	Huamantla	Tlaxcala
XII.1	C3b	-	Talpa de Allende	Jalisco
XII.2	C2b	-	Aguililla	Michoacán
XII.3	C2b	-	Temescaltepec	Edo. México
XII.4	C3b	-	San Mateo Peñasco	Oaxaca
XII.5	C3a	Cañón del Río Blanco	Maltrata	Veracruz
XII.5	C3b	-	San Francisco Cajonos	Oaxaca
XIV.1	C2b	-	San Cristóbal de las Casas	Chiapas

Purpose 1,2,3 (see Table S3 species requirement); a (located in a protected area) or b (not located in a protected area).

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