



## *Abies jaliscana* (Pinaceae): A new combination in section *Grandis* and a key to the species of *Abies* in western Mexico

J. ANTONIO VÁZQUEZ-GARCÍA<sup>1,4</sup>, \*VIACHESLAV SHALISKO<sup>2</sup>, RAMÓN CUEVAS-GUZMÁN<sup>3</sup>, MIGUEL A. MUÑOZ-CASTRO<sup>1</sup> & MAURICIO R. MANTILLA-BLANDÓN<sup>1</sup>

<sup>1</sup> Herbario IBUG, Instituto de Botánica, Departamento de Botánica y Zoología, Centro Universitario de Ciencias Biológicas y Agropecuarias, Universidad de Guadalajara. Km 15.5 Carr. Guadalajara a Nogales, Las Agujas, Nextipac, Zapopan 45110, Jalisco, México.

<sup>2</sup> Departamento de Geografía y Ordenación Territorial, Centro Universitario de Ciencias Sociales y Humanidades, Universidad de Guadalajara, Guanajuato 1045, Col. Alcalde Barranquitas, Guadalajara 44260, Jalisco, México.

<sup>3</sup> Instituto Manantlán de Ecología y Conservación de la Biodiversidad. Departamento de Ecología y Recursos Naturales, Centro Universitario de la Costa Sur, Universidad de Guadalajara, Independencia 151, Autlán de Navarro, 48900, Jalisco, México.

<sup>4</sup> Investigador Prometeo—Universidad Estatal Amazónica, Paso lateral, Km 2½ vía a Napo, Puyo, Pastaza, Ecuador

\*E-mail: [vshalisko@cucba.udg.mx](mailto:vshalisko@cucba.udg.mx)

### Abstract

Recent morphological and phenological data support recognition of *Abies jaliscana* (Martínez) Mantilla, A. Vázquez & Shalisko at the species level. A key to distinguish *A. jaliscana* from other species of *Abies* in western Mexico is provided.

**Keywords:** *Abies durangensis*, *Abies flinckii*, *Abies guatemalensis*, *Abies religiosa*, Sierra de Cacoma, Sierra de Cuale, Jalisco

### Resumen

Datos morfológicos y fenológicos recientes apoyan el reconocimiento de *Abies jaliscana* (Martínez) Mantilla, Shalisko & A. Vázquez en la categoría de especie. Se proporciona una clave para distinguir *A. jaliscana* de otras especies de *Abies* en el occidente de México.

### Introduction

*Abies* Miller (1754: 11) is represented in western Mexico by two sections: *Grandis* Engelmann (1878: 596) and *Oiamel* Franco (1950: 10). The only *Abies* species from western México belonging to section *Oiamel*, as defined by Farjon (1990, 2010), is *A. religiosa* (Kunth 1817: 5) Schlechtendal & Chamisso (1830: 77), a species widespread in the mountains of Mexico and possibly Guatemala (Farjon & Filer, 2013). Populations from Nevado de Colima were described as *A. colimensis* Rushforth & Narave in Rushforth (1989: 105), but this species was not recognized by McVaugh (1992), Eckenwalder (2009), or by Farjon (2010), who consider this species to be a synonym of *A. religiosa*. Subsequently, these populations were treated as *A. religiosa* var. *colimensis* (Rushforth & Narave) Silba (2000: 20) and *A. religiosa* subsp. *colimensis* (Rushforth & Narave) Silba (2008: 44).

Section *Grandis* as defined by Farjon & Rushforth (1989) is characterized by long and relatively narrow leaves, with an obtuse, acute or emarginate apex, narrow cylindrical cones up to 12 cm long with a mostly obtuse apex, and green or olive (rarely bluish) during the growing season; ratio of cone length to width is usually between 2.5 and 3; seed bracts are included to barely exerted with small cusps, and by slender and conical cone rachis. Section *Grandis* in western Mexico include *Abies flinckii* Rushforth (1989: 101) and *A. durangensis* Martínez (1948: 77), the latter ranging from the Sierra Madre Occidental of eastern Sonora and western Chihuahua south to northern Jalisco (Pérez de la Rosa, 1987, Vázquez-García *et al.*, 2004). *Abies flinckii* is restricted to mesic subtropical mountains in Jalisco and Michoacán. Before the work of Rushforth *Abies* populations on the seaward-facing slopes in western Jalisco were

## Acknowledgements

Dr. Jorge Pérez de la Rosa is acknowledged for his comments on the manuscript. Dr. Zsolt Debreczy and Dr. Istvan Racz, both from the International Dendrological Research Institute (IDRI, Boston, USA-Budapest, Hungary), for comments, financial support and for sharing photodocumentation of their field work. Dr. Aljos Farjon, Dra. Lourdes Rico and two anonymous reviewers for comments on the manuscript. David Jimeno-Sevilla for the line drawings included in the manuscript. José Villa Castillo, Mary Hektner, P. Soaring Brito, Sonia Navarro Pérez & M. Cardenas Manzo are acknowledged for their excellent specimens collected to support this research.

## References

- Aguirre-Planter, E., Furnier, G.R. & Eguiarte, L.E. (2000) Low levels of genetic variation within and high levels of genetic differentiation among populations of species of *Abies* from southern Mexico and Guatemala. *American Journal of Botany* 87: 362–371.  
<http://dx.doi.org/10.2307/2656632>
- Cuevas-Guzmán, R., Martínez-Rivera, L.M., Cisneros-Lepe, E.A., Sánchez-Rodríguez E.V. & Guzmán-Hernández, L. (2008) Ordenación y clasificación de los oyametales del estado de Jalisco, México. In: Sánchez-Velásquez, L.R., Galindo-González, J., & Díaz-Fleischer, F. (Eds.) *Ecología, manejo y conservación de los ecosistemas de montaña en México*. Mundi Prensa México, Mexico, D. F., pp. 212–227.
- SEMARNAT. (2010) *Norma Oficial Mexicana NOM-059-SEMARNAT-2010, 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. 30 de diciembre de 2010*. Diario Oficial de la Federación, Mexico, D. F., pp. 1–77.
- Eckenwalder, J.E. (2009) *Conifers of the world: The complete reference*. Timber Press Inc., Portland, London, 720 pp.
- Engelmann, G. (1878) A synopsis of the American firs (*Abies* Link). *Transactions of the Academy of Science of St. Louis* 3: 593–602.
- Farjon, A. (1990) *Pinaceae – drawings and descriptions of the genera Abies, Cedrus, Keteleeria, Nothotsuga, Tsuga, Cathaya, Pseudotsuga, Larix and Picea*. Koeltz Scientific Books, Königstein, 330 pp.  
<http://dx.doi.org/10.1017/s0960428600000767>
- Farjon, A. (2010) *A Handbook of the world's conifers*. Brill Academic Publishers, Leiden, The Netherlands, 1112 pp.
- Farjon, A. (2014) *Conifers of the world. Resources for conifer research. On-line database*. Royal Botanical Gardens Kew, UK. Available from: <http://herbaria.plants.ox.ac.uk/bol/conifers> (accessed 30 May 2014).
- Farjon, A. & Filer, D. (2013) *An atlas of the world's conifers: An analysis of their distribution, biogeography, diversity, and conservation status*. Brill Academic Publishers, Leiden, The Netherlands, 512 pp.
- Farjon, A. & Rushforth, K.D. (1989) A classification of *Abies* Miller (Pinaceae). *Notes from the Royal Botanic Garden, Edinburgh* 46: 59–79.
- Flous, F. & Gaussen, H.M. (1932) Une nouvelle espèce de sapin mexicain *Abies hickeli*. *Bulletin de la Société d'Histoire Naturelle de Toulouse* 64: 24–30.
- Franco, J.A. (1950) *Abietos*. *Anais do Instituto Superior de Agronomia* 17: 1–253.
- Jaramillo-Correa, J.P., Aguirre-Planter, E., Khasa, D.P., Eguiarte, L.E., Piñero, D., Furnier, G.R. & Bousquet, J. (2008) Ancestry and divergence of subtropical mountain forest isolates: Molecular biogeography of genus *Abies* (Pinaceae) in southern Mexico and Guatemala. *Molecular Ecology* 17: 2476–2490.  
<http://dx.doi.org/10.1111/j.1365-294x.2008.03762.x>
- Kollmann, J., Prado-Córdova, J.P. & Munk-Andersen R. (2008) Factors limiting regeneration of an endangered conifer in the highlands of Guatemala. *Journal for Nature Conservation* 16: 146–156.  
<http://dx.doi.org/10.1016/j.jnc.2008.06.002>
- Kunth, K.S. (1817) *Coniferae. Nova genera et species plantarum (cuarto ed.)* 2: 2–5.
- Martínez, M. (1948) Los *Abies* mexicanos. *Anales del Instituto de Biología, Universidad Nacional Autónoma de México, Serie Botánica* 19: 11–104.
- Mantilla, B.M. (2006) *Phenology of Abies (Pinaceae) of western Jalisco*. Unpublished bachelor's degree thesis, Centro Universitario de Ciencias Biológicas y Agropecuarias, Universidad de Guadalajara. México, Guadalajara, 47 pp.
- McVaugh, R. (1992) *Flora Nova-Galiciana: Gymnosperms and pteridophytes*. Vol. 17. University of Michigan Herbarium, Ann Arbor, 467 pp.
- Miller, P. (1754) *The gardener's dictionary, ed. 4. vol. 1*. London, 520 pp.
- Pérez de la Rosa, J.A. (1987) Notas del herbario del Instituto de Botánica de la Universidad de Guadalajara (IBUG). Primer reporte de

- Abies durangensis* Martínez, en Jalisco. *Tiempos de Ciencia* 8:37–38.
- Rehder, A. (1939) The firs of Mexico and Guatemala. *Journal of Arnold Arboretum* 20: 281–287.
- Rushforth, K.D. (1989) Two new species of *Abies* (Pinaceae) from western Mexico. *Notes from the Royal Botanic Garden, Edinburgh* 46: 101–109.
- Schlechtendal, D. & Chamisso, A. (1830) Plantarum mexicanum a cel. viris Schiede et Deppe collectarum. *Linnaea* 5: 72–236.
- Silba, J. (2000) Variation geographic et populations isole de les gymnospermes rarissime. *Journal of the International Conifer Preservation Society* 7(1): 17–40.
- Silba, J. (2008) *Abies guatemalensis* Rehder subsp. *jaliscana* (Martínez) Silba. *Journal of the International Conifer Preservation Society* 15(2): 41.
- Silba, J. (2008) *Abies religiosa* subsp. *colimensis* (Rushforth & Narave) Silba. *Journal of the International Conifer Preservation Society* 15(2): 44.
- Strandby, U., Christensen, K.I. & Sorensen, M. (2009) A morphometric study of the *Abies religiosa-hickelii-guatemalensis* complex (Pinaceae) in Guatemala and Mexico. *Plant Systematics and Evolution* 280: 59–76.  
<http://dx.doi.org/10.1007/s00606-009-0164-x>
- Tropicos.org (2014) *TROPICOS*. Missouri Botanical Garden, St. Louis. Available from: <http://www.tropicos.org> (accessed 30 May 2014).
- Vázquez-García, J.A., Cházaro-Bazañez, M.J., Nieves-Hernández, G., Vargas-Rodríguez, Y.L., Vázquez-García, M. & Flores-Macías, A. (2004) *Flora del Norte de Jalisco y Etnobotánica Huichola*. Serie Fronteras de Biodiversidad 1. Universidad de Guadalajara (CUCBA-CUCSH), Guadalajara, 182 pp.
- Xiang, X., Cao, M. & Zhou, Z. (2007) Fossil history and modern distribution of the genus *Abies* (Pinaceae). *Frontiers of Forestry in China* 2: 355–367.  
<http://dx.doi.org/10.1007/s11461-007-0058-4>