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35 Años Transformando el Campo

Editorial

In Mexico, institutionalized forest research started in 1932, with the creation of the Mexican Institute of Forest Research, although, in fact, it began its activities two years later in the Autonomous Forest and Hunting and Fishing Department, annexed to the Higher Education and Forest Department, which was called the Institute of Forest Research for Hunting and Fishing. Subsequently, in 1960, within the framework of the Forest Law, the National Institute of Forest Research (INIF) was formalized, which had been in operation since November 1958. And in 1985 it merged with the national institutes of agricultural research (INIA) and livestock research (INIP), institutions with great experience and notable contributions to agricultural and livestock knowledge. This union gave rise to the *Instituto Nacional de Investigaciones Forestales, Agrícolas y Pecuarias* (National Institute of Forest, Agricultural and Livestock Research) (INIFAP).

At present, of the 832 active researchers of INIFAP, 12 % are dedicated to the attention of the forest sector, particularly in regard to the management of timber and non-timber resources, forest protection (pests, diseases and fires), industrialization and emerging topics of great importance such as Climate Change, and the use of biotechnological tools in the management of forest resources. Likewise, 7 % address multisectoral issues that cover sustainability of natural resources matters (water, soil, climate, integrated watershed management and genetic resources) and technological innovation.

In its 35 years of existence, INIFAP forest researchers have generated multiple contributions to the knowledge of ecosystems and their associated resources, the application of which has contributed to the management, conservation and improvement of forests, tropical forests and plant communities in arid and semi-arid zones of the country; from several lines of research focused on the generation of knowledge and the development of technologies on forestry, environmental services; exploitation and establishment of plantations of non-timber resources, especially in arid areas; diagnosis and control of pests and diseases; water management in agroecosystems; integrated watershed management; wood technology and processes for its industrialization.

The *Revista Mexicana de Ciencias Forestales* commemorates the 35th Anniversary of the *Instituto Nacional de Investigaciones Forestales, Agrícolas y Pecuarias* (National Institute of Forest, Agricultural and Livestock Research) with the edition of this publication, which includes seven review articles whose subject matter refers to the scientific achievements of its forest researchers on fundamental themes for the management, conservation and improvement of the natural resources of Mexico.

The reader will find an ample review of the academic works published in national and international journals, as well as others of a technical nature that are mainly part of INIFAP's own documentary collection. In addition, each of the contributions highlights the aspects in which the research carried out at the Institute stands out among forest teaching and research institutions. Likewise, some lines of action are set forth in the environmental and social context that prevails in the short and medium term.

The result of 35 years of forest research at INIFAP is the definition of areas of strength, and in some issues its pioneering quality in the implementation of studies, such as the case of biometrics, forestry and paleoclimate. Also, the contributions in the knowledge of non-timber resources of arid zones stand out, in particular on land use planning, modeling of productive potential, plant production and *ex situ* conservation of plant genetic resources of native species.

Regarding Climate Change, INIFAP highlights the research focused on the definition of strategies for mitigation and adaptation to climate change, based on the reduction of greenhouse gas (GHG) emissions, and the quantification and measurement of the increase in the CO_2 capture.

In regard to forest protection, the scientific staff of the Institute has generated knowledge for the assessment of fuels, in fire ecology, fire behavior, zoning, climate

change, recently in dendropyrochronology and fire from the social perspective. Whereas, the main contributions in phytosanity refer to taxonomic, biological knowledge and control of bark insects and sawfly in conifers, as well as other defoliators and some exotic pests; about forest diseases, the diagnostic studies of the causal agents of rot and rusts, mainly fungi, and the diagnosis, impact and control of parasitic plants, both in natural forests and in urban trees and plantations, are worth noticing. This knowledge is the basis for the NOM-019-SEMARNAT 2017 Official Mexican Standard.

In relation to the sustainability of natural resources, the topics that refer to the impact of climate change on ecosystems and biodiversity stand out, as well as the importance of ecosystem services and sustainable forest management. Another relevant aspect is water management in agroecosystems and integrated watershed management.

Through the genetic improvement of perennial plants, cutting-edge lines of research are promoted, which together with conventional management have the purpose of strengthening the programs of forest improvement and conservation of the country's genetic resources.

In this regard, the germplasm collection work to obtain improved lines of species with high productive potential, from traditional methods of genetic improvement, of genera such as *Pinus, Cupressus, Taxus, Eucalyptus, Gmelina, Hevea, Cedrela* and *Swietenia* stands out. In the last decades, studies with molecular markers have been implemented, among them the AFLP (Amplified fragment length polymorphism) for *Pinus pseudostrobus* Lindl. They are the first step in a quality evaluation program for its seed.

Another research topic is genotyping, an example of this is the high resolution dissociation analysis (HRM) of rubber (*Hevea brasiliensis* (Willd. ex A. Juss.) Müll. Arg.). Likewise, INIFAP has contributed to the development, characterization and establishment of clonal orchards of red cedar and mahogany, as well as the generation

of various *in vitro* cultivation protocols for forest species. A relevant achievement, in association with the *Instituto Nacional de Investigaciones Nucleares* (National Institute for Nuclear Research), is the proof of concept to obtain mutants of *Psudotsuga menziesii* (Mirb.) Franco through gamma-ray irradiation, which represents the first effort of INIFAP for artificial induction of genetic variability in a conifer.

In the of industrialization area, through strategic lines of research in wood science and technology, industries and forest products, knowledge has been generated which contributes to improving production systems and processes in the forest industry. In regard to wood technology, topics related to physical, mechanical and chemical aspects are addressed; as for the industrialization, sawmilling, drying and machining of wood. In particular, oak species and other so-called tropical commons.

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