

Foreword

The pine nut, the edible kernel of the Mediterranean stone pine, *Pinus pinea*, is one of the world's most expensive nuts. Although well known and planted since antiquity, pine nuts are still collected mainly from natural forests in the Mediterranean countries, and only recently has the crop taken the first steps to domestication as an attractive alternative on rainfed farmland in Mediterranean climate areas. Over the last century, the Mediterranean stone pine has experienced a range expansion, especially in the Southern and Eastern Mediterranean Basin, as well as a large increase of planted areas in its countries of origin, both through forest restoration and by farmland afforestation. Today, the Iberian Peninsula accounts for about 75% of the stone pine area in the world, Portugal being the main pine nut producer, followed by Spain, Turkey, Lebanon and Italy. The species performs well on poor soils and needs little husbandry, it is affected by few pests or diseases and withstands adverse climatic conditions such as drought and extreme or late frosts. It is light-demanding and hence has potential as a crop in agro forestry systems in Mediterranean climate zones around the world. Knowledge about stone pine as a crop in grafted plantations is increasing as a result of ongoing research. Plantations on farmland could yield more pine nuts in the future than the natural forests and contribute to rural development and employment of local communities.

Recently, the FAO-CIHEAM Inter-Regional Cooperative Research Network on Nuts restored its sub-network on Stone pine –that had not had any activity since the 1st Symposium on Mediterranean Stone Pine held in Valladolid (Spain) in 2000 –and linked with the former Cooperative Research Network on Stone Pine Silviculture within the framework of FAO Silva Mediterranea (1987-1997). In this context, the international meeting AGROPINE2011 aimed at bringing together the main research groups and potential users in order to gather the current knowledge on Mediterranean stone pine as a nut crop and to analyse its potential and current challenges. The Meeting was organised by the FAO-CIHEAM Network on Nuts, the Mediterranean Agronomic Institute of Zaragoza (IAMZ-CIHEAM), the Spanish National Institute for Agricultural and Food Research and Technology (INIA), the Institute for Agro-food Research and Technologies of Catalonia (IRTA), the Forestry and Forest Industry Services and Promotion Centre (CESEFOR, Centro de Servicios y Promoción Forestal y de su Industria de Castilla y León), and the Forest Sciences Centre of Catalonia (CTFC).

AGROPINE 2011 was held from 17 to 19 November 2011 in Valladolid, located in the northern plateau of central Spain. Valladolid is at the centre of the most important production area of pine nuts in Spain, and stone pine is its most characteristic forest tree. The Meeting was structured into two scientific sessions dealing with management of stone pine for cone production and on genetic improvement, selection and breeding of this species, and was closed by a round table discussion where challenges and opportunities of the pine nut industry and markets were discussed. On the last day a field trip was organized to visit stone pine experimental plots and grafted plantations. Thirty nine scientists, and forest and industry managers, coming from Lebanon, Portugal, Spain, Tunisia and Turkey participated in the meeting, which will hopefully be the first of a series of meetings and activities of the newly restored FAO-CIHEAM Sub-network on Mediterranean Stone Pine.

We acknowledge and thank the support from the organising institutions as well as from the Junta de Castilla y León, the Sustainable Forest Management Research Institute of University of Valladolid-INIA, Piñonsol (Soc. Coop.), the Spanish Agency of International Cooperation for Development (AECID) and the European Regional Development Fund (ERDF).

Sven Mutke (INIA, Coordinator of the FAO-CIHEAM Subnetwork on Stone Pine)
Mercè Rovira (IRTA, Coordinator of the FAO-CIHEAM Network on Nuts)
Ignacio Romagosa (IAMZ-CIHEAM)

Mediterranean Stone Pine for Agroforestry

Edited by:
S. Mutke, M. Piqué, R. Calama



OPTIONS méditerranéennes

**SERIES A: Mediterranean Seminars
2013 – Number 105**



Les opinions, les données et les faits exposés dans ce numéro sont sous la responsabilité des auteurs et n'engagent ni le CIHEAM, ni les Pays membres.

Opinions, data and information presented in this edition are the sole responsibility of the author(s) and neither CIHEAM nor the Member Countries accept any liability therefore.

Mediterranean Stone Pine for Agroforestry



Editors: S. Mutke, M. Piqué, R. Calama

Proceedings of the Agropine 2011 International Meeting, organized by the FAO-CIHEAM Network on Nuts, the Mediterranean Agronomic Institute of Zaragoza (IAMZ-CIHEAM), the Spanish National Institute for Agricultural and Food Research and Technology (INIA), the Institute for Agrofood Research and Technologies of Catalonia (IRTA), the Forestry and Forest Industry Services and Promotion Centre (CESEFOR, Centro de Servicios y Promoción Forestal y de su Industria de Castilla y León), and the Forest Sciences Center of Catalonia (CTFC).
Valladolid (Spain), 17-19 November 2011



With the support of: INIA (Acción Complementaria nº AC2011-00031-00-00), CIHEAM, AECID (Spanish Agency for International Development and Cooperation), Junta de Castilla y León



With the collaboration of: Piñonsol, Silva Mediterranea, Sustainable Forest Management Research Institute (U. Valladolid-INIA), Tragsa



OPTIONS méditerranéennes

Head of publication: Francisco Mombiela

2013

Series A: Mediterranean Seminars

Number 105



Centre International de Hautes Etudes Agronomiques Méditerranéennes
International Centre for Advanced Mediterranean Agronomic Studies

L'édition technique, la maquette et la mise en page de ce numéro d'Options Méditerranéennes ont été réalisées par l'Atelier d'Édition de l'IAM de Zaragoza (CIHEAM)

Technical editing, layout and formatting of this edition of Options Méditerranéennes was carried out by the Editorial Board of MAI Zaragoza (CIHEAM)

Crédits des photos de couverture / *Cover photo credits:*
S. Mutke, M. Piqué

Tirage / *Copy number:* 270 ex.
Printer: INO Reproducciones, S.A.
Pol. Malpica, calle E, 32-39
(INBISA II, Nave 35)
50016 Zaragoza-Spain
Dep. Legal: Z-2893-91

Fiche bibliographique / *Cataloguing data:*

Mediterranean Stone Pine for Agroforestry. S. Mutke, M. Piqué, R. Calama (eds). Zaragoza: CIHEAM / FAO / INIA / IRTA / CESEFOR / CTFC. 2013, 115 p. (*Options Méditerranéennes*, Series A: Mediterranean Seminars, No. 105)

Catalogue des numéros d'Options Méditerranéennes sur /
Catalogue of Options Méditerranéennes issues on:
www.ciheam.org/publications

ISSN: 1016-121-X – ISBN: 2-85352-508-2

© CIHEAM, 2013

Reproduction partielle ou totale interdite
sans l'autorisation du CIHEAM

*Reproduction in whole or in part is not permitted
without the consent of CIHEAM*

List of contents

The FAO-CIHEAM interregional cooperative research network on nuts 3

Foreword..... 5

Session 1: Management of stone pine for cone production in forests and agroforestry

Influence of stand and tree attributes and silviculture on cone and seed productions in forests of *Pinus pinea* L. in northern Tunisia – Boutheina A., El Aouni M.H., Balandier P.....9

Climate factors and their relation regarding cone yield of stone pine (*Pinus pinea* L.) in the Kozak Basin, Turkey – Parlak S., Kilci M., Sayman M., Akka M.E., Bucak C., Boza Z. 15

Effects of nutrients on cone losses of stone pine (*Pinus pinea* L.) in Kozak Basin – Kilci M..... 21

Effects of pests and diseases on stone pine (*Pinus pinea* L.) conelet losses in Kozak catchment area – Özçankaya I.M., Nafisi Balay S., Bucak C..... 29

Cone yield evaluation of a grafted *Pinus pinea* L. trial – Bono D., Aletà N..... 35

Production and management of stone pine (*Pinus pinea*) for early nut production: grafted plantations as an alternative for restoring degraded areas and generating income in rural communities of Tunisia – Piqué M., Ammari Y., Solano D., Aletà N., Bono D., Sghaier T., Garchi S., Coello J., Coll L., Mutke S..... 43

Thinning effect in two young stone pine plantations (*Pinus pinea* L.) in central southern Chile – Loewe V., Venegas A., Delard C., González M..... 49

Session 2: Genetic improvement, selection and breeding in Mediterranean stone pine

Mediterranean stone pine (*Pinus pinea* L.) genetic variability for growth traits in a Portuguese provenance trial – Carrasquinho I., Gonçalves E..... 59

Provenance trials of stone pine (*Pinus pinea* L.) in the Aegean region: Tenth year evaluation – Acar F.C., Altun Z.G., Boza A., Bilgin F..... 67

Low genetic and high environmental diversity at adaptive traits in *Pinus pinea* from provenance tests in France and Spain – Mutke S., Gordo J., Khouja M.L., Fady B..... 73

Characterization of *Pinus pinea* L. and *P. halepensis* Mill. provenances from Spain and Tunisia related to their rootstock use – Bono D., Othmani H., Ammari Y., Piqué M., Aletà N..... 81

Cloning stone pine (*Pinus pinea* L.) by somatic embryogenesis – Celestino C., Carneros E., Ruiz-Galea M., Alonso-Blázquez N., Alegre J., Toribio M..... 89

Round table: Pine nut industry and markets

Chemical profiling of Portuguese <i>Pinus pinea</i> L. nuts and comparative analysis with <i>Pinus koraiensis</i> Sieb. & Zucc. commercial kernels – Evaristo I., Batista D., Correia I., Correia P., Costa R.	99
Toward a traceability of European pine nuts "from forest to fork" – Mutke S., Pastor A., Picardo A.	105
Conclusions	115
List of participants.....	113