Forest Systems
26 (2), 6 pages (2017)
eISSN: 2171-9845
https://doi.org/10.5424/fs/2017262-12277
Instituto Nacional de Investigación y Tecnología Agraria y Alimentaria O. A., M. P. (INIA)

PRESENTATION

OPEN ACCESS

Presentation of the Special Section 'Mediterranean Silviculture: Homage to Gregorio Montero'

The special section 'Mediterranean Silviculture: Homage to Gregorio Montero' represents a tribute to this outstanding forest researcher. This special section includes contributions from different Gregorio's colleagues, disciples and friends who wrote about the topics in which Gregorio has worked during his professional life. The papers cover from natural regeneration and thinning to the estimation of rotation age including forest modelling, silvicultural path design, the use of National Forest Inventory data, multifunctionality and the economic basis of forestry.

In this presentation the editors of the special section introduce his biography and highlight the relevance of his contributions to forest science. Also we include the text 'Gregorio Montero, A Landscape-based Appreciation' by Paul Starrs.

Gregorio Montero González: Forest Researcher. The transition of the Spanish Forest Science to XXIst century

Felipe Bravo[1, 2] and Miren del Río[1, 3*]

Professor Gregorio Montero's distinguished research activity is well-known and recognized, having a significant and diverse impacts on forest science, from his scientific publications, his roles in the Spanish forest scientific system, to his mentoring work. It is noteworthy his holistic view of forest science. Although most of his research activity has been focused on Mediterranean silviculture, he has always made efforts to collaborate with researchers in diverse areas such as forest genetics, reforestation, ecology, economy, etc., needed to integrate the scientific basis of silviculture in forest management.

After the recent retirement of Gregorio Montero many of us felt the need to honor him, his outstanding contributions to forest science and forest practice, and his remarkable human quality. The scientific journal *Forest Systems* allowed us to publish this special section dedicated to this well-known forest scientist, with the support of all the editorial team and especially of Ricardo Alia, Gregorio's friend and editor-in-chief of the journal.

Biography

Gregorio Montero worked on forest research since its vey first professional steps in 1968. Gregorio was born in 1946 in Cabezabellosa (Cáceres, Extremadura) in western Spain and grew up in a goatherd's family living part of the year apart of the village with the herds. At the age of fourteen he started to work as forest worker in his homeland forest and rangelands. During the compulsory military service, Gregorio learned to write and read. After gaining the primary school diploma he moved to the Forest Rangers School in Lourizan (Pontevedra, Galicia) in northwestern Spain. He graduated as Forest Ranger in 1968 and started to work in the first National Forest Inventory. During this time he met his first boss, Rafael Serrada, at that time a young Forest Engineer which deserved truly and long lasting friendship with Gregorio.

In 1971, Gregorio moved to Madrid to work in the Forest National Research Center (INIA-CIFOR) and started to study the bachelor degree in Forestry at the *Universidad Politécnica de Madrid*. He received his forestry bachelor degree (*Ingeniero Técnico en Explotaciones Forestales*) in 1975 being the first of his cohort. After his graduation as *Ingeniero Técnico*, Gregorio started to pursue the next steps in his professional career and graduated as *Ingeniero de Montes* in 1982 and Doctor in 1987 also in the *Universidad Politécnica de Madrid*.

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Following his academic successes, Gregorio increased his responsibilities at INIA-CIFOR from technician to Subdirector for Research devoting his time to elaborate and strength different experimental and observational studies, research groups and laboratories, not only for forest science research but the whole agrarian sector in Spain, while he deployed a powerful initiative on silvicultural research. By supporting the links between the INIA-CIFOR and the University of Valladolid at Palencia Campus in the framework of the *Instituto Universitario de Investigación en Gestión Forestal Sostenible* (iuFOR, http://sotenible.palencia.uva.es), Gregorio tried to increase the size of research groups to confront more complicated tasks and generate a truly cooperation atmosphere between researchers, allowing them to interact and exchange ideas, laboratories, experimental and observational plots and techniques. Also on this idea, overpass the dispersion of research groups, Gregorio lead the Spanish Silviculture Research Network (SELVIRED, http://wwwsp.inia.es/Investigacion/centros/CIFOR/redes/Selvired/Paginas/Introduccion.aspx). Not always truly cooperation succeeds but never Gregorio left behind this objective.

Gregorio's silvicultural research was concentrated on Mediterranean forest ecosystems since his very beginnings. His PhD thesis was devoted to increase the insight on cork production and cork quality in Spain (Montero, 1987). It was remarkable his continuous efforts to maintain and improve the Experimental Network for Research in Sustainable Forest Management of INIA-CIFOR, through the establishment and monitoring of the most extensive permanent plot and thinning experiment networks in Spain (Montero *et al.*, 2004). Gregorio showed a powerful mentoring capacity by advising or co-advising a total of 16 PhD thesis in different universities. Today, former Gregorio's PhD students are professors of Silviculture, Forest Inventory and Forest Management in Spain, Greece and Chile, research leaders in Silviculture and Forest Stand Dynamic in different Spanish research centers and Forest Managers in different areas in Spain. By this mix of activities, Gregorio's students honored his interest both in the theoretical and applied aspects of silviculture. Through his mentoring, Gregorio impulsed the research in different areas (growth and yield, thinning, cone production, regeneration and economics) for different Mediterranean species (*Pinus sylvestris, Pinus pinea, Pinus pinaster* and *Quercus suber*), while developing different theoretical approaches (maximum and self-thinning lines, impact of silvicultural and environmental changes on forest growth and cone production…) and practical tools (growth and yield models, cone production or biomass equations). Gregorio Montero taught regularly silviculture at bachelor, master and PhD level at Universidad Politécnica de Madrid and Universidad de Valladolid (campus de Palencia) and delivered invited talks in most of the Spanish Forest Schools expanding his knowledge to a wide audience.

Strength forest research in the Mediterranean countries and especially in Spain was always a main landmark of Gregorio's work. He was one of the first members (since 1993) and president of the Spanish Society of Forest Science (SECF, http://www.secforestales.org) from 2005 to 2013 organizing two of the Spanish Forest Congress (www.congresoforestal.es) in Avila (2009) and Vitoria-Gasteiz (2013). In 2017, during the 7th Spanish Forest Congress (CFE from *Congreso Forestal Español*), Gregorio delivered the closing talk on 'Forestry research in Spain: Characteristics and priorities' (most of the Gregorio Montero contributions to the different CFEs can be downloaded from https://goo.gl/vSYj9s). During his SECF presidency, the Society established the yearly award for university final dissertations at Bachelor, Master and PhD level. Since 2006 up today more than 40 young forest researches have been recognized by these awards (http://secforestales.org/content/premios-universitarios-secf).

The international dimension of Gregorio's work has twofold dimension. On the one hand the interaction with international researchers by collaborating in projects, hosting his/her visits, delivering talks and leading working groups at the International Union of Forest Research Organizations (IUFRO). Gregorio was coordinator of IUFRO Mountain Silviculture since 1995 to 2005, worked in research projects with European and North American researchers always on Mediterranean systems such as *dehesas* or coppiced forests. Gregorio is member of the Italian Academy of Silviculture where he maintains the long lasting friendship with Professor Roberto Mercurio. On the other hand Gregorio, being aware of the importance of the publication of a Mediterranean forest science journal, was from 1998 to 2011 editor-in-chief of *Investigación Agraria: Sistemas y Recursos Forestales* (renamed as Forest Systems since 2010). In 2007 Forest Systems became part of the Science Citation Index, been one of the, at that time, 40 forest science international journals. This achievement, jointly with the progression of forest science in Spain, boosts the international presence of Spanish forest researches in the international arena. Nowadays Spain is the 10th research producers in forest science (in terms of published papers in SCI journals) and progressively is increasing its scientific impact (as is shown by the citation of works leaded or participated by Spanish researchers or the participation of Spanish groups in international research projects).

Gregorio never forgot the importance of forest science as an applied discipline. He was the president of the Spanish Society of Professional Foresters (PROFOR, http://www.profor.org) from 2002 to 2006 and the editor of the oldest Spanish forest technical journal MONTES (http://www.revistamontes.es) since 1990 to 1999. During Gregorio's activity as editor, MONTES published different outstanding articles of seminal importance for forest management in Spain where the last achievements of forest science were introduced to operational foresters.

Contribution to forest science

The main contribution of Gregorio Montero to forest science has been his noticeable advances in Mediterranean silviculture. His scientific and technical contribution to the development of silviculture in Spain is broad and varied, but three topics may be highlighted due to the outstanding results based on his extended dedication: quantitative silviculture, tree species-specific silviculture and carbon sequestration.

Quantitative silviculture. A relevant amount of Gregorio Montero scientific contributions has been devoted to growth and yield science. Very knowledgeable of the main principles of quantitative silviculture based on the thorough study of Assmann's and Carvalho Oliveira's oeuvres, he has translated, adapted and extended these principles to the main Spanish forest species. It is noteworthy his studies on site index, density-growth relationships, thinning theory and application, as well as his effort to develop forest growth and yield models as basic tools for forest management. His approach was to understand forest stand dynamic and its dependence on environmental conditions and silvicultural interventions as the basic scientific knowledge required to design appropriate silvicultural guidelines and models for our forests and to link silviculture practice to its economical dimension. He focused his studies not only on tree and stand growth and yield, but also on other quantitative aspects as non-wood forest products.

Tree species-specific silviculture. As Gregorio Montero indicates, the general principles of silviculture might be the common base for the application of species-specific silviculture, which have to be adapted according to the different species traits and ecological and socio-economic conditions. Although he studied most of the main forest tree species present in the Iberian Peninsula, it is outstanding his contributions on the silviculture of Scots pine (*Pinus sylvestris* L.), stone pine (*P. pinea* L.) and cork oak (*Quercus suber* L). His numerous research studies on these three species have covered different aspects relevant for developing a species-specific silviculture, such as ecological requirements, natural regeneration, tending treatments, cone or cork production, wood quality, etc. This knowledge has been reflected in numerous scientific papers as well as in technical books oriented to forest practice. As a major example, it is significant his interest on editing a book compiling the state of the art in silviculture of the main forest species in Spain, being editor and author of numerous chapters (Serrada *et al.*, 2008).

Forest carbon sequestration. Since the beginning of XXIth century Montero has been aware of the important role of forest systems in the mitigation of climate change due to their capacity to act as carbon sinks. His concern about carbon sequestration in forests has derived in studies on quantification of carbon stocks and sequestration as well as on the effects of silviculture on these stocks. A significant contribution of Montero to the forest sector has been the development of biomass equations for most of the forest tree species in Spain (Montero *et al.*, 2005), providing an essential tool for forest practitioners, policy makers and scientists to consider carbon stocks in their activities and researches. During the last years he followed this research line focusing on other forest compartments as shrubs, litter and soil, and on the integration of carbon balance in the economic and environmental valuation of silvicultural schedules.

Beyond his scientific and technical publications, Montero has had a great impact on forest science along his research activity due to several reasons. His continuous reflections and discussions with colleagues from different forest disciplines about silviculture, forest management, and forest science in general, has provided a doctrine about the concept of silviculture and forest management as a science which has served as a reference point for many of his followers.

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Gregorio Montero, A Landscape-based Appreciation

Paul F. Starrs[2]

When I first met Gregorio Montero in 1997, twenty years ago, he was on the one hand bookish and scholarly, but unmistakably a fieldworker and skilled professional who knew first-hand the landscapes and situations he was studying, where he could apply hard-won scientific knowledge to specific problems. That, it seems to me, is the essence of good practice and applied scientific management. No less, the description fits Gregorio to the core, although in the years since he has added abilities in capable administration and earned the political skills needed to direct a significant Institute devoted to research in matters relating to forestry, food, and features fundamental to the diverse landscapes of Mediterranean Spain.

Our visits and collaborations through the years have only rarely seen us meeting among groves and tree plantations (I am no forester, just a geographer working at the landscape scale). Our encounters, however, tend to be in interesting places, since the common grounds where we coincide are as fans of places and their people and what French scholars call *genres de vie* — ways of life or livelihoods. And there Gregorio Montero finds few equals: he recognizes that good forestry practice involves human activities that are deeply rooted in desires and history, which requires weighing economic profit against local needs and a sense of tradition. There, science meets folklore — in both Spain and California.

Someplace like Spain — with thousands of years of history on the land, many ruling peoples and kingdoms, remarkably diverse climates and vegetation — makes for a complicated mosaic of ideas and livelihoods. The rigid imposition during the early Franco regime years of a model of forestry in a homogenous German style was not a particular long-term success in terms of silviculture, economy, or quality-of-life for the human communities that adjoined what were soon turned into severely terraced and sculpted sites. Push-back from local residents by the 1960s and ’70s was pointed and at times put to flame forests of exotic species planted on vast terraced plantations carved into hillsides and mountains. Unmaking mistakes of imposed one-size-fits-all rules proved a particularly weighty task from the late 1980s-onward for Gregorio Montero and his colleagues at CIFOR–INIA, a division of the Instituto Nacional de Investigación y Tecnología Agraria y Alimentaria, within the Spanish Ministry of Science and Technology. And, it might be admitted, the title of Ingeniero de Montes brought burdens of its own — those who bear the title “engineers” do not always recognize local needs as an immediate concern in any project, not in Spain, not in the United States, nor anywhere. For that, Gregorio was the exception.

Overcoming preconceptions is a great thread running through Gregorio’s biography, and as in any story, there is a beginning, a middle, and something approaching an end, which bears brief discussion. For the full narrative, a long conversation with the man himself is indicated.

Beginnings

Gregorio Montero González was born in Cabezabellosa, a village (population 408 in 2011) perched in the Montes de Tras la Sierra north of Cáceres, Spain (Fig. 1). While a rural start was obviously no secret to Gregorio, his United States friends knew little of this until we visited Monfragüe National Park with Gregorio in 2001. A park guard, pointing out raptors and vultures circling near a *mirador* (overlook), began talking to Gregorio, who turned out — for someone the guard recognized was an academic potentate — to have a startlingly detailed knowledge of the area. With a laugh, Gregorio admitted that in the summers of his childhood, he traveled the area in the company of the herds of goats who were his sometime-charges.

From humble origins can emerge distinguished careers. In 2005, I was a visiting professor at the University of Alicante. Walking to the bus stop on a Wednesday, I bought a copy of *El Pais* to begin working my way through the daily offerings. As often, after scanning the headline stories, I flipped to the traditional

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Figure 1. The town of Cabezabellosa (Cáceres, Extremadura), where Gregorio Montero lived as a child, looms above the plains of Cáceres and Plasencia. Surrounding the town, however, is a vast area of shrubs and scrub vegetation that provides fodder for livestock, but especially for goats. Gregorio Montero lived as a child, tending goats, and would return during summers. Photograph by Paul F. Starrs, 2016.

back-cover profile and did a double-take: front and center was a photograph of Gregorio. The story by Carmen Morán bore a fetching title: "De cabrero a doctor ingeniero — el subdirector de Investigaciónes Agrarias aprendió a escribir en la 'mili', " which added that Gregorio's writing skills were acquired during his term of obligatory military service (Morán, 2005). She writes, "He is a free spirit. After all, [quoting him] 'the goatherd is the most independent figure of the *dehesa*.' Does Gregorio still know how to milk goats? she asks. 'That,' he assures her, 'is nothing you ever forget.' ".

Gregorio Montero would earn a doctorate in 1987, with a dissertation that quantified cork oak production as a function of site attributes and silvicultural treatment. Few areas of life are so strongly steeped in received knowledge and superstition as Iberian beliefs about oak cultivation, and Gregorio and his CIFOR-INIA colleagues have systematically debunked mythologies about the *dehesa* of Spain and the *montados* of Portugal, bringing silvicultural experiments and field-based measurement to forest science. For Gregorio, however, it can all be said to have started in Cabezabellosa, steering his caprine charges through languid travels across the landscape.

Middle

In 2000 Gregorio spearheaded an agreement with the University of California for exchange of scholars and advanced graduate students, and those interactions began with a momentous conference in Madrid in 2001, moved to California in 2004, and continued through today. Scholars at CSIC — the Spanish National Research Council — and at Spanish universities traveled to California over the last fifteen years and, in turn, hosted researchers from California and nearby states.

The U.S. researchers could marvel at the diversity of products emerging from the Spanish oak woodlands, including, of course, cork and the delectable jamón iberico de bellota. Spanish researchers visited California ranches, set in oak woodlands, noting the profusion of Spanish-language woodland terms across the California landscape (*encina, bellota, roble, madrone,* even *dehesa*). Discussions have considered the best strategies for improving woodland regeneration (equally a perpetual problem in Spain and California), and how to encourage landowners to protect oak woodlands in the long term from pressures of development — either toward housing tracts or setting aside traditional multi-product management for the allure of managing properties solely for wildlife (generally wild boar or deer) and the prestige hunting known as the *monteria*. Since that start in the early 2000s, collaborations continue, recognizing the role of politics in decision-making, with efforts to further-develop cooperation of land managers, woodland

Figure 2. At a conference on cork oaks in the woodlands of Catalonia, a field study tour visited the finca of Joan Botey Serra in Les Gavarres to see how oak management, reforestation, and tourism could join together. Near the main house sits a small chapel, which Botey assured visitors was established during the reign of Carlos Magno, or Charlemagne (c. 742–814 AD), which unsurprisingly proved a focal point for visitors. Gregorio Montero at the left, Paul Starrs to the right. Photograph by Paul F. Starrs, 2005.

producers, politicians — even master chefs and hoteliers — between Spain and California.

End

With a no-doubt welcome retirement from senior administrative duties a few years ago, Gregorio found time for family and for writing. He stepped up to help edit a massive joint California-Spanish project, more than a decade in the making, examining research and the landscapes of the working oak woodlands of Spain and California. Published by Springer-Verlag, the 500-plus page study brought together fifty-four authors from multiple countries, all working on oak woodland themes (Campos *et al.*, 2013). Contributing to several chapters, Gregorio offered a voice of reason, while emphasizing that a "working" landscape is by definition productive. Those products can be timber and firewood, cork or wild game or mushrooms, ecosystem services such as fresher air or cleaner streams, tourism or trout or trails for hikers. All make it easier for a woodland landscape with a 2,000 year management history to persist — which was at least one of the major underlying themes of the collaborative effort.

Figure 3. Gregorio Montero at Hopland Research Station, University of California. In April 2003, with a grant from the Del Amo Foundation, Lynn Huntsinger and colleagues at the University of California, Berkeley, brought a delegation of ten Spanish researchers to California for a week-long tour of California woodlands, a match to the 2001 visit that Gregorio Montero organized through CIFOR-INIA in Spain. Photograph by Paul F. Starrs, 2003.

Gregorio Montero, modest origins and all, is a potent force for the rational management of woodland and forest landscapes in Spain, and elsewhere. We owe him no small debt of thanks.

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