



# Jordi Voltas

## Full professor

### Personal Information



**Position:** Full professor

**Area of expertise:** Silviculture

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### Academic background

- PhD, Universitat de Lleida, 1998
- Agricultural Engineer, Universitat Politècnica de Catalunya, 1992
- Technical Engineer, Universitat Politècnica de Catalunya, 1989

### Professional experience

- since 2010. Full professor, Universitat de Lleida
- 2000 – 2010. Associate Professor, Universitat de Lleida
- 1996 – 2000. Assistant professor, Universitat de Lleida

### Research

My research activities are mostly focused on the ecophysiological and adaptive characterization of forest trees under Mediterranean conditions in the face of global change. In particular, I am interested in (i) the evaluation of intraspecific genetic variation and evolutionary trade-offs in life history traits in Mediterranean conifers; (ii) the identification and use of physiological traits of potential application in screening and breeding activities of forest trees (physiological breeding), in particular those associated to drought resistance; and (iii) the retrospective analysis of climate responses in forest trees and the interpretation of climate signals under current and future climate conditions using dendrochronological approaches. I also develop research in the evaluation of statistical tools that allow integrating physiological and environmental information into ecological response models. The aim of these models is to achieve a better understanding of genotype-environment interaction patterns linked to local adaptation and genetic variation in phenotypic plasticity relevant to ecological and evolutionary genetics and in breeding and deployment of genetic material in forest management practices. Many of my contributions to



the aforementioned topics use as inferential tool the relative abundance of the main stable isotopes present in the biosphere ( $^{13}\text{C}/^{12}\text{C}$ ,  $^{18}\text{O}/^{16}\text{O}$ ,  $^2\text{H}/^1\text{H}$ ,  $^{15}\text{N}/^{14}\text{N}$ ), which are of widespread use in physiology, ecology and genetics of forest tree species. The information provided by this approach allows, among others, relating the isotopic signatures to environmental cues linked to precipitation, vapor pressure deficit and thermic regime, allowing an in-depth understanding of the interactions between plants and the environment. This methodology is valid for studying a broad scope of cases which include from the characterization of genetic differences in water use efficiency to the development of novel models of palaeoenvironmental inference using archaeobotanical remains. I have coauthored 75 SCI articles and 14 chapters of national and international books. I have also participated in 19 competitive national research projects (in 7 as principal investigator) and in 4 competitive international projects (in all of them being principal investigator).

## Teaching

· BIOLOGY AND FOREST GENETICS	BsC in Forestry
· FOREST NURSERIES	BsC in Forestry
· GENETICS, CONSERVATION AND BREEDING OF FOREST TREES	MsC in Forest Engineering
· DESIGN AND ANALYSIS OF EXPERIMENTS IN PLANT BREEDING	MsC in Plant Breeding
· DESIGN AND ANALYSIS OF EXPERIMENTS	MsC Erasmus Mundus in Mediterranean F
· DESIGN OF EXPERIMENTS AND DATA ANALYSIS	MsC in Crop Protection
· STATISTICAL METHODS	MsC in Agricultural Engineering

## Recent Publications

Shestakova T, **Voltas J**, Saurer M, Siegwolf RTW, Kirdeyanov AL (2017) Warming effects on *Pinus sylvestris* in the cold-dry Siberian forest-steppe: Positive or negative balance of trade? *Forests* (8) 12, 490.

Granda E, Camarero JJ, Diego-Galván J, Sangüesa-Barreda G, Alla AQ, Gutiérrez E, Dorado-Liñán I, Andreu-Hayles L, Labuhn I, Grudh H, **Voltas J** (2017) Aged but withstanding: Maintenance of growth rates in old pines is not related to enhanced water-use efficiency. *Agricultural and Forest Meteorology* 243: 43-54.

Shestakova T, Camarero JJ, Ferrio JP, Knorre AA, Gutiérrez E, **Voltas J** (2017) Increasing drought effects on five European pines modulate  $^{13}\text{C}$  growth coupling along a Mediterranean altitudinal gradient. *Functional Ecology* 31: 1359-1370.

Choury Z, Shestakova T, Himrane H, Touchan R, Kherchouche D, **Voltas J** (2017) Quarantining the Sahara desert: growth and water-use efficiency of Aleppo pine in the Algerian Green Barrier. *European Journal of Forest Research* 136: 139-152.

Shestakova T, Gutiérrez E, Kirdeyanov A, Camarero JJ, Génova M, Knorre A, Linares JC, Resco de Dios V, Sánchez-Salguero R, **Voltas J** (2016) Forests synchronize their growth in contrasting Eurasian regions in response to climate warming. *Proceedings of the National Academy of Sciences of the United States of America* 113: 662-667.

Del Castillo J, Comas J, Voltas J, **Ferrio JP** (2016) Dynamics of competition over water in a mixed oak-pine Mediterranean forest: Spatio-temporal and physiological components. *Forest Ecology and Management* 382: 214-224.



- di Matteo G, **Voltas J** (2016) Multi-environment evaluation of *Pinus pinaster* provenances: evidence of genetic trade-offs between adaptation to optimal conditions and resistance to the maritime pine bast scale (*Matsucoccus feytaudi*). *Forest Science* 62: 553-563.
- Fardusi MJ, Ferrio JP, Comas C, **Voltas J**, Resco de Dios V, Serrano L (2016) Intra-specific association between carbon isotope composition and productivity in woody plants: a meta-analysis. *Plant Science* 251: 110-118.
- Resco de Dios V, Mereed T, Ferrio JP, Tissue DT, **Voltas J** (2016) Intra-specific variation in juvenile tree growth under elevated CO<sub>2</sub> alone and with O<sub>3</sub> – A meta-analysis. *Tree Physiology* 36: 682-693.
- Sixto H, Gil PM, Ciria P, Camps F, Cañellas I, **Voltas J** (2016) Interpreting genotype-by-environment interaction for biomass production in hybrid poplars under short-rotation coppice in Mediterranean environments. *GCB Bioenergy* 8: 1124-1135.
- Voltas J**, Lucabaugh D, Chambel MR, Ferrio JP (2015) Intraspecific variation in the use of water sources by the circum-Mediterranean conifer *Pinus halepensis*. *New Phytologist* 208: 1031-1041.
- Barbeta A, Mejía-Chang M, Ogaya R, **Voltas J**, Dawson TE, Peñuelas J (2015) The combined effects of a longterm experimental drought and an extreme drought on the use of plantwater sources in a Mediterranean forest. *Global Change Biology* 21: 1213-1225.
- Araus JL, Ferrio JP, **Voltas J**, Aguilera M, Buxó R (2014) Agronomic conditions and crop evolution in ancient Near East agriculture. *Nature Communications* 5 (3953): 1-9.
- Shestakova TA, Aguilera M, Ferrio JP, Gutiérrez E, **Voltas J** (2014) Unravelling spatiotemporal tree-ring signals in Mediterranean oaks: a variance-covariance modelling approach of carbon and oxygen isotope ratios. *Tree Physiology* 34: 819-838.
- Here AM, **Voltas J**, Claramunt-López B, Martínez-Vilalta J (2014) Drought-induced mortality selectively affects Scots pine trees that show limited intrinsic water-use efficiency responsiveness to raising atmospheric CO<sub>2</sub>. *Functional Plant Biology* 41: 244-256.
- Granda E, Rossatto DR, Camarero JJ, **Voltas J**, Valladares F (2014) Growth and carbon isotopes of Mediterranean trees reveal contrasting responses to increased carbon dioxide and drought. *Oecologia* 174: 307-317.
- Voltas J**, Camarero J, Carulla D, Aguilera M, Ortiz A, Ferrio JP (2013) A retrospective, dualisotope approach reveals individual predispositions to winterdrought induced tree dieback in the southernmost distribution limit of Scots pine. *Plant, Cell & Environment* 36: 1435-1448.
- del Castillo J, Aguilera M, **Voltas J**, Ferrio JP (2013) Isoscapes of tree-ring carbon-13 perform like meteorological networks in predicting regional precipitation patterns. *Journal of Geophysical Research - Biogeosciences* 118: 352-360.
- Yousfi S, Serret MD, Márquez AJ, **Voltas J**, Araus JL (2012) Combined use of <sup>13</sup>C, <sup>18</sup>O and <sup>15</sup>N tracks nitrogen metabolism and genotypic adaptation of durum wheat to salinity and water deficit. *New Phytologist* 194: 230-244.
- Aguilera M, Ferrio JP, Araus JL, Tarrús J, **Voltas J** (2011) Climate at the onset of western Mediterranean agriculture expansion: evidence from stable isotopes of sub-fossil oak tree rings in Spain. *Palaeogeography, Palaeoclimatology, Palaeoecology* 3-4: 541-551.



Aguilera M, Espinar C, Ferrio JP, Pérez G, **Voltas J** (2009) A map of autumn precipitation for the third millennium BP in the eastern Iberian Peninsula from charcoal carbon isotopes. *Journal of Geochemical Exploration* 102: 157-166.

**Voltas J**, Chambel MR, Prada MA, Ferrio JP (2008). Climate-related variability in carbon and oxygen stable isotopes among populations of Aleppo pine grown in common-garden tests. *Trees-Structure and Function* 22: 759-769.

Araus JL, Ferrio JP, Buxó R, **Voltas J** (2007) The historical perspective of dryland agriculture: lessons learned from 10,000 years of wheat cultivation. *Journal of Experimental Botany* 58: 131-145.

Ferrio JP, Alonso N, Lopez JB, Araus JL, **Voltas J** (2006) Carbon isotope composition of fossil charcoal reveals aridity changes in the NW Mediterranean Basin. *Global Change Biology* 12: 1253-1266.

**Voltas J**, Hernández M, Serrano L, Pemán J (2006) Carbon isotope discrimination, gas exchange and stem growth of four Euramerican hybrid poplars under different watering regimes. *New Forests* 31: 435-451.

Pemán J, **Voltas J**, Gil-Pelegrín E (2006) Morphological and functional variability in the root system of *Quercus ilex* L. subject to confinement: consequences for afforestation. *Annals of Forest Science* 63: 425-430.

Ferrio JP, **Voltas J** (2005) Carbon and oxygen isotope ratios in wood constituents of *Pinus halepensis* as indicators of precipitation, temperature and vapor pressure deficit. *Tellus B* 57: 164-173.

**Voltas J**, Borrás G, López-Córcoles H (2004) Use of biplot analysis and factorial regression for the investigation of superior genotypes in multi-environment trials. *European Journal of Agronomy* 22: 309-324.

Malosetti M, **Voltas J**, Romagosa I, Ullrich S, van Eeuwijk FA (2004) Mixed models including variables for studying QTL by environment interaction. *Euphytica* 137: 139-145.

Ferrio JP, Florit A, Vega A, Serrano L, **Voltas J** (2003)  $^{13}\text{C}$  and tree-ring width reflect different drought responses in *Quercus ilex* and *Pinus halepensis*. *Oecologia* 142: 512-518.

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*<http://webgrec.udl.cat/cgi-bin/DADREC/crgen.cgi?FONT=3&IDI=CAT&PID=367567&IDNC=201210161350170> ])*