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Título:

Camelina sativa, un nuevo cultivo oleaginoso para la producción de biolubricantes.

Resumen de la Memoria:

La preocupación por el medio ambiente, unida a la búsqueda de fuentes alternativas a la utilización de aceites minerales derivados del petróleo plantea la necesidad de buscar y/o desarrollar nuevas fuentes de aceites menos agresivos con el medio ambiente y que contribuyan a romper la actual dependencia del petróleo y sus derivados. Hasta ahora, los cultivos destinados a la fabricación de biolubricantes han sido básicamente cultivos tradicionales con fines alimentarios (girasol y colza). La gran demanda de aceites vegetales por la industria de biodiesel y biolubricantes compete con la industria alimentaria encareciendo los costes de esta última. Además la demanda por parte de la industria de aceites con composición de ácidos grasos ¿especiales¿ plantea la necesidad del desarrollo de cultivos oleaginosos alternativos. Existen especies oleaginosas no convencionales, que se pueden cultivar orientando su producción al sector industrial, siendo a la vez no competitivos con el sector alimentario. Camelina sativa L. es uno de estos cultivos. La gran ventaja de Camelina es que está adaptada a su cultivo en España, y que es una especie que se transforma fácilmente mediante un protocolo sencillo ya establecido muy similar al empleado con *Arabidopsis thaliana*. Por lo tanto, tenemos la tecnología, experiencia (técnicas de biología molecular, análisis molecular y lipídico) y la información genética adecuada para generar aceites vegetales, adaptados a su uso como aceite base para biolubricantes, en una oleaginosa que está actualmente fuera de los circuitos alimentarios como es Camelina sativa. Camelina presenta un aceite similar al de otras brassicáceas, rico en ácido linoleico y ácido erúico. En concreto las modificaciones que se pretenden introducir estarán orientadas al aumento del contenido en i) ácido oleico, mediante el bloqueo de los pasos de desaturación y elongación del oleato (mediante técnicas de interacción de RNA sobre los genes: FAD2, oleato desaturasa microsomal, y KCS, keto-acil-CoA sintasa); y ii) ácido palmítico, introduciendo genes de acil-ACP desaturasas con mayor especificidad sobre el ácido palmítico (de especies que acumulan palmítico como macadamia, *Macadamia integrifolia*, o uña de gato, *Doxantha unguis-cati*) o actuando en contra de la enzima condensante KASII, responsable de la elongación de palmítico a esteárico. Posteriormente, se procederá a la caracterización lipídica de nuevas líneas homocigotas transgénicas de camelina mediante estudios analíticos, genéticos y bioquímicos. Las líneas generadas en este proyecto con un aceite con buenas propiedades tribológicas, resistencia a la termo-oxidación a alta temperatura y bajo punto de fusión podrán ser utilizados para la producción de biolubricantes. Mi larga experiencia en el campo de la biología y bioquímica molecular y en el manejo de técnicas analíticas lipídicas me convierte en un candidato idóneo para llevar a cabo este proyecto, modificar la composición del aceite de camelina, poniendo a punto una nueva alternativa de cultivo rentable para el sector agrario, a la vez que se garantiza un suministro de un aceite de calidad a la industria de lubricantes y a un coste competitivo.

Resumen del Curriculum Vitae:

Licenciada en Ciencias Biológicas por la Universidad de Sevilla (1999). En los últimos años de mi licenciatura fui alumna interna en el Depto. Bioquímica y Biología Molecular, además obtuve una beca de colaboración del Depto. de Fisiología y Biología Animal de la misma Universidad. Posteriormente, tras recibir la beca FPI (del MEC) y un contrato predoctoral con cargo a proyecto (Julio a Octubre 2004) realicé mi tesis doctoral en el Instituto de la Grasa, CSIC, bajo la supervisión del Dr. Enrique Martínez Force y el Dr. Rafael Garcés Mancheño. Durante mi tesis doctoral realicé dos estancias en el extranjero, en Rothamsted Research (RRes), BBSRC (Reino Unido), en 2003 y 2004. Tras estas estancias, me incorporé en Noviembre 2004 al grupo del Profesor Johanthan A. Napier. En Febrero 2005 me doctoré obteniendo el título de Doctora Europea por la Universidad de Sevilla, reincorporándome como investigadora permanente de la BBSRC. Tras obtener un contrato I3P, renuncié a mi puesto permanente en la BBSRC, incorporándome en el Instituto de la Grasa en Julio del 2007. Además soy Profesora Asociada de Universidad del Departamento de Genética de la Universidad Pablo de Olavide, Sevilla, desde Octubre del 2009. Resultados de estas investigaciones son 3 patentes internacionales (2 explotadas por la empresa BASF, Alemania, y una por Advanta seeds, Holanda), la publicación de 16 artículos SCI de alta repercusión científica (3 enviados; todos estos artículos se encuentran en 25% de mayor índice de impacto de su área de conocimiento), 2 en preparación, 3 artículos de divulgación científica, 2 contribuciones a congresos nacionales y 29 internacionales. He participado en el desarrollo de 21 proyectos con entidades públicas de nivel tanto nacional como europeo, y en 10 contratos de investigación con empresas como: Advanta, BASF y Unilever. Colaboraciones con científicos reconocidos como Dr. Olga Sayanova, RRes (Reino Unido), Prof. Ian Gram. (York, UK), Prof. Stenn Stymme (Upsala, Suecia), Dr. John Dyer (USA). Durante toda mi trayectoria científica he estado involucrada en la transferencia de conocimientos científicos, así, por ejemplo, he estado involucrada en la divulgación científica a escolares en RRes, he enseñado diversas técnicas de laboratorio a otros científicos y he supervisado a estudiantes de la Licenciatura de Química y Biología de la Universidad de Sevilla. En la actualidad estoy codirigiendo 3 tesis doctorales. Además he revisado artículos para su publicación en diversas revistas internacionales como *Environmental and Experimental Botany* and *World Journal of Microbiology and Biotechnology*. Entre otros méritos destaca poseer una amplia versatilidad respecto a tópicos y sistemas de estudio. Prueba de ello es que durante mi trayectoria científica he trabajado exitosamente en diferentes sistemas (girasol, lino, ricino, *Arabidopsis*, levaduras, cianobacterias, protozoos), usando distintas técnicas como biología molecular de plantas, bioquímica y análisis lipídicos, obteniendo dos premios. En 2005 el Premio Extraordinario al trabajo de la BBSRC (Reino Unido) y en 2007 obtuve una ayuda a la investigación de mujeres jóvenes de RRes-BRSC (Reino Unido).



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Título:

Integrated control of fusarium wilt disease in *Medicago truncatula* and *Pisum sativum* through the use of resistance mechanisms and endosymbionts

Resumen de la Memoria:

Fusarium oxysporum is a ubiquitous soil-borne Ascomycete that causes vascular wilt disease provoking severe losses in important crops. The use of resistance varieties is one of the best alternatives to control this pathogen, since it avoids the use of expensive chemicals that threaten consumers and environment. However, the resistance obtained in several legumes including pea, alfalfa, lentils and chickpea are being overcome by emerging pathogenic races. This is mainly due to inappropriate use of resistance sources, of monogenic nature and for which the underlying resistance mechanisms are unknown. Thus, it is necessary to identify novel resistance sources with well-characterised mechanisms at cellular and molecular level. This would allow the combination of specific resistance responses acting during different fungal developmental stages, the use of mechanisms with a polygenic base and also ease the selection process. Currently, the mechanisms responsible for *Fusarium* resistance are poorly characterised and they should be addressed to allow a more durable resistance and rapid breeding strategies. Biocontrol by soil organism is an alternative and feasible strategy to control *Fusarium*. The potential of several microorganisms including root endosymbionts to control fusarium wilt disease have been evaluated with relative success. However, further studies of the beneficial role of endosymbiosis to control *Fusarium* in general and to understand the mode of action of rhizobium during fusarium wilt biocontrol in particular is necessary to potentiate this alternative control method. Here I propose a multi-disciplinary approach including genetic, molecular biology, biochemistry, microscopy and histology tools to control the fusarium wilt disease in the model legumes *M. truncatula* and *P. sativum*, through the inherent and durable plant resistance and with other feasible control methods. The present proposal will target the identification of new sources of resistance to fusarium wilt in *M. truncatula* and *P. sativum* collections (objective 1), the assessment of rhizobium as biocontrol agent of *Fusarium* (objective 2) and the characterisation of the mechanisms responsible for the resistance in both species at cellular (objective 3) and molecular (objective 4) levels. My expertise in legume, Rhizobium and *Fusarium oxysporum* management as well as in the different techniques that should be applied to fulfil the objectives would greatly contribute to the success of the project.

Resumen del Curriculum Vitae:

My scientific career has built up during three main periods each of them performed in institutions of international recognition from three European countries taking advantage of several mobility programs. In my earliest steps, I graduated in Biology at the University of Caen (France) followed by an MSc in Cellular Biology at INRA-Rennes/Caen University (France). During my MSc thesis I studied the regulation of nitrate uptake by cycling amino acids in rape showing for the first time a positive correlation between GABA and plant nitrate uptake capacity. Then, I obtained a Marie Curie RTN fellowship to perform a PhD in Aberystwyth, Wales (United Kingdom) (01/02/2001-19/01/2005) at the Institute of Grassland and Environmental Research (IGER-BBSRC). During my PhD, I characterised the symbiotic-related changes in root secondary metabolites and a new nodulation gene in *Lotus japonicus*. Finishing my PhD, I reached a 1 year post-doc position at Institute for Sustainable Agriculture (IAS) $\dot{\iota}$ CSIC of Cordoba (01/02/2005 $\dot{\iota}$ 31/01/2006) funded by an EU project which allowed me to widen my experience in plant-soil interactions to the study of plant-parasitic plant interaction. In Feb. 2006, I obtained a 3 year Marie Curie RTN post-doctoral contract in Dr. Di Pietro group (Cordoba University, Spain) to study the plant interaction with another soil borne organism, *F. oxysporum*. There I could widely develop my potential to go beyond the state of the art and I extended the foreseen objectives on the identification of downstream targets of the fungal pathogenicity MAPK pathway by opening new research lines on two additional *F. oxysporum* signalling pathways. In Nov. 2008, I obtained the competitive JAE Post-Doc contract of CSIC to work in the group of Prof. Rubiales at IAS $\dot{\iota}$ CSIC where I am currently developing my own research line on plant resistance to *F. oxysporum* in legumes. Recently, I successfully passed the 2 competitive examinations of the Plant protection and Breeding profile for the $\dot{\iota}$ Científico titular $\dot{\iota}$ position at CSIC finishing in fifth position out of 20. During my scientific career, I have continuously brought up myself, to extend collaborations with other research groups and to develop research of excellence studying various aspects of the plant interaction with soil-borne organisms using multidisciplinary approaches. As a result I have 19 SCI publications (85% of them included in the first 25% of higher impact of their group), 11 as first and 2 as last author summing a total of 153 citations (h-index=7 [source SCOPUS]), 3 book chapters, 2 as first author and 1 outreach article. In addition, 2 SCI publications are under revisions and another 3 in preparation. I participated in 10 research projects (5 EU-funded) and I performed 10 short stays in European institutions. I got involved in several formation activities including one MSc Thesis supervised, a PhD thesis in preparation, several teaching activities and 2 Teaching Innovation projects. In addition, I participated in the organisation of I+D events such as the IX Spanish congress of mycology and I am editor of an outreach journal issue. Results from my work has also been presented in 23 communications in international conferences and 3 in national congresses, 20 as first author and 16 of them oral. I am also member of the International Society of MPMI since 2007 and referee for 5 SCI journals



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Título:

Metabolomics in fruit quality

Resumen de la Memoria:

Metabolomics in addition of being a new high throughput analytical tool used to analyze the chemical components of a living organism, it is a newly developed area of biological research that greatly contributes to integrate physiological and genetics data in a holistic view of the living organisms functioning. The precise and abundant information provided is especially valuable in a physiological context, where it constitutes an important tool to generate information and knowledge for the studied system. For this reason, the main line of research proposed is to incorporate metabolomics approaches to a molecular breeding program of an important cultivated species such as strawberry (*Fragaria x ananassa*). The program will be centered on the study of the genetic and molecular determinants of fruit quality. Metabolomic studies have been successfully incorporated to breeding programs of other cultivated species as tomato (see CV of applicant). In these studies, metabolomic analysis has been crucial to identify QTLs associated to fruit aroma. In strawberry, other \omicron omics approaches, as transcriptomics and proteomics, have been successfully used (see CV of applicant). On line with this, metabolomics analysis will be an adequate complement for the functional genomics studies. In addition to non-directed metabolomic analysis, the research line will be also focused on the study of secondary metabolites, which are especially relevant for the quality of this edible fruit in terms of organoleptic and health-benefit properties. The research on secondary metabolites will pay special attention to the evaluation of the high natural diversity in fruit components in strawberry, as well as in different species of the *Fragaria* genus. In the development of the research line there is the purpose of active interaction with other groups of the new joint UMA-CSIC Institute (Instituto de Hortifruticultura Subtropical y Mediterránea, IHSM) who are currently running breeding programs in other vegetable crops.

Resumen del Curriculum Vitae:

I got my degree in Chemistry in 2000 (University of Málaga). I started the research carrier in 1998 as internal student in the Dept. Molecular Biology and Biochemistry (University of Málaga) investigating the Regulation of Plant Surface Metabolism. During this period we established a method to visualize phenolics and flavonoids of plant cuticle and published in *Plant Physiology and Biochemistry*. In 2001, I started my PhD in the same department with the FPU fellowship. My PhD was concerned with the role of pectin methyl esterase in eliciting defence responses in wild strawberry. As a part of my PhD project, I spent a total of 8 months (years 2002 and 2003) in the Institute of Food Research (Norwich, UK) analysing the cell wall of the transgenic fruits. Main results of this work have been published in *Plant Journal* in 2008 and at the moment, it has received 10 cites in the highest impact factor journals in Plant Science area (*Curr.Opin.Plant Sci.*, *Plant J.*, *Plant Physiol.* among others). My background, during my PhD, had been in molecular biology and biochemistry and I was interest in genomic approaches. For that reason, I carried out a short post-doctoral of 8 months (year 2007) in the IBMCP-CSIC as part of the international tomato genome sequencing project (FOOD-CT-2006-016214 \omicron EU-SOL \omicron). My contribution on this massive project was acknowledged in the publication in *The Plant Genome*. My interest in the integration of genomic, proteomic and metabolomic for better understanding the biological system led me in January 2008 join to Dr. A. Fernie group in Max Planck Institute of Molecular Plant Physiology (Germany) where I am currently a postdoctoral researcher. During this time I have been involved in different projects. 1) Investigating the changes that take place after silencing tomato cell wall invertase on floral and tomato fruit by comprehensive profiling of transcripts, metabolites and hormones. These results have been published in *Plant Physiology journal* in 2009. 2) The second project focussed on the study of biomass partitioning and plant growth using a battery of antisense of tricarboxylic acid cycle genes in tomato plants. The results of the project have been published with a total of 5 papers (2 in *Plant Physiology*, one in *Plant Cell*, one in *Amino Acid journal* and one in *Molecular Plant*). 3) I continued my original PhD project with better characterization of elicited defense response transgenic strawberry fruits from metabolic and transcriptomic point of view. The result of this study has been recently published in *Journal Experimental Botany*. 4) My interest in fruit quality brought me the opportunity to join a project in which we studied the physiological importance of organic acid metabolism for the tomato fruit. These results have been recently published in *Plant Cell*. During this postdoctoral, I have had a leading responsibility in the projects above indicated, being heavily involved in the writing of research proposals, reports, and scientific publications. I have had a very close interaction with the more qualified international groups in this area of research. As a summary, I am author of twenty papers (in five of them in the first position) and three under revision (one as first author) all of them are in JCR, and one (first author) no-included in JCR. Additionally I am first author of four book \omicron s chapter and one as co-author from prestigious editorials. I have participated in four national and three international projects.



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Título:

Phosphoproteomics, a novel approach to improve the response to drought stress in tomato

Resumen de la Memoria:

Among the abiotic stress conditions that affect crops, drought is by far the most economically relevant environmental stress. It has been suggested that worldwide losses in yield due to drought probably exceed the losses from all other causes combined. Understanding the mechanisms by which plants perceive stress and transmit the signal(s) to activate adaptive responses is of great importance to biology and vital for generating strategies to improve stress tolerance in crops. The fast activation of multifaceted signaling networks in response to adverse environmental conditions is essential for triggering the adequate response that allows plant survival. However, research on these signaling pathways reveals the complexity and interconnection at various levels. Modification of already present proteins is crucial for the efficacy and maintenance of the response and thus reversible protein phosphorylation plays an important role in these signaling pathways. This antagonistic action of specific kinases and phosphatases modulates the activity of a protein, regardless of its enzymatic, regulatory or structural nature. Recent studies demonstrate the key role of protein phosphatases, in particular protein-phosphatases PP2A, in the transduction of drought related signals. PP2A is a heterotrimeric protein, consisting of a catalytic (C) subunit bound to a scaffold A subunit and a regulatory B subunit. Yet, it is unknown the specific role of each subunit and the target proteins of PP2A activity. Therefore, a molecular and proteomic approach will be undertaken to characterize the PP2A complex and to identify target proteins of PP2A that may be involved in activation of drought signaling pathways in tomato. This species is an important agronomic crop and this approach will allow future studies on fruit ripening and post-harvest conditions. To establish the role of PP2A, we will analyze by qPCR the expression pattern of the PP2Ac gene family, which in tomato consists of five members. The subcellular compartment where dephosphorylation takes place will be determined by transient expression of GFP-PP2Ac fusion proteins. Silenced transgenic plants will be generated and the specific PP2Ac subunit that participates in drought responses will be identified. Subsequent co-immunoprecipitation studies with tagged PP2Ac will be performed to determine the specific A and B subunits that regulate the activity of the heterotrimer upon drought stress. Finally, a proteomic approach will be performed to identify target proteins of PP2A that may be involved in these signaling pathways. Identification of target proteins will open the way for future basic research lines and will also have profound implications for the design and engineering of more efficient strategies to improve plant abiotic stress tolerance of other crops of agronomical interest.

Resumen del Curriculum Vitae:

I started my research activity with an EU-COMETT grant at the Marine Institute of Crete. I implemented there a novel technology for phytoplankton production that was transferred to hatchery companies, and participated in a European project studying the use of frozen phytoplankton for rotifer production. Next, I focused my research interest to applied plant molecular biology and obtained my Masters degree at MAICH (Greece). Research from my Ms thesis was published in a top-ranked journal in Plant Science (Diallinas et al, 1997 3rd author). I also participated in a European project aimed to the molecular characterization of melon aroma formation. These research lines allowed me to learn and apply molecular biology techniques to crops. I got the prestigious European Training Mobility and Research grant to perform my PhD at the IMBB (Greece). The main objective of my research was to increase ascorbic acid content in melon by silencing AO. I got acquainted with plant transformation techniques in two short-term stays at ENSAT-Toulouse and MSU-Michigan. My PhD thesis (Excellent Cum Laude) contributed to 5 publications (Sanmartin et al, 2003; 2007; Pateraki et al, 2004; Al-Madhoun et al, 2003 2nd author; Davey et al, 2000 3rd author) in top-ranked journals in Plant Science and 2 book chapters. I participated in 4 European projects that focused on improving quality and shelf-life in vegetables. The experience acquired gave me the opportunity to supervise 2 Master theses at the IMBB. As a postdoctoral researcher, I joined the department of Pharmaceutical Sciences (Thessaloniki) and participated in a European project addressing the molecular characterization of antioxidant mechanisms that plants activate upon oxidative stress (Fotopoulos et al, 2007 2nd author). During this period, I also collaborated in a European project to improve post-harvest quality in citrus. In 2002, I joined the CNB where I got the opportunity to develop my own research line studying plant defense mechanisms activated upon stress. I obtained a postdoctoral contract from the competitive CSIC-I3P program and participated in 4 research projects being the responsible scientist for one of them. During this time, I published 4 papers in top-ranked journals in Plant Science (Sanmartin et al, 2005; 2007; Farmaki et al, 2007; Moschou et al, 2008 2nd author). The experience acquired gave me the opportunity to organize and impart courses on Plant Biotechnology at the UAM-Madrid. Since 2008, I am a postdoctoral investigator/lab manager responsible for the scientific programs (BIO2008-03052) on-going in Dr Sanchez-Serrano lab at the CNB. I have supervised 2 DEA theses and directed 2 PhD theses. Taken advantage of my expertise on plant biotechnology, we generated tomato plants with improved aroma and increased cold stress tolerance (Domínguez et al 2011, corresp. author), two important agronomic traits. My research is now focused on elucidating the role of the protein phosphatase 2A in plant stress responses (ms submitted to Plant J, corresp. author). I am also collaborating with Dr. Rojo (CNB) in developing a new research line studying the control of stem cell differentiation in Arabidopsis (Sanmartin et al, 2011; submitted Nat Cell Biol). I have also participated in refereeing manuscripts in journals (J Agric Food Chem) and evaluating research project and grant applications (ANEP).



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Título:

Hormonal regulation of changes in antioxidant and defense metabolites in citrus plants subjected to abiotic stress.

Resumen de la Memoria:

Abiotic stress factors act limiting worldwide crop performance and productivity; among them, salt stress and soil flooding are especially relevant to citriculture. Citrus respond to these conditions altering their photosynthetic activity, inducing antioxidant enzyme activities and metabolites (ascorbate, glutathione and secondary metabolites) and modifying phytohormone balances (Arbona et al. 2008; Arbona and Gómez-Cadenas 2009). The main objective of the proposed research line is to understand how citrus plants modify their metabolism to adapt to the adverse environmental conditions and how this process is regulated by phytohormones. To accomplish this, there are several particular goals that need to be completed: (1) Characterize the response of the antioxidant and secondary metabolites to several abiotic elicitors in relation to plant tolerance and/or sensitivity; (2) Characterize the hormonal profiles in citrus under stress, focusing not only in traditionally stress-related hormones (ethylene, JA, ABA, SA, and conjugates) but also in other newly stress-associated hormonal factors (IAA, cytokinins and gibberellins); (3) Assess the interconnection of specific hormonal factors with groups of specific antioxidant and secondary metabolites by chemical inhibition of phytohormone biosynthesis and/or perception; (4) Identify biosynthetic and/or regulatory genes in the plant hormone-metabolite interaction. For this reason, two model citrus rootstock genotypes will be used: Carrizo citrange and Cleopatra mandarin that are sensitive and tolerant respectively to the adverse conditions mentioned before. The results obtained will be of interest both from the fundamental and applied points of view: the identification of plant secondary metabolites associated to abiotic stress responses and subjected to phytohormone regulation as well as the genes that control this interaction are valuable information to plant physiologists and, in addition, all genes and metabolites found could constitute good markers for the assessment of stress tolerance or sensitivity in citrus.

Resumen del Curriculum Vitae:

I obtained my PhD degree on 2005 from Universitat Jaume I under the supervision of Prof. Dr. Aurelio Gómez Cadenas. During this period, I was involved in the development of an analytical method to profile several acidic plant hormones based on LC/MS and the set-up of antioxidant enzyme activity assays as well as chlorophyll fluorescence data collection and analysis. I. In 2006, I was offered a postdoctoral position by Dr. Carol Lovatt at the University of California in Riverside (USA) to investigate the hormonal and nutritional factors involved in the regulation of alternate bearing in *Pistia* mandarin. I. In 2007, I re-joined Dr. Gómez-Cadenas group as a postdoctoral researcher. During this period, my research objective was to set up a non-targeted metabolomics platform based on reversed phase liquid chromatography coupled to time-of-flight mass spectrometry (LC/ESI-QTOF-MS). I was granted two research projects by Fundació Bancaixa/Universitat Jaume I (P1 1A2007-04) and Generalitat Valenciana (GVPRE/2008/029) to apply metabolomics to the characterization of stress-related secondary metabolites in citrus. During this period, I got funding to spend two months in Leibniz Institute of Plant Biochemistry (Halle, Germany) under the supervision of Dr. Dierk Scheel, to further expand my knowledge in nontargeted metabolite profiling techniques. III. In 2009, I was granted a postdoctoral research fellowship from MICINN to join the group headed by Dr. Dierk Scheel at the Leibniz-Institut für Pflanzenbiochemie to develop several projects related to plant metabolite profiling. In March 2010, I joined the group headed by Dr. Manuel Talón at Instituto Valenciano de Investigaciones Agrarias (IVIA) as a Juan de la Cierva postdoctoral researcher. My research topic is the characterization of the metabolite profiles of fruits from new and traditional clementine varieties in order to correlate specific metabolite over- or downregulation with gene expression. I have published 19 papers in ISI journals, most of them situated in top positions (first quartile) either in Plant Sciences or Agriculture Sections. These articles have received an overall of 180 citations and I have an H index=8. I have also published three papers in CAB international journals and 6 technical papers. I have also been co-author in 7 book chapters. I have been involved in 12 research projects as a researcher being in two of them the Principal Investigator. I have co-advised one PhD thesis and one Master thesis. I participate as regular reviewer for journals such as Chromatographia, Plant Journal, Journal of Agricultural and Food Chemistry, Journal of Plant Physiology and Environmental and Experimental Botany. I have been involved in university teaching (Ingeniería Técnica Agrícola, Agricultural Engineering) at Universitat Jaume I during years 2007-2008 and 2008-2009. In addition, I have taught Official Master classes and seminars at Universitat Jaume I, Universitat de València and Universidad de Salamanca. In addition, I am currently co-advising a PhD Thesis that will be presumably defended throughout the year 2013.



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Título:

Abiotic Stress Protection by Cytosolic Antioxidant Machinery in Plum Plants

Resumen de la Memoria:

Water is increasingly scarce, especially in Mediterranean climates, which are characterised by long periods of intense irradiance and high temperatures. These conditions may result in a transpiration rate which exceeds the water absorption capacity, resulting in a high plant-water deficit. Water-stress is one of the most important environmental factors that regulate plant growth and development, and limit plant production. Additionally, different environmental stresses, such as salinity, high temperatures or cold stress have a water stress component. Water deficit, especially under high light intensity or in combination with other stresses, disrupt photosynthesis and increase photorespiration, altering the normal homeostasis of cells and causing an increased production of reactive oxygen species (ROS). These ROS are highly toxic to the living cells producing damages to membranes, protein oxidation and DNA alterations. Plants have developed an efficient antioxidant defence to limit their harmful effects. This system is based, in part, on enzymatic scavengers of ROS, such as superoxide dismutase (SOD) and ascorbate peroxidase (APX). In this project, we will attempt to fortify the antioxidant capacity of commercial plum plants with transgenes encoding both of these two enzymes by genetic engineering. In this sense, the Fruit Biotechnology group (CEBAS-CSIC) has been able to transform plum seedlings in vitro with two genes encoding cytosolic antioxidants (APX and SOD). The importance of the cytosolic antioxidant system in the response to oxidative stress induced by different abiotic and biotic stress situations has been described. In previous work carried out in tobacco plants this group demonstrated that lines transformed with both genes showed less symptoms as well as better photosynthetic rates than non transformed lines under water-stress conditions, outlining the importance of the cytosolic antioxidant machinery in the regulation of antioxidant defence during drought stress. The main objective of this project is to build durable resistance by increasing the antioxidant ability of commercial plum trees to drought stress. Since water shortage is the main environmental factor affecting productivity in Spain and especially in Murcia region, it is important to develop the necessary research that allows the production of plants resistant to these types of adverse conditions. The transformed plum plants will be rooted and acclimatised for further evaluation in greenhouse under control and water-stress conditions. These plants could be excellent rootstock to be used under water stress conditions and even under other environmental stresses. We will analyse the antioxidative metabolism at subcellular levels, including enzymatic and non-enzymatic antioxidants such as vitamin C and glutathione, as well as oxidative stress parameters (lipid peroxidation, hydrogen peroxide contents and electrolyte leakage). We will also analyse the effect of water-stress on gas exchange and chlorophyll fluorescence measurements, and further evaluation of these transgenic plants will include ionomic, metabolomic, proteomic and transcriptomic techniques in order to achieve a fine characterization of the response to water stress in plum plants.

Resumen del Curriculum Vitae:

Academic background Bachelor: Biology [Univ. de Murcia (19/12/2003)] PhD: Biology [Univ. Politécnica de Cartagena (20/04/2007)] Professional position Institution: CEBAS-CSIC Professional status: Associate Researcher Start date: 01/05/2010 Research area: antioxidant enzymes; antioxidant metabolism; cell redox state; cell signalling; differential gene and protein expression; environmental stresses; oxidative stress; plant development; Prunus; stress tolerance Past scientific experience 1. Centre: CEBAS-CSIC. Work licence (2004) 2. Centre: CEBAS-CSIC. I3P fellowship (2005) 3. Centre: CEBAS-CSIC. Associate Researcher Contract (4/05/2006 - 3/11/2007) 4. Centre: Newcastle University. Postdoctoral fellowship (21/01/2008 - 31/05/2009) 5. Centre: University of Leeds. Postdoctoral fellowship (1/06/2009 - 31/01/2010) Most outstanding publications 1. Diaz-Vivancos P et al. (2006). J Exp Bot 57:3813-3824. IF: 3.630. Ranking: 15/156 (Q1) 2. Diaz-Vivancos P et al. (2008). J Exp Bot 59:2147-2160. IF: 3.917. Ranking: 15/156 (Q1) 3. Barba-Espin G*, Diaz-Vivancos P* et al. (2010). Plant Cell Environ 33:981-994. *Equivalent authors. IF: 5.081. Ranking: 9/172 (Q1) 4. Ortigosa SM*, Diaz-Vivancos P* et al. (2010). Planta 232:593-605. *Equivalent authors. IF: 3.372. Ranking: 20/172 (Q1) 5. Diaz-Vivancos P et al. (2010). Biochem J 431:169-178. IF: 5.155. Ranking: 50/283 (Q1) 6. Diaz-Vivancos P et al. (2010). The Plant Journal 64:825;838. IF: 6.946. Ranking: 6/173 (Q1) Participation in research projects 1. Title: Respuesta de los Sistemas Antioxidantes de Albaricoquero a la Infección por Plum Pox Potyvirus. CICYT (AGL2002-02115), 2002-2005. Title: Bases fisiológicas y bioquímicas de la respuesta a Plum pox virus en plantas de melocotonero: Función del glutatión. CICYT (AGL2005-00062), 2005/2006. Title: Desarrollo de Marcadores Moleculares Ligados a la Resistencia al Virus de la Sharka (Plum pox virus) en Albaricoquero. Comunidad Autónoma Región de Murcia (23BIO2005-04-6444), December 2005-December 2007. Title: Estrategias bioquímicas y biotecnológicas para inducir resistencia a la sharka (Plum Pox Virus) en Prunus. CICYT (AGL2006-01743), October 2006-October 2009. Title: Función del metabolismo antioxidativo en la germinación, crecimiento y respuesta al Plum pox virus (PPV) en plantas de guisante y en diferentes especies de Prunus: Efecto en la expresión de proteínas. Fundación Séneca (05571/PI/07), 2007-2009. Title: Función del metabolismo antioxidativo en la protección de las plantas frente a situaciones de estrés ambiental. Fundación Séneca (11883/PI/09), 2010-2012. Title: Mejora de la tolerancia a sequía en albaricoquero incrementando su capacidad antioxidante mediante sobre-expresión de superóxido dismutasa y ascorbato peroxidasa. CICYT (BFU2009-07443), 2010-2012 Other achievements Published items: 20 Times Cited: 88 Average Citations per Item: 4.40 h-index: 5 Presentations in congresses: 28 (oral communications: 7) Languages: English, Speaking (Good), Reading (Perfectly), Writing (Good). Gene bank sequences: P. sativum chloroplast stromal Ascorbate Peroxidases (stAPX5 - GQ304508; stAPX12 - GQ304509). Authors: Barba-Espin G, Faize L, Faize M, Diaz-Vivancos P, Clemente-Moreno MJ, Burgos L, Hernández JA.



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Título:

Biological control under examination. A molecular view of a tripartite Plant-Microbe interaction

Resumen de la Memoria:

One of the most attracting fields of research in plant-microbe interactions is biological control, i.e. the use of microorganisms to manage a disease. This strategy is intended to improve quality of products with less environmental impact, but it also offers the possibility to investigate aspects of microbial ecology as species interaction, cell-cell communication, colonization etc. What makes bacteria efficiently colonize, interact with other organisms, what factors do trigger the genetic machinery involved in its ability to control a disease are questions I would like to pursue in my project. To do so, I will start working with the gram-positive bacteria *Bacillus subtilis*. Two main reasons are: 1) Different isolates of this species have proven efficiency as biocontrol agents and commercialised for such purpose, 2) *B. subtilis* is used as a model microorganism and there exist vast information of the genetics circuitries that govern important process as antibiotic production, cell differentiation, and biofilm formation. Now we know that within a bacteria population there exist subpopulations of cells dedicated to different tasks. I am planning to set up a multidisciplinary approach that will combine genetics, biochemistry, proteomics, cell biology and molecular biology to visualize how a bacterial population interacts, communicates with plants and other microorganisms, or how environmental factors as pesticides organic amendments may trigger or inhibit a response such as biofilm formation, antibiotic production or formation of sessile spores. From these studies we could know how the structure of the bacterial population varies and which could be the effects in terms of disease control efficiency. The formation of biofilms is well known to lead an efficient bacterial colonization. I am also interested in knowing if structural components of bacterial extracellular matrix (exopolysaccharides or proteins) are important for bacterial fitness. If this were the case, I would also investigate which environmental factors affect their expression and assembly in functional biofilms. The insights get on these studies are committed to bring some new lights not only in the field of biological control but also in other plant-microbe interactions.

Resumen del Curriculum Vitae:

PUBLICATIONS Romero D, et al. 2010, PNAS, 107, 2230-2234 Kolodkin-Gal I, Romero D, et al. 2010, SCIENCE, 328, 627-629 Romero D, et al. Molecular Microbiology. Submitted Romero D, et al. Chemical Reviews. Submitted Romero D and Kolter R. Trends in Microbiology. Submitted Pérez-García A, Romero D and de Vicente A. 2011 Current Opinion in Biotechnology. Press Pérez-García A, Romero D and de Vicente A. 2011 In, Aerobic, Endospore-Forming Soil Bacteria. Press López-Ruiz FJ, et al. 2010. Pest Management Science, 66, 801-808 Pérez-García A, Romero D, et al. 2009, Molecular Plant-Pathology, 10, 153-160 Romero D, et al. 2008, Journal of Plant Physiology, 165, 1895-1905 Cazorla FM, Romero D, et al. 2008. In, Biology of Plant-Microbe Interactions, 6, 1-6 Romero D, et al. 2007, Molecular Plant-Microbe Interactions, 20, 430-440 Romero D, et al. 2007, Journal of Applied Microbiology, 103, 969-976 Romero D, et al. 2007, Plant Pathology, 56, 976-986 Arrebola, E, et al. 2007 Molecular Plant-Microbe Interactions, 20, 200-209 Cazorla FM, Romero D, et al. 2007, Journal of Applied Microbiology, 103, 1950-1959 Romero D, et al., 2006 Journal of Microbiological Methods, 66, 556-559 Pérez-García A, et al. 2006, Journal of Phytopathology, 154, 190-192 Fernández-Ortuño D, et al. 2006, European Journal of Plant Pathology, 115, 215-222 Romero D, et al. 2004, Applied Microbiology and Biotechnology, 64, 263-269 Romero D, et al. 2003, Mycological Research, 107, 64-71 PATENTS Kolodkin I, Romero D, et al. Methods and Compositions for Treating Biofilms No: PCT/US11/20705 Holder Identity: HARVARD COLLEGE RESEARCH PROJECTS (most recent) Molecular genetics of biofilm formation. NIH, USA. 1998-2014 PI: Dr Roberto Kolter Developing D-amino acids as anti-biofilm drugs. Accelerator Technology Development Fund, USA. 2010-2011 PI: Dr Roberto Kolter Estrategias genómicas dirigidas al control biológico de enfermedades de cultivos relevantes en Andalucía. PAIDI. Junta de Andalucía. Incentivos a proyectos de excelencia (P10-AGR5797). 2011-2014 PI: Dr Cayo Ramos CONGRESS. Last five years Romero D, et al. 2009. Prokaryotic Development. Boston. Poster. International. Romero D, et al., 2009. Sociedad Española de Microbiología. Poster. National. Romero D. 2009. 3rd Central European Symposium On Antimicrobial Resistance. Croatia. Oral. International. Romero D, et al., 2008. XIV Congreso de la Sociedad Española de Fitopatología. Oral. National. Romero D, et al. 2007. XXI Congreso Nacional del Microbiología. Poster. National. García-Gutiérrez L, D Romero et al. 2007. Mip07. (SEM). Oral. National. Zerihou H, D Romero, et al. 2007. Mip07. (SEM). Málaga. Oral. National. Romero D, et al. 2007. XIII Internacional Congress on Molecular Plant-Microbe Interactions. (Italia). Poster. International. Martín-Pérez R, D Romero, et al. 2007. XIII Internacional Congress on Molecular Plant-Microbe Interactions. (Italia). Poster. International. García-Gutiérrez L, D Romero, et al. 2007. IOBC/Working groups meeting on Multitrophic interactions in soil. (Francia). Oral. International. OTHERS Fulbright fellowship for Post-doctoral. Ministerio de Educación y Ciencia. 2008-2010. FEMS Grant to attend the 3rd Central European Symposium on Antimicrobial Resistance, 2009 FPI fellowship for PhD studies. Ministerio de Ciencia y Tecnología. 2002-2006 Extraordinary prize of PhD Studies (2006-2007). Universidad de Málaga.



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Título:

EFFECTS OF PLANT DOMESTICATION ON RNA VIRUS EVOLUTION

Resumen de la Memoria:

One of the main consequences of plant domestication is the drastic reduction of the genetic diversity in the crop population. This results in a high density of susceptible hosts, which greatly facilitates virus spread. However, the role of genetic diversity in the host population on virus evolution remains poorly understood. Theoretical models predict that in a genetically homogeneous host population, virus adaptation leads to higher multiplication levels, and therefore higher virulence than in homogeneous host populations. Under these models, virulence and virus transmission levels are correlated. Consequently, in genetically heterogeneous populations trade-offs between transmission ratios in different host genotypes also result in lower transmission levels. Less is known about the genetic mechanisms underlying these processes. Theory predicts that higher fixation rates are favoured in the context of higher host genetic diversity, as viruses need to rapidly adapt the different environment represented by each host genotype. Different constraints may modulate the speed of virus adaptation. For instance, competition of beneficial mutations occurring in different lineages slows down the fixation rate (i.e. clonal interference). Other main factors for generating genetic diversity, like recombination or reassortment, can also play a role in the capacity of virus adaptation. However, experimental analysis of these processes is scarce. My research line will be focused on assessing the role of host genetic diversity in plant virus evolution. To do so, I will use pathosystems *Arabidopsis thaliana*-Cucumber mosaic virus, and chiltepin/pepper-Potyvirus. These plant-virus interactions have been observed in nature, and genetic diversity of a significant number of plant populations, and susceptibility of host genotypes to the referred viruses has been characterized, which make them highly suitable for addressing the objectives of my research. I will address the objectives of my proposed research by combining experimental approaches, and advanced bioinformatic tools. This represents a novel interdisciplinary approach, which will help to answer the questions that cannot be addressed by experimental analyses alone. To explore the relationships between virulence/transmission efficiency and host genetic diversity, and the role of clonal interference, I will measure viral accumulation, virulence and transmission efficiency in viral isolates obtained from natural host populations in individuals of these populations and in reference virus strains passaged in different conditions of host genetic diversity, population size. I will also use bioinformatic methods to study the genetic factors underlying adaptation to host populations with different degree of genetic diversity through analysis of sequences from natural and laboratory generated virus populations. I will estimate fixation rates and time-scaled phylogenies, sites under selective pressures, main mutation events that occurred during the virus evolution, viral determinants of virulence and transmission, and role of recombination and reassortment. This analysis will contribute to understanding the dynamics of viral epidemics, and the consequences of plant domestication. This is highly relevant from an agronomical perspective, as this knowledge might aid in the design of new control strategies based on genetically heterogeneous populations.

Resumen del Curriculum Vitae:

CENTRO DE INVESTIGACIONES BIOLÓGICAS ¿ 2000/2003 →PROJECT: Analysis of plant defence mechanisms and repair of photosynthetic machinery against virus infection. Unpublished results. →CONTRACT: Transformation of tomato to obtain genetic resistance against the potyvirus pepino mosaic virus (PepMV) Results property of Western Seeds. CENTRO DE BIOTECNOLOGÍA Y GENÓMICA DE PLANTAS (UPM/INIA) ¿ 2003/2009 → PROJECT: Evolution of plant viruses: epidemiology and population genetics (FPI Fellowship)- Pagán et al. (2007) The Relationship of Within-Host Multiplication and Virulence in a Plant-Virus System. PLoS ONE 2,e786 - *Pagán et al. (2008) Host Responses in Life-History Traits and Tolerance to Virus Infection in *Arabidopsis thaliana*. PLoS Path 4,e1000124- Pagán et al. (2009) Differential Tolerance to Direct and Indirect Density-Dependent Costs of Viral Infection in *Arabidopsis thaliana*. PLoS Path 5,e1000531- Pagán et al. (2010) *Arabidopsis thaliana* as a Model for the Study of Plant-Virus Co-Evolution. Phil Trans R Soc B 365,1983- **Factors Involved in Virulence Evolution of Cucumber mosaic virus in *Arabidopsis thaliana* (2008) Thesis dissertation*PHYTOMA award in the XIV Congress of the Spanish Society of Phytopathology (2008) **Awarded with Premio extraordinario de Tesis Doctoral (2010) → PROJECT: Impact of pathogens in the conservation of endangered species: Application to wild populations of Chiltepin (*Capsicum annum* var. *aviculare*) in Mexico.- Pagán et al. (2010) Genomic and Biological Characterization of Chiltepin yellow mosaic virus, a New Tymovirus Infecting *Capsicum annum* var. *aviculare* in Mexico. Arch Virol 155,675 → PROJECT: PEPEIRA (Pest Risk Assessment for Pepino mosaic virus)- Pagán et al. (2006) Genetic Structure of the Population of Pepino mosaic virus Infecting Tomato Crops in Spain. Phytopathology 96, 274- Hanssen, Mumford, Blystad, Cortez, Hasiów-Jaroszewska, Hristova, Pagán, et al. (2010) Seed Transmission of Pepino mosaic virus in Tomato. Eur J Plant Pathol 126,145 → CONTRACT: Study of soil-transmitted viruses in beet crops Primer design for detection of beet viruses THE PENNSYLVANIA STATE UNIVERSITY ¿ 2009/2011 → PROJECT: Analysis of speciation mechanisms in RNA viruses (Marie Curie Fellowship)- Pagán & Holmes (2010) Long-Term Evolution of the Luteoviridae: Time Scale and Mode of Virus Speciation. J Virol 81,6177- Pagán et al. (2010) Phylogenetic Analysis Reveals Rapid Evolutionary Dynamics in the Plant RNA Virus Genus Tobamovirus. J Mol Evol 71,298- Fraile, Pagán, Anastasio, Sáez & García-Arenal (2010) Rapid Genetic Diversification and High Fitness Penalties Associated With Pathogenicity Evolution in a Plant Virus. Mol Biol Evol Adv pub, Dec 3- Allison, Harbison, Pagan, et al. (2011) Parvoviruses in Raccoons Provide Multiple Examples of Host Range Variation and Adaptation that Reveal Underlying Rules that Regulate Viral Host Switching. PNAS. Under rev- Pagán & Holmes (2011) Association Between Gene Expression Level and Selective Pressures in the Mononegavirales. In prep COLLABORATIONS- Donaire et al. (2008) Structural and Genetic Requirements for the Biogenesis of Tobacco Rattle Virus-derived Small Interfering RNAs. J Virol 82,5167- Sánchez-Rodríguez et al. (2008) The ERECTA Receptor-like Kinase Regulates Cell Wall-Mediated Resistance to Pathogens in *A. thaliana*. Mol Plant-Microbe Int 22,953



Nombre: BLANCO VACA, JUAN ANTONIO

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Título:

LONG-TERM INTERACTIONS BETWEEN CLIMATE, SPECIES COMPETITION AND FOREST MANAGEMENT IN SCOTS PINE / EUROPEAN BEECH MIXED FORESTS

Resumen de la Memoria:

Spanish forests could experience important changes in the near future due to changes in climate and management: from timber to bioenergy production, carbon sequestration, biodiversity conservation, etc. In northern Spain, mixed Scots pine / European beech stands cover important areas, where interspecific competition could increase in the future due to reduction in precipitation by climate change and cease of artificial beech suppression as management techniques change. As a result, it is unknown how these stands could develop in the future. Forest ecosystems are the result of interactions between biological and geoclimatic conditions, and the most suitable tools to study these interactions and how are affected in the long-term by human activity are ecological models that combine the reliability of field data with the scientific knowledge on ecophysiological processes and management practices and their impact on the forest ecosystem. To study these interactions, the objectives of my research are: 1) to estimate future trends of tree growth, ecosystem carbon and other variables at stand and landscape scales to support the design of sustainable forest management; and 2) to develop reliable ecologically-based mathematical tools to support ecological research on interactions among trees and their environment that can be used for management applications. To achieve these objectives my research will have three phases. First, field data on forest productivity from experimental plots in Scots pine and European beech stands in the Pyrenees will be collected to estimate pools and cycles of biomass and nutrients in the canopy, understory and soil. Nutrient cycles will be estimated to assess the importance of nutrient limitation, and evapotranspiration and other water-related soil properties will be studied to assess the importance of water limitation in these stands. The rates of ecological processes such as litterfall production, litter and coarse woody debris decomposition, tree and understory growth and nutrient uptake will be estimated. Greenhouse experiments will provide information on seed germination and photosynthetic efficiency. Dendroclimatological studies will provide information on historical patterns of tree growth/climate relationships. During the second phase, the model FORECAST-Climate will be calibrated and tested with the field data collected in the first phase. Model simulations will be evaluated against independent field data and when the model performance is considered acceptable, libraries of stand-level ecosystem variables will be created for different types of Scots pine / European beech mixed stands. During the third phase, these libraries will be used by the landscape-level model LLEMS together with GIS data to project future growth trends of these forests in the western Pyrenees. Several scenarios of forest management and climate change will be simulated to assess their long-term consequences on these forests, and to evaluate the possibility of adapting forest management for climate change mitigation (increasing carbon sequestration, producing bioenergy) and adaptation (reducing climate change impacts on forest systems). This research will provide guidance for more sustainable forest management under climate change and will develop methodologies that could be applied to other forests in Spain and the rest of Europe.

Resumen del Curriculum Vitae:

I am Agricultural Engineer (1998) and PhD (2004) from the Public University of Navarra (Pamplona, Spain). I got a MEC-FPI fellowship to do a PhD on the effects of forest thinning on nutrient pools, nutrient use efficiency, nutrient resorption and litter production and decomposition in Scots pine forests in the Pyrenees. The most important papers from my PhD are: 1) The first ecological model to assess long-term sustainability of forest management in Scots pine stands in the Pyrenees (Blanco et al. 2005, For.Ecol.Manage. 213:209-228); 2) The first proof that thinning causes differential effects on nutrient use efficiency depending on local geoclimatic conditions (Blanco et al. 2009, Ecol.Appl. 19:682-698); 3) The first description of differential short-term changes in post-thinning litter decomposition rates depending on site conditions (Blanco et al. 2011, Biogeochem. in press). Then I got MEC and Government of Navarra postdoctoral fellowships to work as a postdoc at the University of British Columbia (Vancouver, Canada). Now I am Instructor of the course FRST 202; Forest Ecology and Research Associate. I have got 4 MITACS research grants. My research lines are: developing protocols to validate forest models, developing stand-level ecological models, modelling long-term ecological consequences of forest management at stand and landscape levels in boreal, temperate and tropical forests, studying potential impacts of atmospheric pollution on forest plantations and assessing the sustainability of traditional and alternative management regimes in Canada, Cuba, China, Spain and USA. The most important papers from my postdoc are: 1) The most comprehensive validation of an ecosystem-level forest model with statistical and ecological tests, showing how different model applications lead to different model calibration and performance requirements (Blanco et al. 2007, Can.J.For.Res. 37, 1808-1820); 2) The first conceptual model of allelopathy at ecosystem scale, with a study case showing the importance of this ecological phenomenon in some forest types and guidelines for modelling allelopathy (Blanco 2007, Ecol.Model. 209, 65-77); 3) The first methodology to assess the performance of weather models in mountainous areas (Lo et al. 2011, Environ.Modell.Softw. 26, 644-657); 4) The first textbook on ecosystem-level models for forest management, research and education (Kimmins et al. 2010, Forecasting Forest Futures, Earthscan Ltd.). I have been involved in technological transfer from academia to industry, government agencies and general public, organizing and teaching 3 technical workshops on forest modelling for management applications in Cuba, China and Spain. I have also collaborated in creating 2 spin-off companies (FORRX Consulting Inc. and DPI Territorial), which specialise in providing support to stakeholders to develop sustainable forest management plans. I have done 6 international research stays. In total, I have 21 SCI papers (4 more under review; 15 as first or contact author), 13 book chapters, 2 books, 34 communications to conferences and 11 technical papers. I have been the opening speaker at the 5th SIMFOR (Cuba 2008) and chaired sessions at the 7th NAFEW (Canada 2007), IUFRO Landscape Ecology Conference (China 2008) and Euroco 2011 (Spain 2011). I am reviewer of 11 SCI journals. My publications have been cited >160 times, with h-index 7.



MINISTERIO
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**SUBPROGRAMA RAMON Y CAJAL
CONVOCATORIA 2011**

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Area: Agricultura

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Título:

Estrategias de lucha contra la desertificación en las Islas Canarias

Resumen de la Memoria:

Canarias es una de las Comunidades Autónomas españolas con mayor superficie con alto riesgo de desertificación. Los ecosistemas y agrosistemas insulares se caracterizan por su fragilidad, lo que les hace extremadamente sensibles a los procesos de degradación ambiental. Además, las actuaciones humanas sobre estos frágiles ecosistemas, junto con las severas limitaciones climáticas, topográficas y edáficas llevan a una disminución progresiva de la potencialidad biológica del suelo. En algunos estudios previos se han citado los principales factores y procesos que pueden generar este fenómeno, tanto los de carácter natural, caso de la erosión hídrica y eólica, como los provocados por la actividad antrópica, especialmente por el riego con aguas de baja calidad (salinas y/o sódicas) junto con sistemas de riego localizado, sobrefertilización, sobrepastoreo, y abandono de los agrosistemas tradicionales. Sin embargo, hasta el momento no se ha abordado el estudio de la significación que tiene cada uno de estos procesos en las diferentes islas, y, en consecuencia no se ha podido plantear una estrategia global para el archipiélago de acciones de lucha contra la desertificación. En este trabajo se trata de analizar conjuntamente todos los procesos definidos, pues algunos de ellos considerados de forma independiente pueden deformar la realidad, por ejemplo el considerar los procesos de erosión sin tener en cuenta los agrosistemas tradicionales conservadores de suelos y aguas, tan abundantes en Canarias. Como resultado de este análisis, cuyos datos quedarán reflejados en una base de datos usando Sistemas de Información Geográfica, se seleccionarán zonas representativas afectadas por los diferentes procesos en las que se propondrán, y en la medida de lo posible se llevarán a cabo, las acciones de rehabilitación que correspondan. Posteriormente se extrapolarán los resultados al conjunto de las zonas de las islas afectadas por estos procesos de degradación y, junto con los datos que se obtengan, se realizará un análisis tendencial, finalmente se planteará la Estrategia de Lucha contra la Desertificación para el archipiélago. Dejamos constancia del interés de la Administración Autonómica, con la que se mantiene una relación estrecha en este ámbito, por este estudio para establecer un Programa Global de actuación. La formación integral del solicitante en los principales aspectos de la investigación favorecerá la misma así como las posibilidades de éxito.

Resumen del Curriculum Vitae:

Licenciado en CC. Biológicas por la Universidad de La Laguna (Islas Canarias) (1996). Comencé mi carrera investigadora en 1996 con una beca de investigación del Departamento de Agroecología del Centro de Ciencias Medioambientales de Madrid para el estudio de modelos no contaminantes alternativos al tratamiento de suelos con bromuro de metilo. En 1998 comencé mis estudios de doctorado en el Departamento de Edafología y Geología de La Universidad de La Laguna tras obtener una beca de Formación de Personal Investigador del Ministerio de Educación y Ciencia. Mi principal área de estudio estuvo relacionada con aspectos de conservación de suelos y agua en sistemas agrícolas tradicionales de las zonas áridas de las Islas Canarias. Presenté mi tesis doctoral en 2004, siendo galardonada con el Premio Extraordinario de Doctorado de La Universidad de La Laguna y con el Premio al Mejor Trabajo de Investigación en Temas Agrícolas otorgado por el Gobierno de Canarias. Los resultados de mi tesis doctoral han sido recogidos en 9 artículos científicos (8 publicados, 1 en preparación) todos ellos incluidos en el Journal Citation Report, siendo en 8 de ellos primer o último firmante. Durante mis estudios de doctorado realicé estancias en los siguiente centros nacionales e internacionales de investigación: Department of Land Resource Science, University of Guelph, Canada; Blaustein Institute for Desert Research, University of the Negev, Israel; Instituto Nacional de Desarrollo Agrario, Cabo Verde; y Departamento de Medio Ambiente y Ciencias del Suelo, Universidad de Lérida. En 2005 fui contratado como investigador por La Universidad de La Laguna con fondos otorgados por el Gobierno de Canarias para la realización del proyecto ¿Diseño para el desarrollo de proyectos de innovación y formación en reciclaje de aguas¿. Resultados de este estudio han sido recogidos en un artículo científico publicado en Catena. En 2006 obtuve una beca postdoctoral del Ministerio de Educación y Ciencia iniciando mi carrera postdoctoral en recursos de suelo y agua en el Departamento de Land, Air and Water Resources de la Universidad de California en Davis. Tras la finalización de mi beca posdoctoral a finales de 2008 fui contratado como investigador por la Universidad de California hasta Abril de 2010. Durante mi estancia postdoctoral desarrollé tres principales líneas de investigación: i) procesos biogeoquímicos en humedales artificiales para el tratamiento de aguas de drenaje agrícola; ii) reutilización de aguas de drenaje agrícola en la producción de cultivos; y iii) factores de formación de suelos en áreas volcánicas activas. Los resultados de estas investigaciones han sido recogidos en 9 publicaciones (7 publicadas, 2 en preparación) de las cuales soy primer autor o autor senior en 8 de ellas. Estos artículos han sido publicados en revistas de alto índice de impacto incluyendo Environmental Science & Technology, Water Research y Agriculture, Ecosystems & Environment. Durante mi postdoctorado realicé colaboraciones con la Universidad de Arizona, Universidad de Fresno y Universidad de Hong Kong. Desde Julio de 2010 disfruto de un contrato de investigación en la Universidad de La Laguna para la realización de una base de datos en formato SIG de la capacidad agrícola de los suelos de la Reserva de Biosfera de la isla de Lanzarote. Estoy acreditado como Profesor Colaborador y Profesor Ayudante Doctor y co-dirijo en la actualidad una tesis doctoral que será defendida en 2011



MINISTERIO
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**SUBPROGRAMA RAMON Y CAJAL
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Título:

Adaptación de la planificación de la gestión forestal al efecto de las perturbaciones de origen abiótico

Resumen de la Memoria:

Mi línea de investigación pretende estudiar la interrelación existente entre la gestión forestal y el riesgo proveniente de perturbaciones de origen abiótico, concentrándome especialmente en el riesgo proveniente de los incendios forestales. Mi principal interés es estudiar los diferentes factores que influyen en la ocurrencia (inicio y propagación) de los incendios forestales, así como el efecto que los incendios tienen en los ecosistemas forestales y en las funciones que estos proveen. Los estudios a realizar para acometer esta tarea deben considerar diferentes escalas espaciales: región, paisaje, rodal y árbol. Un objetivo común de todos los estudios será generar información, que pueda ayudar a desarrollar alternativas de gestión forestal que minimicen las pérdidas debidas a los incendios y/o minimicen la intensidad y tamaño de los propios incendios. Dichas alternativas de gestión, deberán poder ser integradas en la planificación forestal táctica y estratégica, con el fin de maximizar la rentabilidad de la gestión del bosque a medio-largo plazo, respecto a sus funciones económicas, medioambientales y sociales. Más concretamente, las líneas de investigación prioritarias serán: ¿ Estudio de los patrones espacio-temporales de la ocurrencia de incendios, mediante el análisis geo-estadístico de datos históricos de ocurrencia de igniciones y de los fuegos subsiguientes. ¿ Generación de modelos de combustible de estrato arbóreo que sean dependientes de la gestión forestal, mediante la combinación de datos de inventario (3er Inventario forestal nacional), reglas de propagación de fuegos de copa, y experimentación en campo. ¿ Análisis del efecto del fuego en la masa arbórea, tanto en relación a la supervivencia de los árboles afectados, como a la posible variación en el crecimiento de los árboles supervivientes. Para dicho fin se combinarán estudios basados en la comparación de datos del Inventario forestal nacional, y análisis dendrocronológico de muestras de campo (árboles afectados por incendios). ¿ Desarrollo de sistemas que permitan predecir las pérdidas debidas al fuego a nivel de paisaje, de manera espacialmente explícita, basados en la simulación estocástica de incendios (dependientes de la gestión forestal). Para dicha línea pretendo desarrollar un simulador de incendios que utilice los conocimientos adquiridos a través de las dos primeras líneas de trabajo. ¿ Adaptación del conocimiento adquirido a sistemas de planificación adaptativa, teniendo en cuenta el posible efecto debido a cambios en el uso del suelo y clima. Para ello se combinara el simulador de incendios a sistemas de planificación basados en la búsqueda combinatoria de óptimos. Como líneas de investigación secundaria se considerara el estudio de otras perturbaciones que puedan ser integradas en el futuro en la planificación forestal, tales como el viento, la nieve o la erosión. Además se planteara el uso de inventarios forestales espacialmente continuos, a través del manejo de imágenes LIDAR, para mejorar la información espacial en los problemas de planificación de la gestión forestal a nivel de paisaje.

Resumen del Curriculum Vitae:

Dr. José Ramón González Olabarria Nacido en Bilbao el 8 de agosto de 1975.-Ingeniero Técnico Agrícola por la Universidad Pública de Navarra (1998)-Ingeniero de Montes por la universidad de Lérida (2001)-Master en Ciencias Forestales por la universidad de Joensuu, Finlandia (2002)-Doctor en Ciencias Forestales por la Universidad de Joensuu (2006) Hablo, leo y escribo correctamente en español e inglés, con conocimientos en portugués, catalán y euskera. He trabajado como becario en el Instituto Forestal Europeo y como investigador junior en la Universidad de Joensuu (Joensuu, Finlandia). He trabajado en el Centro Tecnológico Forestal de Cataluña desde 2006, los últimos 3 años como investigador Juan de la Cierva. He participado o participo en 7 proyectos de investigación competitivos, incluyendo un proyecto integrado de la unión europea: ¿ EFORWOOD- Tools for Sustainability Impact Assessment of the Forestry Wood Chain¿ EU IP project , , un proyecto singular estratégico del Ministerio de Ciencia e Innovación ¿ Restauración y gestión forestal (PSE-310000-2008-1) ¿, y un proyecto CONSOLIDER ¿ MONTES: Los montes españoles y el cambio global: amenazas y oportunidades (CSD2008-00040)¿. He participado o participo en 5 contratos de investigación, 2 de ellos con la Generalitat de Cataluña en los que he sido el investigador responsable, 2 contratos marco de la comisión europea, y un proyecto CDTI. He publicado 14 artículos de temática forestal en revistas SCI, 8 de ellos como primer autor, y 6 de las publicaciones correspondiendo al año 2010 y primeros meses del 2011. Además tengo otro artículo de primer autor, en prensa (revisadas galeradas), otro aceptado con revisiones menores de coautor, y diversos manuscritos enviados para revisión. También he publicado otros 4 artículos revisados en revistas de reconocido prestigio (no SCI). He participado en 14 congresos científicos He realizado visitas a instituciones científicas extranjeras, siendo las últimas gracias a la concesión de la ayuda de viaje José Castillejo del MICINN. Codirijo la Tesis doctoral de Mari Selkimäki en la Universidad del Este de Finlandia (anteriormente Universidad de Joensuu) Premio al joven científico forestal europeo 2007 (Tim Peck young scientific award 2007) Miembro de la Sociedad Española de Ciencias Forestales, IUFRO, y de la red EFIMED. Docente invitado en la Universidad de Joensuu, Finlandia. Cursos académicos: 2007- 2010 (Curso Metodos de Investigación en Ciencias Forestales, obligatorio, 4 ECTS) Miembro de la acción COST FP1001 y colaborador de la acción COST FP0603 Revisor invitado de artículos en revistas SCI: Ecological Indicators, Journal of Environmental Management, Forest Ecology and Management, Annals of Forest Science, Ecological Modelling, Forest Systems, International Journal of Wildland Fire, Ecological Engineering He participado en la redacción de dos propuestas de proyecto integrado europeo, pendientes de resolución: FP7 IP project FORSCAPES ¿ Forest Management Guidance for Multifunctional Landscapes¿ y FP7 project SCALES ¿ Securing the conservation of biodiversity across administrative levels and spatial, temporal, and ecological scales¿.



Nombre: CANDELA ANTON, HECTOR

Referencia: RYC-2011-09517

Area: Agricultura

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Título:

Biotechnological potential and functional characterization of plant hydathodes

Resumen de la Memoria:

Despite having an enormous agrobiotechnological potential, we know little about the molecular mechanisms that control the function and differentiation of hydathodes in plant leaves. The hydathodes are the glands of guttation and the active secretion of xylem fluid to the plant exterior and in some species they also participate in the reabsorption of water and solutes from the leaf surface, contributing to maintain an appropriate water balance. Some plant pathogens use hydathodes as an entry point for infection, taking advantage of the fact that passive hydathodes connect with the exterior through constitutively open stomata. For instance, *Xanthomonas campestris* enters the leaves of Brassica oleracea through the hydathodes, and the infection subsequently spreads through the xylem. In Brassica, the hydathodes also represent the first line of defense, because they secrete antibiotic agents, such as peroxidases, which inhibit bacterial growth on the leaf surface and cause the lignification of cell walls, helping to arrest the spread of the infection. Antibiotic compounds have been found in guttation fluid from other species, such as barley (*Hordeum vulgare*). Such compounds might be secreted even in the absence of infection, acting in a preventive manner. A group of hydathode cells (the epithem) has specialized for the reabsorption of solutes from the xylem fluid before it is secreted outside the plant, using a mechanism that is distantly reminiscent of animal kidneys. The epithem cells have a lobed surface, large nuclei and abundant mitochondria, and express genes encoding transporters of ions and molecules, such as sulfates, potassium or purines. Transporter proteins might help to generate an osmotic gradient to drive the movement of water. The latter might be the function of some genes that are expressed in hydathodes and participate in starch metabolism. Last, the hydathodes also contribute to the elimination of toxic substances, such as some metals, or excess nitrogen, as suggested by the presence of amino acids in xylem fluid and by the expression in hydathodes of GLUTAMINE DUMPER1, a gene encoding an amino acid transporter. We have previously shown that hydathodes are amenable to genetic dissection. To explore their potential biotechnological impact, I propose to characterize hydathode function and differentiation, with a focus on their agricultural applications. This includes (but is not limited to) identifying the genes that control the number, position and differentiation of hydathodes in plant leaves, their manipulation to optimize water use and to limit pathogen invasion, and their possible use for delivery/uptake of foliar fertilizers. I will use a crop (maize; *Zea mays*) as a model for monocot plants, and will take advantage of *Arabidopsis* as a model for dicot plants, two species for which I have extensive experience.

Resumen del Curriculum Vitae:

I got my BS degree in Biology from the University of Alicante in 1994 (Premio Extraordinario de Licenciatura). I joined the lab of Prof. José Luis Micol (Instituto de Bioingeniería, Universidad Miguel Hernández) with predoctoral fellowships (FPI) from the Valencian Government (1995-1998) and the university (1999-2000). In this period, I carried out research on the genetic basis of vascular patterning and leaf morphogenesis in *Arabidopsis thaliana*. On January 2002, I defended my PhD dissertation, which received the highest grades (Sobresaliente cum laude por unanimidad) and Premio Extraordinario de Doctorado; advisors: Prof. J.L. Micol and Prof. Antonio-Martínez-Laborda). From October 2000 to September 2003 I held a lecturer position (Ayudante de Universidad), which gave me the opportunity to acquire teaching experience in Genetics (more than 500 hours of lecture and laboratory classes). I then joined the laboratory of Prof. Sarah Hake (Plant Gene Expression Center, University of California at Berkeley and US Department of Agriculture) to carry out research on maize genetics. From October 2003 to September 2005, I was funded by a postdoctoral fellowship from the Government of Spain (FPU). From October 2005 to March 2006, I was appointed as a Postdoctoral Scholar Employee at UC-Berkeley. From March 2006 to October 2008, I held a Research Geneticist position of the US Department of Agriculture. In total, I stayed in Berkeley for 61 months. In 2008, I was awarded a Marie Curie International Reintegration Grant (European Commission; 2009-2013; reintegration host: Prof. J.L. Micol) to return to Spain and carry out research on plant development. In January 2009, I joined the Micol lab again with a postdoctoral contract. I have supervised three Master's theses, which were defended in 2010, and I am presently supervising the work of two PhD students in the Micol lab. My research has been presented in 64 posters and oral communications, 31 of which at international conferences. I have participated in 1 research contract and 13 different research grants funded by national and international agencies. I have published 15 articles in the following journals: *Developmental Biology*, *Genetics*, *The International Journal of Developmental Biology* (twice), *Plant Physiology* (twice), *Development*, *Plant Signaling and Behavior*, *Nature Reviews Genetics*, *The Plant Cell*, *Current Opinion in Plant Biology*, *Trends in Genetics*, *Genesis*, *Plant and Cell Physiology*, and *Trends in Plant Science*. All but one of these journals have SCI impact factor. Most of these journals are in the first quartile of their categories. I have also peer reviewed manuscripts for *Plant Cell*, *Planta*, *Plant Physiology*, *Cell Research*, and *The International Journal of Developmental Biology*. I was a member of the local organizing committee in an international workshop (*Plant Growth Biology and Modeling* 2009). I am a member of the scientific committee and the local organizing committee of the *Plant Growth Biology and Modeling* 2011 workshop (<http://pgbm2011.umh.es>). I have been positively evaluated by ANECA for academic positions (Profesor Contratado Doctor and Ayudante Doctor) and, in the last years, I have taught some genetics, genomics and bioinformatics classes in the Master en Bioingeniería (Universidad Miguel Hernández).



Nombre: SIMON DE GOÑI, OIHANE

Referencia: RYC-2011-07689

Area: Agricultura

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Título:

Integration of baculovirus-based insecticides as components of biorational pest management programs in horticultural production in greenhouses

Resumen de la Memoria:

The development of resistance to commonly used pesticides in combination with recent European legislation and public concerns regarding insecticide residues in food have led many horticultural farmers in Almeria (southern Spain) to adopt biological control as the principal strategy of pest control in greenhouse crops. Highly effective natural enemies are available for the control of many greenhouse pests but a number of lepidopteran species, specifically *Spodoptera exigua*, *Helicoverpa armigera* and *Chrysodeixis chalcites* have proven difficult to control and the presence of insect natural enemies and pollinators in the greenhouse environment severely limits the use of all but the most selective of phytosanitary products. Insect baculoviruses (BVs) are effective and highly selective insecticides for the control of lepidopteran pests. This project aims to understand the interactions of BV-based insecticides with key biological and chemical components of integrated pest management programmes based around biorational products in greenhouse agroecosystems in Almeria, with the aim of optimizing the use of these biopesticides in effective and sustainable pest management programs. For this, a series of studies will be performed in the laboratory and greenhouse crops in order to clone and identify unique BV genotypes that could play important roles in determining the pathogenicity and virulence of novel BV-based insecticides. Other facets of the study will include (i) the identification of compounds, such as stilbene derivatives and enhancer proteins, that can be used in developing BV formulations with improved efficacy and persistence on the crop, and (ii) the identification of juvenile hormone analogues that can be effectively employed to increase the efficiency of the mass-production of virus insecticides. Economic thresholds and treatment thresholds will be determined using established models based on crop infestation and yield reduction, with the objective of establishing appropriate grower guidelines as to when and how frequently to apply BV-based control measures. Similarly, the effects of BV-based control on target and non-target species, including interactions with insect natural enemies and with biorational phytosanitary products (imidacloprid, indoxacarb, spinosad, neem, *Bacillus thuringiensis*, etc.) commonly used in greenhouse production will be determined with the aim of defining key areas of potential incompatibility or improved levels of pest control. Taken together, these studies potential to markedly extend the use of integrated systems of pest control with corresponding benefits in the sustainability of pest control strategies and a reduction in xenobiotic residues in Almerian horticultural crops.

Resumen del Curriculum Vitae:

I obtained my first degree specializing in Agricultural and Environmental Biology from the University of Navarre in 1999. I then joined the Agricultural Entomology and Pathology of Insects Group in the Public University of Navarre (UPNA) under the supervision of Prof. P. Caballero, working on the development of insect pathogens as biological insecticides. In 2000 I was awarded a Ministry of Education and Science (MEC) scholarship to conduct my doctoral thesis that involved the characterization of the *Spodoptera frugiperda* multiple nucleopolyhedrovirus, that infects *S. frugiperda*, the most important pest of maize and sorghum in Mesoamerica, with the aim of developing it as a biopesticide. An additional MEC grant allowed me to spend two 6-month periods at the Station de Recherches de Pathologie Comparée, INRA, France, under the supervision of Dr. M. López-Ferber where I acquired a range of skills in molecular biology methods applied to insect pathogens. I obtained my doctoral degree in 2004 under the European Doctoral Thesis model, and after that I spent again 7-months period at the INRA. The UPNA then awarded me a post-doctoral position to continue research on the structure and function of baculovirus populations and I subsequently joined Prof. R.D. Possee's group at the Centre for Ecology particularly those related to the insecticidal characteristics and transmission of these viruses. I also studied the role of persistent infections in virus survival and transmission. In 2007 I returned to UPNA as an Assistant Professor (Prof. Ayudante Doctor) where I taught various courses in the Agricultural Engineer and Agricultural Technician degrees. During this period I took advantage of the José Castillejo Programme to spend periods in two prestigious international laboratories: Great Lakes Forestry Centre (Sault St Marie, Canada) and Centre Nationale de la Recherche Scientifique (CNRS, France). In 2009 I joined the Microbial Bioinsecticides group at the Agrobiotechnology Institute (CSIC, Mutilva Baja) with a JAE-Doc contract. I should highlight that my salary as a researcher has always been defrayed by an ample array of competitive grants (pre-doctoral, post-doctoral, mobility grants and post-doctoral contracts). I have a total of 16 international publications of which I am the first author in 11; all are in indexed journals and 75% of these are in the top 25% rated journals in their area (as determined by impact factor), with a total of 120 citations to date. I have supervised 9 Masters theses and am currently supervising 3 doctoral students. I have collaborated in teaching several courses in the Masters programme. Overall, I have participated in 8 national and international research projects and have been the head researcher of three of them. I have participated in 6 projects of special relevance to commercial companies. I am the author of 29 contributions in international congresses and 13 in national congresses. I have also been a member of various doctoral thesis examining boards. I was invited to participate in an international jury to evaluate presentations and posters at the Annual Society for Invertebrate Pathology Meeting, Warwick, UK in 2008. Finally, I have been approved to hold the position of Doctor Contracted Professor by the ANECA.



Nombre: GRIMPLET, JEROME

Referencia: RYC-2011-07791

Area: Agricultura

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Título:

Understanding the integration of grapevine within the environment through systems biology

Resumen de la Memoria:

The quality of the grape berry depends on local microclimatic factors and trophic and hormonal exchanges of the berry with the other organs of the plant, these exchanges depend themselves on the macro-environment. This metabolic flexibility is part of a comprehensive phenotypic and genetic plasticity that can be deciphered by systems biology approaches. The major scientific challenge for grapevines and other species is to mobilize the tools, data and knowledge to reach a comprehensive understanding of integrated physiology of living organisms in order to apprehend the response to environment (biotic and abiotic) and valorize good viticulture practices. Apart from its economical importance, the grapevine is particularly suited for these approaches. It is considered as the model species for woody and fruit plants since major programs in grapevine genomics have been carried out, including the sequencing of the genome and the developing of high throughput analytical tools. Platforms are available for high throughput transcriptomics, proteomics, metabolomics, phenotyping and genotyping. The objective of the proposed research topic is to develop and strengthen integrative approaches that seek a broad understanding of genetic variation in plant development and environment response. The aim is to provide information for viticulture management and breeding programs. I will develop tools for the integrated interpretation of data from multiple sources (RNA, proteins, metabolites, phenotypes, genotypes) generated by high-throughput strategies. The first objective is to provide a high-quality functional annotation of the genes through the international committee for the functional annotation of the grapevine genome that I am co-chairing. Then it will be necessary to develop a platform centralizing the available information on the grapevine molecular mechanisms that will feature integrated data, regrouping functional annotation of the molecules, their genetic variation and their pattern of expression within different conditions. In the meantime several approaches will be carried out for new gene functions discoveries based on data integration.

Resumen del Curriculum Vitae:

I spent most of my career working on topics related to fruit crops quality, mostly grapes and apricots using functional genomics and bioinformatics approaches. I started to develop my interest in cognitive approaches and data processing during my master degree at INRA Montpellier with Dr Gil Morrot. I acquired knowledge of bioinformatics tools and the physiology of fruit development during my PhD (2001-2004) that I realized at INRA Montpellier under the direction of Dr. Nancy Terrier. The topic was the identification of quality molecular markers of apricot fruit through genomics. Since my postdoctoral experiences, I'm definitely interested in the overall physiology of the plant through the main topics of the laboratories where I worked (response to water stress, cold hardiness, reproductive development), having more and more interests into developing integrated approaches. From 2005 to 2007, I worked as a post doctoral researcher (NSF grant) in Pr. John Cushman laboratory at the University Nevada Reno, my main interest was the molecular behavior of the grape berry tissues during ripening and water stress. From 2007 to 2009, I was a post doctoral fellow (NSF grant) in Pr. Anne Fennell laboratory at the South Dakota State University. My main interest was to develop system biology tools for the grapevine and the molecular mechanism of bud dormancy and cold hardiness. Since 2009, I am a post doctoral fellow (JAE-DOC, CSIC) in the Instituto de Ciencias de la Vid y del Vino with Pr. José-Miguel Martínez-Zapater. I am continuing to develop system biology approaches to grapevine. I am also developing collaboration with the main grapevine genomics laboratories in the US, France and Italy, in particular by being appointed by the International Grape Genome Project to lead the Grapevine Annotation Committee. I am also currently working on topics related to flowering or resistance to pathogens. Bibliometrics: 17 research articles (16 SCI with IF>1; Median IF: 3.8, Mean IF 3.5), 5 book chapters. Total citations: 393. H index: 10. Cites/ paper: 18.7. Cites/ SCI article: 24.4. Oral communications in congress: 34.



Nombre: CASALS TORTRAS, PERE

Referencia: RYC-2011-09489

Area: Agricultura

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Título:

Gestión multifuncional de formaciones arbustivas en un contexto de cambio global

Resumen de la Memoria:

Las formaciones arbustivas, ya sea como comunidades secundarias o bajo cubierta arbórea, dominan gran parte del paisaje forestal. La proliferación de arbustos conlleva una disminución de un posible aprovechamiento pastoral y un aumento del riesgo de incendio. Además, el estrato arbustivo bajo arbolado ha sido tradicionalmente gestionado para disminuir la competencia por el agua y los nutrientes con el arbolado o el riesgo de incendios de copa. En general las formaciones arbustivas tienen un escaso valor económico; sin embargo, en un contexto de crisis económica, ganan interés ya sea como complemento forrajero en ganadería extensiva o como biomasa para uso energético. Además, tienen un valor ecológico fundamental como, por ejemplo, sumideros de C, para la conservación de la biodiversidad o prevención de la erosión. Así, el interés por una gestión multifuncional de estas formaciones es evidente. La roza con maquinaria o fuegos controlados, seguidos o no de pastoreo, constituyen los instrumentos más frecuentemente utilizados para la gestión de las formaciones arbustivas. Esta investigación tiene como finalidad contribuir al conocimiento y a la provisión de instrumentos para el proceso de decisión de la técnica (o combinación de técnicas), más adecuada para la gestión de formaciones arbustivas. El objetivo general es conocer la respuesta de los arbustos a las perturbaciones causadas por los manejos citados y los efectos de ellas sobre el funcionamiento del ecosistema. Específicamente, esta investigación pretende:- Analizar los mecanismos determinantes de la respuesta de distintos tipos funcionales de arbustos a distintos manejos- Conocer las ventajas e inconvenientes de los posibles manejos de distintos tipos de formaciones arbustivas- Estimar el efecto de las distintas prácticas sobre el funcionamiento del ecosistema, incluyendo la fertilidad del suelo y el valor pastoral- Definir los procesos clave en la modelización de los cambios a nivel de planta y de rodal asociados a distintos tipos de gestión. Para ello, esta investigación se centra en dos líneas interconectadas. La primera tiene como objetivo entender, a nivel de planta, los mecanismos subyacentes a la respuesta de los arbustos frente a distintas estrategias de manejo. La segunda pretende determinar los efectos de las distintas gestiones sobre la estructura y composición de la vegetación, su valor pastoral, la fertilidad del suelo y los ciclos del C y N. Ambas líneas se abordarán a través del monitoreo a nivel de planta y de rodal de experimentos con gestiones contrastadas, donde el tipo de manejo y el momento de la actuación en relación a la fisiología de la especie clave, serán factores determinantes. Estos experimentos se complementarán con análisis detallados de bases de datos existentes y nuevos muestreos. Toda la información recogida conjuntamente con la ya existente se integrará mediante modelos con el fin de predecir los resultados de diferentes estrategias de gestión.

Resumen del Curriculum Vitae:

Mi actividad investigadora se ha centrado, en los últimos quince años, en las interacciones suelo-planta en bosques y pastos, y su relación con el cambio climático y de uso del suelo. Los estudios realizados, mayoritariamente basados en experimentos de campo, han analizado el efecto de los fuegos controlados o el pastoreo sobre el ciclo de los nutrientes, los sumideros de C orgánico o la dinámica de la vegetación. Durante este tiempo he coordinado numerosos experimentos de campo y trabajos de laboratorio, he sido el responsable de proyectos de transferencia, coordinado un proyecto de investigación nacional (VULCA, CGL2005-08133-CO3/CLI) y, actualmente, soy el investigador principal de dos proyectos internacionales (GHG-Europe, FP7-Env-2009-1; SILPAS, Research Council of Norway, Envir. 2015 programme). Además he dirigido un estudiante de doctorado (F. Montané, 11/2/2010, Univ. Barcelona -UB), dos estudiantes de masters (Enita-Clermont; CATIE) y tres proyectos final de carrera. He participado como examinador de tres masters (CATIE-Costa Rica; Enita-Clermont; U. Melbourne-Australia). Actualmente soy el director de una tesis doctoral en curso (López-Sangil, UB). Hasta la fecha he participado en la preparación y publicación de 23 artículos incluidos en el Journal Citation Report, mayoritariamente en el primer cuartil de las categorías de Suelo y Ciencias Ambientales, y dos capítulos de libro; tengo 4 manuscritos en revisión, 5 artículos en revistas no indexadas, 10 comunicaciones en actas revisadas de congresos, 4 artículos divulgativos y 29 presentaciones en congresos nacionales e internacionales. He revisado artículos en revistas científicas (Agroforestry Systems; Annals of Forest Science; Acta Oecologica; European J. of Forest Research; Soil Biology and Biochemistry, Plant and Soil) y 16 proyectos de investigación nacionales. En mi trayectoria científica se pueden diferenciar dos líneas de investigación (i) efectos de los fuegos controlados en las relaciones planta-suelo y (ii) efectos del cambio climático y del abandono en los ciclos biogeoquímicos de C y N; líneas que convergen en una nueva área de interés que pretende contribuir a analizar el papel de la gestión silvopastoral en un contexto de cambio climático y de uso del suelo.