CENTRO DE BIOTECNOLOGÍA Y GENÓMICA DE PLANTAS
UPM-INIA (CBGP)
Parque Científico y Tecnológico de la UPM
Campus de Montegancedo, Autopista M-40, Km 38
Pozuelo de Alarcón, 28223 Madrid

POSTDOCTORAL RESEARCHER OFFER
SWEETMUNITY PROJECT
(*Juan de la Cierva Fellow Call of the Spanish Research Agency*)

The "Plant Innate Immunity and Resistance to Necrotrophic Fungi Research Group" at CBGP (UPM-INIA) is seeking for a motivated **Postdoctoral Researcher to work in the project *SWEETMUNITY***: *Deciphering the structural and molecular bases of glycans perception by the innate immune system of plants: from glycans recognition to modulation of plant immune responses and disease resistance.*

SWEETMUNITY: Plants and animals have evolutionary developed a repertoire of monitoring systems to sense carbohydrate-based structures (glycans) derived either from the cell walls of microorganisms (non-self-glycans) they are exposed to, or from glycan self-structures that are released from plant cell walls or animal extracellular matrixes upon tissue damaged caused by pathogens or injury. These non-self and self-glycan ligands (Pathogen- and Damaged-Associated Molecular Patterns (PAMPs/DAMPs), respectively) are perceived by specific plasma-membrane anchored receptors (e.g. Toll-like Receptors (TLRs) from mammals or Pattern Recognition Receptors (PRRs) from plants), that upon binding trigger immune responses leading to disease resistance or anti-inflammatory responses. Our current understanding of the structural and molecular bases of glycans recognition by TLRs/PRRs is very scarce. In this project we intend to characterize the bases of this receptor/glycan recognition by combining *in silico*, i*n vitro* and *in vivo* approaches. The results of these project will provide unprecedented structural data on glycan/receptor recognition and the bases for the rational design of novel glycan-based biologicals (glycol-mimetics) that will be more efficient in the activation of the immune system of plants (crops), contributing to the generation of novel immunomodulators to develop a more sustainable agricultural. The Group of Dr. Molina is internationally recognized by its contributions to the characterization of cell walls (plant and microorganisms) function in the regulation of plant/crops immunity. The postdoctoral researcher will integrate in a multidisciplinary group with expertise in different aspects of plant immunity and crop resistance to pathogens. This group has recognized experienced in Translational Biology and has identified, patented and commercialized several glycoligands that regulate crop protection.

Job profile description of the Postdoctoral Researcher (R2-R3) offered: Very motivated Postdoctoral Reseracher that preferentially should have expertise in biochemical and structural characterization of cell walls of plants and associated microorganisms, including purification of specific cell wall structures (glycans) from fungi/oomycete (Molecular Associated Molecular Patterns, MAMPs) or plants (Damage Associated Molecular Patterns, DAMPs), that modulate immune responses. Expertise in the characterization of the mechanism of plant recognition of cell wall derived DAMPs and MAMPs, activation of immune responses and resistance to pathogens will be valuable, but not fully required. The researcher will use molecular, biochemical and genetic approaches (e.g. Arabidopsis mutant screenings) to identify genes encoding Pattern Recognition Receptors (PRRs) perceiving glycoligands (already characterized or to be identify in the frame of the project) and their mode of action and potential activity in crops. The Postdoctoral researcher will have the opportunity to interact with several collaborators of Dr. Molina group with expertise in mammal immunity regulated by glycoligands, *in silico* synthesis of glycoligands, and structural biology of PRRs.

**R2 (Recognised Researcher): PhD holders or equivalent who are not yet fully independent; R3 (Established Researcher): Researchers who have developed a level of independence)*

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Contact Person and Deadline for application (*send CV and motivation letter*)

Principal Investigator: Dr. Antonio Molina

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Deadline for application: January 25th 2022

Information about the Juan de la Cierva (JdC) Fellow Program of the Spanish Research Agency:

https://www.aei.gob.es/en/announcements/announcements-finder/ayudas-contratos-juan-cierva-formacion-2021

Recent Publications of the Group related with the Postdoctoral Position:

- Molina, A*., Miedes, E., Bacete,:, Rodriguez, T., Mélida, H., Denancé, N., Sánchez-Vallet, A., Rivière, M.P., López, G., Freydier, A., Barlet, X., Pattathil, S., Hahn, M., Goffner D. (2021). Arabidopsis cell wall composition determines disease resistance specificity and fitness. **Proced. Natl Acad. Sci. USA (PNAS),** 118(5):e2010243118.
- Rebaque, D., del Hierro, I., Lopez, G. Bacete, L., Vilaplana, F., Dallabernardina, P., Pfrengle, F., Jordá, L., Sanchez-Vallet, A., Pérez, R., Brunner, F, Molina, A.*, Mélida, H.* (2021). Cell wall-derived mixed-linked β-1,3/1,4-glucans trigger immune responses and disease resistance in plants. **The Plant Journa**l, 106:601-615
- Del Hierro, I., Mélida, H., Broyart, C., Santiaago, J and Molina, A. (2020) *Computational prediction method to decipher receptor-glycoligand interactions in plant immunity.* ***The Plant Journal*** DOI: 10.1111/tpj.15133 (***in press***).
- Téllez J, Muñoz-Barrios A, Sopeña-Torres S, Martín-Forero AF, Ortega A, Pérez R, Sanz Y, Borja M, de Marcos A, Nicolas M, Jahrmann T, Mena M, Jordá L, Molina A. (2020). *YODA Kinase Controls a Novel Immune Pathway of Tomato Conferring Enhanced Disease Resistance to the Bacterium Pseudomonas syringae.* ***Front Plant Sci.*** 11:584471.
- Mélida, H, Bacete, L., Ruprecht, C., Rebaque, D., Del Hierro, I., López, G., Brunner, F., Pfrengle F and Molina A. (2020). *Arabinoxylan-oligosaccharides act as Damage Associated Molecular Patterns in plants regulating disease resistance*. ***Frontiers in Plant Science,*** 11, 1210.
- Molina, A., Miedes, E., Bacete,, Rodriguez, T., Mélida, H., Denancé, N., Sánchez-Vallet, A., Rivière, M.P., López, G., Freydier, A., Barlet, X., Pattathil, S., Hahn, M., Goffner D. (2020). *Arabidopsis cell wall composition determines disease resistance specificity and fitness.* ***bioRxiv 2020.05.21.105650.***
- Bacete, L., Mélida, H., López, G., Dabos, P., Tremousaygue, D., Denancé, N., Miedes, E., Bulone, V. Goffner, D., Molina, A. (2020). *Arabidopsis Response Regulator 6 (ARR6) modulates plant cell wall composition and disease resistance.* ***Molecular Plant Microbe Interactions*** 33:767-780.
- Escudero, V., Torres, M.A. Delgado, M., Sopeña-Torres, S., Swami, S., Morales, J., Muñoz-Barrios, A., Mélida, H., Jones, A.M., Jordá, L., Molina, A. (2019). *Mitogen-Activated Protein Kinase Phosphatase 1 (MKP1) Negatively Regulates the Production of Reactive Oxygen Species During Arabidopsis Immune Responses.* ***Molecular Plant Microbe Interactions***, 32:464-478.
- Sopeña-Torres, S., Jordá, L., Sanchez-Rodriguez. C,, Miedes, E., Escudero, V., Swami, S., López, G., Piślewska-Bednarek, M., Lassowskat, I., Lee, J., Gu, Y., Haigis, S., Alexander, D., Pattathil, S., Muñoz-Barrios, A., Bednarek, P., Somerville, S., Schulze-Lefert, P., Hahn, M.G,, Scheel, D., Molina, A. (2018). *YODA MAP3K kinase regulates plant immune responses conferring broad-spectrum disease resistance*. ***New Phytologist,*** 2: 661-680.
- Mélida H, Sopeña-Torres S, Bacete L, Garrido-Arandia M, Jordá L, López G, Muñoz-Barrios A, Pacios L.F., and Molina A. (2018). Non-branched β-1,3-glucan oligosaccharides trigger immune responses in Arabidopsis. ***The Plant Journal,*** 93: 34-49.
- Bacete L, Mélida H, Miedes E and Molina A (2018). Plant cell wall-mediated immunity: cell wall changes trigger disease resistance responses. ***The Plant Journal,*** 93: 614-636.