



POLITÉCNICA



E.T.S. DE INGENIERÍA AGRONÓMICA,
ALIMENTARIA Y DE BIOSISTEMAS

Título de las prácticas (Title of the internship):

Discovery and characterization of genomic fragments from wild species in the tomato genome

Descripción de las funciones del alumno (Description of the student's tasks)

During the 1940s, improvement and diversification of the tomato crop started using tomato wild species as source of novel genes and alleles that gave tomato new resistances or fruit characteristics. To bring in these new genes, tomato was crossed with wild tomato species in a backcrossing scheme that removed as much as possible of the wild genome without removing the target gene.

With the availability of genome sequences for hundreds of tomato accessions, we can recognize wild introgressions in the tomato genome. We observe introgressions that occupy up to 75% of the chromosome; or residual fragments with no known utility likely forgotten due to incomplete backcrossing programs. Foreign introgressions have been shown to have a deleterious effect in plant genomes, reducing recombination, bringing undesirable alleles through linkage drag and modifying global patterns of gene expression and methylation. In this project we will catalogue the presence of wild introgressions in the tomato genome and study their effect in genomic features such as recombination or expression.

This will require two students:

One student will be responsible to design a method to detect introgressions in the tomato genome, and to define their location and their properties (size, gene content, collinearity, species of origin, frequency in modern tomatoes, etc.).

Another student will study the effect of wild introgressions in recombination and global gene expression.

All tasks in this proposal are exclusively bioinformatic, and all necessary data is already present in the host lab or available in public databases. All activities will be performed at the Centro de Biotecnología y Genómica de Plantas (CBGP), UPM-INIA-CSIC.



Requisitos (Prerequisites): *(indicar titulación y curso) (give Grade and academic year); otros requisitos adicionales (idiomas, informática, otros conocimientos, etc) (other additional prerequisites (languages, informatics, other knowledge, etc))*

Experience with programming in R and Bash is mandatory. Familiarity with Python OR Perl is necessary. Good command of English is advisable.

Proyecto formativo (Training Project)

Module EXTERNAL PRACTICES. The fundamental goal of the external practices is to guide the student in applying his previously acquired knowledge to real tasks in a group work environment that realistically represents the work conditions the students will encounter in their future roles. In this way, the student will be able to get familiar with a working environment (work schedule, responsibility, attitude, organization, etc.), and with the adequate working methodology in professional reality, contrasting and applying the acquired academic knowledge.

Actividades a desarrollar en la práctica académica (Activities that will be performed in the academic internship):

1. Cataloguing the existence of wild introgressions in the tomato genome.
 - The student will learn parameters of evolutionary biology and will be trying 3 different software to detect introgressions and comparing their results.
 - The student will determine introgression properties like location, size, gene content, collinearity, species of origin, frequency in modern tomatoes, etc.
2. Study the effect of wild introgressions in the tomato genome
 - The student will calculate recombination inside and outside wild introgressions for 95 molecular markers in more than 2500 F2 tomato plants.
 - The student will identify modulators of expression inside wild introgressions in RNA-seq data from more than 300 tomato accessions.

Nº de plazas: (Nr. of places)	2
¿El alumno tendrá trato habitual	NO



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con menores? (Has the student dealings with underage persons?)	
Fecha de inicio: (Starting date)	01/11/2023
Fecha de fin: (End date)	31/05/2024 (up to 280h)
Horas semanales: (Weekly hours)	20
Horario jornada laboral: (Working hours)	Flexible
Importe Ayuda/Bolsa de estudio: (Amount of fellowship / remuneration)	€/mes
Tutor académico: (Academic tutor (UPM)) Email:	Julio Isidro Sanchez <i>j.isidro@upm.es</i>
Departamento tutor académico: (Dept. of academic tutor)	Centro de Biotecnología y genómica de Plantas
Tutor empresa:	José M Jiménez-Gómez



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**E.T.S. DE INGENIERÍA AGRONÓMICA,
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(External tutor)	
Email tutor empresa: (Email external tutor)	jose.jimenez.gomez@csic.es
Departamento tutor empresa: (Dept. of external tutor)	Department of Computational Systems Biology And Genomics (CsBGP)
Ubicación de la estancia de las prácticas (Location of the internship)	Centro de Biotecnología y Genómica de Plantas (CBGP), UPM- INIA-CSIC
ENTIDAD COLABORADORA: (Collaborating Entity)	UPM
A cumplimentar por Oficina Prácticas ETSIAAB: Créditos a reconocer (Nº ECTS):	

Enviar por email a: OFICINA DE PRÁCTICAS ACADÉMICAS EXTERNAS – ETSIAAB
secretaria.pei.etsiaab@upm.es – Secretarías: Visitación Pérez / Susana Pardo - Tfno: 913363686)