



Offre n°2025-08745

Post-Doctoral Research Visit F/M Inference of a demo-genetic model for sustainable plant resistance

Type de contrat : Fixed-term contract

Niveau de diplôme exigé : PhD or equivalent

Fonction : Post-Doctoral Research Visit

A propos du centre ou de la direction fonctionnelle

The Inria centre at Université Côte d'Azur includes 42 research teams and 9 support services. The centre's staff (about 500 people) is made up of scientists of different nationalities, engineers, technicians and administrative staff. The teams are mainly located on the university campuses of Sophia Antipolis and Nice as well as Montpellier, in close collaboration with research and higher education laboratories and establishments (Université Côte d'Azur, CNRS, INRAE, INSERM ...), but also with the regional economic players.

With a presence in the fields of computational neuroscience and biology, data science and modeling, software engineering and certification, as well as collaborative robotics, the Inria Centre at Université Côte d'Azur is a major player in terms of scientific excellence through its results and collaborations at both European and international levels.

Contexte et atouts du poste

This postdoctoral position is funded by the ANR (French National Research Agency) [ENDURANCE](#) *ENhanced DURability AgaiNst Crop Enemies* project,

which brings together partners from INRAE and Inria. This interdisciplinary project combines molecular biology, population genetics, and epidemiological modelling, to determine optimal deployment strategies for plant resistance.

The postdoctoral fellow will join the [MACBES](#) team (Inria, INRAE, CNRS, Université Côte d'Azur) in Sophia Antipolis and will closely collaborate with [Suzanne Touzeau](#) (MACBES & M2P2 teams) and **Florence Carpentier** (AgroParisTech & MaIAGE, INRAE) based near Paris.

The postdoctoral fellow will interact with other ENDURANCE partners and the [M2P2](#) team at ISA (INRAE, CNRS & Université Côte d'Azur).

Mission confiée

Crop protection often remains dependent on chemical pesticides, which are both harmful for the environment and human health. Resistant crops are an agroecological alternative to pesticides, but their extensive use may lead to the emergence/selection of virulent pathogens and resistance breakdown. Devising deployment strategies of resistant crops that are both efficient, i.e. that reduce crop damages, and durable, i.e. that limit the virulent pathogen populations, is hence a major issue.

The postdoctoral fellow will tackle this issue by means of a demo-genetic model, tailored for a specific pathosystem, the phoma stem canker of oilseed rape caused by fungus *Leptosphaeria maculans*. The emergence and development of virulent pathogens may vary according to the genetic determinisms of virulence (molecular mechanisms responsible for the transition to virulence, epistatic interactions, fitness costs), which are studied by other partners of the ENDURANCE project.

The work will be **based on**:

- time-series data of (i) phoma populations and resistance breakdowns, as well as (ii) resistance deployment in oilseed rape crops;
- a stochastic, discrete-time epidemiological model of an haploid monocyclic fungal pathogen, which includes features of the oilseed rape stem canker, such as interactions between resistance and avirulence genes;
- the corresponding C++ code.

The **objectives** of this position are threefold:

1. adapt the model to take into account migration, mutation, and pathotype-dependent virulence costs, based on recent advances in the genetic determinisms of virulence;
2. develop a method to estimate model parameters from historical data, in order to gain deeper insights into the observed dynamics of resistance breakdown;
3. devise durable strategies for the deployment of multiple resistances.

Principales activités

Generic activities include: literature review, data processing, reporting, paper writing, participation and presentation in project meetings and in relevant conferences.

Specific activities include:

- dynamical model development,
- programming and numerical simulations (using a computing cluster),
- inference based on simulations (ABC-like method),
- numerical exploration (sensitivity analysis) and optimisation.

Compétences

- Background in population dynamics and/or population genetics.
- Expertise in inference and/or optimisation.
- Experience in programming, preferably in C++.
- Knowledge of plant epidemiology would be a plus.
- Proficiency in written and spoken English.

Avantages

- Subsidized meals
- Partial reimbursement of public transport costs
- Leave: 7 weeks of annual leave + 10 extra days off due to RTT (statutory reduction in working hours) + possibility of exceptional leave (sick children, moving home, etc.)
- Possibility of teleworking and flexible organization of working hours
- Professional equipment available (videoconferencing, loan of computer equipment, etc.)
- Social, cultural and sports events and activities
- Access to vocational training
- Contribution to mutual insurance (subject to conditions)

Rémunération

2788 € per month

Informations générales

- **Thème/Domaine** : Modeling and Control for Life Sciences
- **Ville** : Sophia Antipolis
- **Centre Inria** : [Centre Inria d'Université Côte d'Azur](#)
- **Date de prise de fonction souhaitée** : 2025-08-01
- **Durée de contrat** : 1 year, 6 months
- **Date limite pour postuler** : 2025-05-31

Contacts

- **Équipe Inria** : [MACBES](#)
- **Recruteur** :
Touzeau Suzanne / suzanne.touzeau@inria.fr

A propos d'Inria

Inria est l'institut national de recherche dédié aux sciences et technologies du numérique. Il emploie 2600 personnes. Ses 215 équipes-projets agiles, en général communes avec des partenaires académiques, impliquent plus de 3900 scientifiques pour relever les défis du numérique, souvent à l'interface d'autres disciplines. L'institut fait appel à de nombreux talents dans plus d'une quarantaine de métiers différents. 900 personnels d'appui à la recherche et à l'innovation contribuent à faire émerger et grandir des projets scientifiques ou entrepreneuriaux qui impactent le monde. Inria travaille avec de nombreuses entreprises et a accompagné la création de plus de 200 start-up. L'institut s'efforce ainsi de répondre aux enjeux de la transformation numérique de la science, de la société et de l'économie.

L'essentiel pour réussir

- Expertise in simulation-based inference.
- Modelling skills in population dynamics or population genetics.
- Marked interest in biological applications and motivation for interdisciplinary work.
- Good communication skills to ensure a smooth collaboration with Florence Carpentier.

Attention: Les candidatures doivent être déposées en ligne sur le site Inria. Le traitement des candidatures adressées par d'autres canaux n'est pas garanti.

Consignes pour postuler

Sécurité défense :

Ce poste est susceptible d'être affecté dans une zone à régime restrictif (ZRR), telle que définie dans le décret n°2011-1425 relatif à la protection du potentiel scientifique et technique de la nation (PPST). L'autorisation d'accès à une zone est délivrée par le chef d'établissement, après avis ministériel favorable, tel que défini dans l'arrêté du 03 juillet 2012, relatif à la PPST. Un avis ministériel défavorable pour un poste affecté dans une ZRR aurait pour conséquence l'annulation du recrutement.

Politique de recrutement :

Dans le cadre de sa politique diversité, tous les postes Inria sont accessibles aux personnes en situation de handicap.