**M2 internship (2024) title :** Evaluation of production methods to control damage due to late spring frost in fruit trees

*Key words :*

*Fruit trees, apricot, late spring frost, agronomy, tree physiology*

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| **Host organization** | |
| Lab | **Unité de Pathologie Végétale (Mistral team**) : https://www6.paca.inrae.fr/pathologie\_vegetale/ |
| **Intership subject** | |
| Context | The spring frost of 2021 in France - the biggest in Western Europe since 1947 - was the latest reminder of the growing risk of extreme weather events with devastating consequences for agricultural production. The changes in temperature patterns that are expected to accompany ongoing climate change will contribute to increasing plant vulnerability to frost, while the probability of frosts will remain high. As a result, the incidence of frost damage is set to increase over the coming decades. For example, the apricot industry has lost 70% of its production due to frost, resulting in major economic  Unfortunately, agronomic practices to protect plants remain fairlylimited and often with relatively low efficiency.  One technique used to combat the emergence of a disease (moniliosis) is flower thinning. This practice offers many advantages, in particular the production of fewer but larger fruit, providing better performance. On the other hand, growers are still reluctant to use it because with late spring frosts, the risk of losing all production is high (since the number of fruits is smaller). There is a need to know whether these larger fruits are also more resistant to frost to encourage growers to use this technique. It this technique proves effective, it could be a part of a very short-term solution to frost damage. |
| Aims | The aim is to test different agronomic approaches on the frost resistance of apricot trees. The various methods tested will be : the effect of flower thinning (the reduction in the number of flowers, and therefore of fruits, allows for greater fruit size, and the hypothesis tested is the greater frost resistance of these fruits), the application of various antifreeze products and the effect of an anti-hail protection net (would protect against extreme temperatures).  All these techniques will be tested in an experimental orchard on the INRAE Gotheron site near Valence, France. Some of the experiments will also take place under controlled conditions at INRAE Avignon, unité de Pathologie Végétale. |
| Date et durée du stage | Beginning : February 2024  6 months |
| Location | * INRAE Avignon, domaine de Saint-Maurice. UR Pathologie Végétale |
| Activités attendues | * Contribute to the development of an experimental device in the field (apricot orchard) * Compare the effect of frost on various modalities: flower thinning method, effect of an anti-hail protection net, effect of antifreeze products * Measurement of various physiological parameters : young fruits size, frost necrosis * Installation of various equipment in the field : temperature recording etc. * Measurements in the lab (simulate frost episodes on plant material) * Analyze and interpret results. * Write a report. |
| Conditions pratiques | * Some travel (with expenses reimbursed) for field trials at INRAE Gotheron |
| **General informations** | |
| Skills | * M2 agronomy, plant physiology or ecophysiology * Interest in plant experiments in the field (measurements in outdoor conditions, samplings and set up an experimental device) * Interest in lab experiments on plants * Work in a team * Use of Rstudio and statistical analyses * Organization, rigor and autonomy * Writing skills * Searching bibliography * Good communication skills (English or French) |
| Contacts and supervisors | Send a CV and covering letter to the following e-mail addresses :  Lia Lamacque : lia.lamacque@inrae.fr  Cindy Morris : cindy.morris@inrae.fr |