TFM proposal
Multiomics integration to study the transcriptional regulation of cannabinoid and terpenoid pathways in *Cannabis sativa*

About the project

Cannabis sativa is a source of food, fibre and specialised metabolites such as aromas and medicinal cannabinoids, with pharmacological effects. The fibre (hemp, type III) and medicinal (typeII) chemotypes of *C. sativa* differ in their cannabinoid chemical composition phenotype and also in the accumulation of terpenoid compounds that constitute a strain's particular flavour and scent. In these plants, specialised metabolite production is restricted both temporally (throughout development) and spatially (tissue and subcellular localisation), and this is mainly regulated by transcription factors. The recent release of cultivar-specific genomes and transcriptomic data presents an ideal opportunity for a systems-wide approach to study the cannabinoid and terpenoid pathways, both in terms of enzyme-encoding genes and the transcription factors that regulate them. Indeed, cultivar-specific differences are expected and these could be explored accordingly.

We propose, amongst other transcriptomic analyses, to inspect already-developed gene co-expression networks based on public data (both cultivar and tissue specific) to help dissect the regulation of the cannabinoid and terpenoid pathways using principles from Network Theory. Moreover, we are currently generating TF-DNA binding data (DAP-Seq; DNA-affinity purification) of putative regulators of terpenoid and cannabinoid synthesis, still to be analysed. The student would need to analyse this data and integrate it into the above-mentioned transcriptomic analyses to evaluate candidate regulators. The student will also have the opportunity to participate in the development of the CannaViz module within the PlantaeViz platform, an omics web portal developed by the lab. This would mainly involve implementing visualisation and data analysis tools relevant to the study of Cannabis developed over the course of the project. Publications are expected by the end of the Master's project.

We hope to hear from prospective 1st and 2nd year students looking for a lab to carry out a final year master's project. Feel free to contact us with any questions you may have!

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