

## Master 2 / Engineer internship - 2022

### Impact of water deficit on the health value of goji berry in relation with its biochemical and histological properties

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Place : Avignon, France

Host Laboratory : UR PSH – Plantes et Systèmes de culture Horticoles (INRAE)

Supervisors :

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Indicative period: February-July 2022 (6 months).

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#### Context and Objectives

In the current context of global change, plant production must face a double challenge: i) to maintain yields while reducing inputs and adapting to climatic constraints, ii) to improve the quality and in particular the health value of harvested/processed products in order to meet high consumer expectations. To meet this challenge, it is necessary to understand how the emerging production contexts can impact the fruit matrices, how the properties will be maintained upstream during processing/preservation and what will be the health effects on consumers. We are studying this issue on goji in the framework of a project supported by the INRAE Syalsa metaprogram. Goji is not only an interesting source of phytomicronutrients (PMNs) for food systems, but also a plant species particularly well adapted to abiotic constraints. The health effects of goji berries seem to be linked to a polysaccharide-PMNs cocktail such as carotenoids or phenolic compounds (Dumont et al., 2020<sup>1</sup>). In spite of its potential nutritional and environmental interest, the ecophysiological determinants of berry qualities remain poorly explored. For example, although goji is known to be drought resistant, thus allowing its establishment in the Mediterranean area, the impact of this abiotic stress on yield or quality components is not documented. In this context, the subject of this internship proposes to explore the mechanisms of quality development of goji berries under conditions of reduced water supply and to characterize the impact on the biochemical and cellular properties of the fruit matrix.

#### Research questions and internship program

What is the impact of water deficit on the elaboration of the qualities of goji berries during development: size and number of cells, content and cellular and subcellular localization of PMNs, quantity and structure of polysaccharides, pH, allocation of carbon to soluble and insoluble dry matter?

What would be the major levers in field to modulate these qualities without limiting the yield and what are the sensitive stages of plant development during which plant responses can impact the yield and berry structure and composition?

To answer these two questions, the student will conduct a literature review and a greenhouse experiment in the PSH unit to analyze the response of this species to water deficit. The student will participate in the establishment and maintenance of the crop as well as monitoring irrigation and climate. He/she will make ecophysiological measurements (development, organ growth, gas exchanges, water potential...). Fruits will be sampled at particular stages of their development to measure the impact of water supply on the development of cellular (number and size of cells) and sub-cellular (plastids and walls) structures by optical microscopy (classical and confocal) and to establish links with the final content of PMNs measured by HPLC and polysaccharides characterized by HPSEC-MALLS on the 3A platforms in Avignon.

#### Student profile

We are looking for a motivated and rigorous Master 2 student, specialized in Biology and/or Plant Production. The candidate will be trained in ecophysiological methods and microscopy analysis. In addition to analytical skills, the candidate will develop skills in experimental planning, data analysis, report writing and oral presentations.

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<sup>1</sup> Metabolites. 10, 422; doi:10.3390/metabo10100422