Towards a functional-structural plant model of the apple branch –

Two positions at IRHS, Angers, France

The Institute for Horticultural and Seed Research – IRHS (UMR1345) is seeking to fill two temporary positions within the frame of a research project on apple ecophysiology and fruit quality, financed by the Council of the "Région Pays de la Loire"

Context and background

Established on January 1, 2012, the IRHS (UMR1345) aims at constituting a unique research framework, enabling its 220 members (of which 170 permanents) to treat scientific questions in horticulture and seed quality in a more efficient way at all levels. It has been conceived to develop integrated approaches by coordinating efforts and expertise of geneticists, phytopathologists, eco-physiologists, modelers and statisticians.

Located at the heart of one of the main horticultural and seed production areas in Europe, research activities in the plant sciences in the region "Pays de la Loire" are essentially lead by this Angers-based research center, under the auspice of INRA (National Institute of Agronomic Research), Agrocampus Ouest centre d'Angers (National Institute of Horticulture), and the University of Angers.

The work group FruitQual within IRHS studies the genetic and ecophysiological background of fruit quality at the example of the model species apple (*Malus* x *domestica*). The complex interactions between genetic and physiological factors with the environment that are behind the formation of fruit quality traits are still poorly understood, but FruitQual currently invests considerable means and efforts to shed light on them, at different hierarchical scales and using various methodologies. The use of a functional-structural model of the bearing branches (first-order lateral branches bearing developing fruits and vegetative relay shoots) appears to be a promising approach that could integrate existing knowledge and ultimately lead to improved decision-support for apple producers, in the context of a difficult market situation.

Tasks

The main task of the project is the conceptualization and subsequent implementation of a functional-structural plant model of the bearing branch of apple, with a strong emphasis on carbon flows between sources (leaves) and sinks (developing fruits) within the same branch. The model will be based on data from a dedicated experimental programme including a detailed investigation of the nature and timing of bud break, morphometric measurements of the kinetics of developing organs as well as the characterization of the photosynthetic capacity as a function of their position and age. A better knowledge of short-range carbon fluxes and local sink strengths will improve our understanding of the development of fruit quality traits in apple.

The project will be conducted as two subprojects, by a postdoctoral researcher (research engineer, 18 months temporary contract) and a Ph.D. student (36 months temporary contract, within the frame of the graduate school VENAM):

Postdoctoral researcher:

- Concept and implementation of the functional-structural plant model
- Scientific valorization by writing/co-authoring publications

Ph.D. student:

- Conducting experiments on orchard-grown commercial apple cultivars to advance knowledge on the influence of sink-source interactions and fruit quality
- Data analysis, parameterization, calibration and validation of the model
- Scientific valorization by writing/co-authoring publications

Profile of the candidates:

Postdoctoral researcher: We are looking for a self-motivated individual with strong communication and organization skills, who will have (recently) completed a Ph.D. thesis in Plant Sciences, Information Sciences or Horticulture, with an application of plant modeling and a publication record. Knowledge of programming languages (Java, C++, Python) and modeling platforms (Matlab, GroIMP, OpenAlea) is essential, experience in statistical data analysis tools (R) will be an asset.

Ph.D. student: We are seeking a person with a Master in Plant Sciences or Horticulture, with strong experimental skills, ideally in fruit tree ecophysiology. Individuals exhibiting experience or a strong affinity to modeling and statistical data analysis will have a distinct advantage.

Ability to communicate in English both orally and in writing is essential for both candidates. Knowledge of French language will be a strong asset, especially for the postdoctoral researcher as she/he will have to communicate with technical staff.

Duration of project: 18 months (postdoc); 36 months (Ph.D. student)

Deadline: March 15, 2013

Please send your CV, list of publications (postdoc) and a letter of motivation (in French or English) to:

Prof. Dr. Gerhard Buck-Sorlin
UMR1345 Institut de Recherche en Horticulture et Semences (IRHS)
Agrocampus Ouest, Centre d'Angers
2, rue André le Nôtre
49045 Angers cedex 01, France
Tel. : +33(0)2 41 22 55 48
gerhard.buck-sorlin@agrocampus-ouest.fr