Sabbtical Sojourn of Pr J. Wunsche

Pr J. wunsche sojourn in AFEF teamand contribution to study on apple tree biennial bearing

ABSTRACT

Most of the actions planned have been performed, in particular student management and contribution to research program in AFEF team (L. Segret), contribution to student defense and teaching at Montpellier SupAgro.
Regarding research, Pr Jens Wunsche contributed to field experiment at CEHM (Centre Expérimental en Horticulture de Marsillargues), in collaboration with J.J. Kelner ass. Prof at Montpellier SupAgro, and E. Costes, INRA. He also largely contributed to histological studies at PHIV, in collaboration with N. El Kholti, since he continued her experiment after she ended her contract.
Histological studies focused on 3 floral genes, GA 20-oxidase (MdGA20ox1a), TERMINAL FLOWER1 (MdTFL1) and SOC1 (MdSOC1), assumed to have a major role in the control of flower induction (FI) of apical shoot meristems in apple (Guitton et al., 2011). The aim of this study was to reveal the temporal and spatial expression patterns of these 3 genes during floral bud induction and initiation by in-situ hybridization.
Apical meristems from 2-year-old spurs of Royal Gala/ M.9 “on” and “off” trees were collected between 19 April to 14 June 2012, at weekly intervals, as well as on 28 June and on 30 July at CEHM. At sampling, meristems were immediately fixed. Single-stranded antisense and sense RNA probes of the genes were transcribed with T7 polymerase and labelled with digoxiginin (DIG). Prior to in-situ hybridization, samples were washed, dehydrated, embedded in paraffin, and cut in 8 µm sections. In-situ hybridization was performed at 55°C (for genes GA20OX1a and SOC1) and at 57.6°C for TFL1a overnight with 0.2 µg ml-1 of the digoxigenin-labelled RNA probe. Several post-hybridisation washes were then carried out before signal detection using an antiDIG antibody coupled with a phosphatise alkaline and VectorBlue as its substrate.
Distinct temporal and spatial changes were revealed in the expression patterns of the 3 studied floral genes. All genes showed initially no or little expression in meristems. Thereafter, their expression level drastically increased over time, and each gene exhibited a characteristic spatial distribution, irrespective of subsequent induction or repression of flowering. Even though differences between on and off trees could be visually distinguished in mid and late June samples, these results must be further confirmed by quantitative analyses, such as qRT-PCR.
This study led us to propose a poster at the Sixth Rosaceous Genomics Conference, organised by the Edmund Mach Foundation, at San Michele all’Adige, Trento, ITALY. This poster has been presented by J.J. Kelner, and is intitled: "Biennial bearing in apple – expression patterns of several floral genes revealed by in-situ hybridization". Authors are: N. El-Kholti, J.N. Wünsche, J.J. Kelner, J.L. Verdeil, E. Costes.
http://rgc6.org/content/download/1224/10252/file/RGC6_Book%20of%20abstracts_FULL_web.pdf

Regarding teaching, Pr Jens Wunsche has participated to:
- Expert for student defense in Master Hortimet (19/09/2012) : Mariama AIDARA ; Contribution technique et économique au phénotypage automatisé de la qualité du melon au champ (6 months, Syngenta Sarrians-84, confidential report)
- Conference at Master Hortimet le 21/09/2012 :
Topic : " Introduction to Centers for Food Security and Tropical Research at Hohenheim University"
- Conférence au Master Hortimet le 10/10/2012 (in visio from Hohenheim)
Topic : "Manipulation of fruiting in temperate and (sub)tropical fruit species for more und better crop productivity"

After J. Wunsche return to Germany, we have built, written and submitted a research project to ERA-CAPS funding call. This project, named APFlo, aims at continuing our investigations on apple tree flowering and its regularity and elarging the collaborative network to genetic studies, with other german partners at Julius Khun Institute, to novel aspects in eco-physiolgy and statistics with french colleagues at UMR PIAF, Clermont Ferrrand and Grenoble University.

Keywords : Developing the plant of the future, Plant, Ecophysio/architecture/phenotyping, Operation, Architecture, Apple

Year : 2012
Project number : 1200-006
Type of funding : PC
Project type : SP
Research units in the network : HORTSYS
Start date : 2012-05-23
End date : 2013-06-30
Flagship project : no

Project leader : Evelyne Costes
Project leader's institution : INRA-INRAE
Project leader's RU : AGAP

Budget allocated : 10400 €
Total budget allocated (including co-financing) : 10400 €
Funding : Labex

PERSPECTIVES

Our prospects presently depend on the result of ERA-CAPS, APFlo project submission.
In addition to this first submission, a mutual interest for better understanding fruit abscission has emerged from discussions during Pr J. Wunsche sojourn. 2 meetings with colleagues from IRD and UMR IRHS in Angers have been held. Since Pr J. Wunsche will be involved in the organisation of a symposium on fruit abscission in the next International congress in Horticulture (Brisbane, Août 2014), we are planning to present the studies performed in apple, in collaboration between INRA Angers and Montpellier. This will give us the opportunity to meet and discuss again with the German colleagues on the opportunity to submit a new project (this will of course depend on the final decision from ERA-CAPS).