

2nd COST Action FA1204 ANNUAL CONFERENCE

INNOVATION IN VEGETABLE GRAFTING FOR SUSTAINABILITY

20-22 October 2014 - CARCAVELOS, PORTUGAL

REPORT



Report of the COST ACTION FA1204

2nd Annual Conference - Innovation in vegetable grafting for sustainability

The 2nd Annual Conference - Innovation in vegetable grafting for sustainability - of COST ACTION FA1204 took place on October 20-22, 2014, in Carcavelos, Portugal, and was a follow-up to the 1st Meeting in Athens (March 2013), the 1st Annual Conference in Murcia (November 2013) and the 2nd Meeting in Jerusalem (February 2014). Ninety four researchers, teachers and professionals from 24 countries (Table 1) gathered to update their knowledge about vegetable grafting and to meet and build future collaboration on innovation in vegetable grafting for sustainability. The Conference was organized under the auspices of the National Agrarian and Veterinary Research Institute (INIAV, I.P.), the High School of Agriculture/Polytechnic Institute of Viana do Castelo (ESA/IPVC) and the Portuguese Horticultural Association (APH).

Table 1 – Number of participants per country

Country	Number	Country	Number	Country	Number
Albania	1	Hungary	1	Romania	1
Bulgaria	2	Israel	6	Slovenia	1
Croatia	3	Italy	9	Spain	10
Cyprus	2	Jordan	1	Switzerland	1
Egypt	2	Latvia	1	Turkey	8
France	3	Netherlands	1	United Kingdom	4
Germany	2	Norway	1		
Greece	3	Portugal	31		

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The COST ACTION FA1204 2nd Annual Conference started with the official opening followed by the invited presentation on graft-transmissible mobile silencing RNAs and their effects on gene expression by Attila Molnar, two sessions with presentations of participants from WG1 - Genetic resources and rootstock breeding and WG2 - Rootstock-scion interactions and graft compatibility, and the working groups meetings. The second day started with the invited presentation about nematodes ecology and vegetable grafting by Sofia Costa, followed by two sessions with presentations of participants from WG3 – Rootstock-mediated resistance to biotic and abiotic stresses and WG4 – Rootstock-mediated improvement of fruit quality, and the managing committee meeting.

The technical visits to the Oeste Region of Portugal, included the nursery Aromas e Flores - Hortofloricultura, Lda., in Silveira, Torres Vedras, which started the vegetable grafting in Portugal, and the Horticultura Agro-Indústria S.A., in Alcochete, which is a unit of the Wight Salads Company, that supplies around 55% of all UK grown organic tomatoes. The social programme likewise the wine taste in Carcavelos, the touristic tour, and the conference dinner with Fado show, helped the participants to know each other better, and thus to stimulate collaborative research towards identifying and understanding how rootstock-mediated traits can improve vegetable crop yield and quality under adverse conditions.

The program, with two invited communications, nineteen oral communications and twenty three communications by poster, reported in the book of abstracts, focused on vegetable grafting as an important component of sustainable horticulture due to crop increase in vigour and disease resistance, tolerance to temperature and salinity, flooding and drought, and increase nutrient uptake.

The four working group meetings further contributed to the objectives of this COST ACTION FA 1204 - Vegetable grafting to improve yield and fruit quality under biotic and abiotic stress conditions. Focused on grafting as a potential successful key technique for sustainability, which may help producers and breeders to deal with the predicted impacts of climate change and to overcome the consequences of unsustainable agricultural practices that are causing soil degradation and depleting natural resources, the participants exchanged ideas and discussed the future of sustainable vegetable grafting practices, and about how to graft vegetables, what is compatible to what, how to fill knowledge gaps in the area of vegetable grafting, how to stimulate the wider commercial development and exploitation of this technique, and about the potential contribution of vegetable grafting for sustainability.

Session 1: WG1 - Genetic resources and rootstock breeding, chaired by Andrew J. Thompson and Maria Elvira Ferreira as rapporteur, with the main task of setting clear the current genetic variability existing in each vegetable species, as well as the existing breeding programs, emphasized the genetic diversity in bottle gourd in Turkey, genotypic differences in different pH levels in relation to growth and morphology of gourd genotypes and watermelon cultivars, the screening of tomato lines against low temperature, and the possibilities for grafting of melon and cucumbers on rootstocks of *Cucurbita maxima*, *Cucurbita moschata* and *Cucurbita pepo*. The design and implementation of a centralized database on vegetable rootstocks with information on vegetable rootstock's resistance to biotic factors, tolerance to abiotic factors and compatibility to scion of other plants was also objective of one oral communication. The communications by poster contributed to the objectives of this group, which has the task of collecting information on germoplasm available for selected vegetable species; information on commercial rootstocks used in different countries, and information on ongoing breeding programs for developing new rootstocks.

Session 2: WG2 - Rootstock-scion interactions and graft compatibility was chaired by Jan Henk Venema and Miguel Brito as rapporteur, and dealt with chemical compounds (eg. hormones, nutrients, proteins, RNAs) and signalling between root and shoots. The four oral communications highlighted the low-temperature signalling in tomato roots, hormone flow modelling to reveal root-to shoot and shoot-to root ABA signalling in grafted tomato plants, the detection of apoptotic cells at early stages of different graft combinations, and the induction of extensive transcriptional re-programming at the graft interface during graft union formation after grafting with rootstocks. The communications by poster contributed to the objectives of this group of collecting information on the molecular, biochemical and physiological studies related to root-shoot communication and information on the factors affecting grafting compatibility.

Session 3: WG3 – Rootstock-mediated resistance to biotic and abiotic stresses, chaired by Dietmar Schwarz and Maria da Graça Palha as rapporteur, contributed to define the current status of knowledge about rootstock-mediated crop improvement to attenuate the impacts of biotic, abiotic and combined stresses, and on the improvement of resource use efficiency (eg. water, nutrients) by grafting. The five oral communications underlined that epidemiological and laboratory studies of cucumber green mottle mosaic virus (CGMMV) enables reducing disease damage in greenhouses; discussed gene expression in grafted melon plants in compatible and incompatible combination with *Fusarium oxysporum* f. sp. *melonis* races, the agronomic behaviour of some rootstock/scion combinations for eggplant, and the selection of rootstocks that support plants to produce more fruit chlorophyll synthesis; and demonstrated that bottle gourd accessions have significant differences under salinity stress condition showing that promising accessions may be used in rootstocks breeding program against salinity stress. The communications by poster contributed to the objectives of this group which has the task of collecting information on the main biotic and abiotic stresses for the selected vegetable crops in different countries; information on research activities aimed at studying the rootstock responses to biotic and/or abiotic stresses and providing insight into the mechanisms underlying these responses and information on research activities on the effects of rootstocks on resource use efficiency (eg. water use efficiency, nutrient use efficiency).

Session 4: WG4 – Rootstock-mediated improvement of fruit quality was chaired by Cherubino Leonardi and Isabel Mourão as rapporteur, and aimed to compile information on rootstock effects on commercial quality of fruits, and to contribute for the definition of strategies for a better understanding and exploitation of the processes involved. The oral communications wondered about the effect of grafting on the arsenic content in tomato plants, showed that grafting melons onto potential *Cucumis* spp. rootstocks may improve plant vigour and earlier flowering compared to ungrafted plants, as well as the impact of grafting on yield and fruit quality of pepper grown hydroponically under greenhouse conditions, the influence of different rootstocks on aroma profile, sensory and microbiological characters of *Citrullus lanatus* [Thumb.] Matsum.

and Nakai cv. Minirossa (Cucurbitaceae), and the quality and postharvest performance of watermelon fruit in response to grafting on inter-specific cucurbit rootstocks. The communications by poster contributed to the objectives of this group which has the task of collecting information on the most important commercial and nutritional quality traits of selected vegetable crops with particular emphasis to health-promoting compounds, as well as information on research activities aimed to study the rootstock influence on qualitative traits of product.

The Management Committee Meeting occurred on the 21st October, where important subjects for the Action were discussed: status and budget of the Action, update of Training School in Catania, update of the STSM, progress report of the four WG and scientific planning and activities (website, book, Steering Committee Meeting and Annual Conference in 2015).

A technical visit to the Oeste Region of Portugal was organized on the third day of the conference. The visit started at Aromas e Flores, Lda., a Portuguese company founded by César Rodrigues in 2002. The company was born out of the vision of its owner and the feeling that the Portuguese horticulture market needed a company that looks into the future and a company that is able to present the market new ideas to improve productivity. This company was the first in Portugal to produce grafted plants for 5 years now. They try to develop and learn with their experiences and out of that thrive to learn they grafted bean plants, which proved a huge success and transformed the way producers all over Portugal now produce these crop.

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After lunch, the participants had the opportunity to visit Hortivilha Agro-Indústria S.A., with its 13 ha of glasshouses for organic production of tomatoes, with grafted plants. Their goal is to produce high quality organic tomatoes with a taste that truly justifies a premium price.

The Programme and the Book of Abstracts were distributed to the participants before the Conference.

Carcavelos, 24/10/2014

The Local Organizer Committee

Isabel de Maria Mourão

Maria da Graça Palha

Maria Elvira Ferreira

Miguel Brito

Francisco Barreto (Secretariat)