



COST Action FA1204

Vegetable Grafting to Improve Yield and Fruit Quality under Biotic and Abiotic Stress Conditions

FINAL ACHIEVEMENT REPORT (Action start date 01/10/2012 – Action end date 30/09/2016)

This report on the full lifetime of the Action is submitted by the MC Chair on behalf of the Management Committee.

Executive summary of the Achievement Report:

The COST Action permitted the establishment of a large network of scientists and companies (eg. seed companies, nurseries) from 22 COST-Countries, 2 COST Near Neighbour Countries, and 3 COST International Partner Countries. The knowledge on vegetable grafting has been remarkably increased through the meetings, round tables, STSMs and WG activities. Moreover, two training schools on vegetable grafting have been organized in order to promote the transfer of theoretical and practical knowledge to technicians and scientists. Collaborations among scientists and Companies significantly increased during the COST Action as demonstrated by the joint publications and research project proposals. Dissemination of COST Action results was continuously promoted by MC members in their respective Countries and during International Conferences (e.g., presentation at the 2nd International Symposium on Organic Greenhouse held in Avignon from 28 to 31 Oct. 2013; presentations at the 1st International Symposium on Vegetable Grafting - ISVG2014 held in Wuhan, Hubei Province, China from March 17, to 21, 2014; presentation at the MERC-COST Workshop in Viterbo, Italy on 10 November 2015). Moreover, interactions among scientists of different COST Actions and research Consortia have been promoted (e.g. COST Action FA1105 'Biogreenhouse'; Consortium of FP7-EU project 'Rootopower'; Consortium of USAID-MERC project entitled 'Grafting melon as a novel technology for improving yields and reducing chemicals in infested soils'). Dissemination activities were also carried out through COST Action website, distribution of a brochure during meetings, an EPSO Newsletter, and three promotional videos. COST Action meetings and WG activities permitted to define the genetic variability existing in each vegetable species and rootstock breeding programs. Moreover, some major physiological and genetic determinants of root and shoot development and compatibility of rootstock-scion have been identified during the STSMs and meetings (e.g. hormonal factors, RNA, nutrients). Rootstock mediated improvement of (a)biotic stress tolerance/resistance in vegetable crops (especially sub-optimal temperature, salinity, drought, nutrient deficiency, soil pollution, nematodes and soilborne diseases) has been studied during STSMs and WG activities. Control strategies of grafting related diseases (e.g., *Clavibacter michiganensis* in tomato) in nursery have been defined. Effects of rootstocks on fruit quality (especially nutritional quality, aroma volatiles, and shelf life) have been presented during meetings and discussed by WG participants. Critical aspects related to organoleptic quality were highlighted by WG regarding the use of Cucurbita rootstocks on melon and watermelon. WG activities pointed out that vegetable grafting is a sustainable and effective tool not only for Solanaceous crops and Cucurbits but also for other vegetable crops like artichoke and common bean. Part of the results of WG activities have been reported in the book of abstracts, and WG reports. A database was created using the information collected by WGs in order to make these information accessible and easy to use by all stakeholders. A final book gathering all WG findings was written and it will be published by CABI on April 2017. The final book represents the main output of the COST Action.



I. Achievement Report

I.A. COST Action Profile

Objective/ Aim

The aim of the Action is to understand the biological basis of rootstock-mediated improvement of several vegetable crops (tomato, eggplant, pepper, watermelon, melon, and cucumber) and their compatibility by combining the already existing scientific information generated in several COST and non-COST countries as a basis for development and exploitation of new rootstocks.

Details

MoU:	4129/12	Start of Action:	01/10/2012
CSO approval date:	07/06/2012	End of Action:	30/09/2016

COST Member Countries and Cooperating State having accepted the MoU

Country	Date	Country	Date	Country	Date	Country	Date
Belgium	10/12/2012	Bulgaria	02/01/2013	Croatia	27/08/2012	Cyprus	06/02/2013
Czech Republic	21/05/2013	France	19/09/2012	Germany	02/07/2012	Greece	28/08/2012
Hungary	19/06/2012	Israel	26/06/2012	Italy	25/07/2012	Latvia	13/11/2012
Malta	12/07/2015	Netherlands	03/09/2012	Norway	26/05/2014	Portugal	14/08/2012
Romania	28/11/2012	Slovenia	08/11/2012	Spain	15/06/2012	Switzerland	18/10/2012
Turkey	11/07/2012	United Kingdom	21/06/2012				

Intentions to Accept the MoU

0

Other participants:

Institution Name	Country
Agricultural University of Tirana	Albania
Faculty of Agricultural Engineering and Veterinary Medicine, Lebanese University	Lebanon
North Carolina State University	United States of America
College of Horticulture & Forestry, Huazhong Agricultural University	China
The Ohio State University	United States of America

Contacts

Chair/ Vice Chair

Position	Name	Contact details	Country	Date of PhD:	Gender
Chair:	Prof Giuseppe COLLA	University of Tuscia, Dept. DAFNE via S.C. de Lellis snc01100 Viterbo Tel. +39-(0)761-357536 Fax. +39-(0)761-357453 giucolla@unitus.it	Italy	1996	Male
Vice Chair:	Dr Francisco PEREZ ALFOCEA	Consejo Superior de Investigaciones Cientificas (CEBAS), CSIC, Campus de Espinardo, 2530100 Murcia Tel.: +34968396342. Fax: +34968396213 alfocea@cebas.csic.es	Spain	1991	Male

Working Group Leaders

WG#	WG Title	WG Leader	Country	Date of PhD:	Gender	Number of participants ¹
1	WG1 - Genetic resources and rootstock breeding	Andrew J. Thompson	UK	1993	Male	38
2	WG2 - Rootstock-scion interactions and graft compatibility	Jan Henk Venema	The Netherlands	2001	Male	28
3	WG3 – Rootstock-mediated resistance to biotic and abiotic stresses	Dietmar Schwarz	Germany	1993	Male	63
4	WG4 – Rootstock-mediated improvement of fruit quality	Cherubino Leonardi	Italy	1994	Male	34

Other positions if applicable (STSM Coordinator, WG Vice Leader, Task Force Leader...)

Position	Name	Country	Date of PhD:	Gender
STSM Coordinator	Dimitrios Savvas	Greece	1992	Male
Editorial Board Coordinator	Georgia Ntatsi	Greece	2013	Female
WG 1 Vice leader	Halit Yetisir	Turkey	2001	Male
WG 2 Vice leader	Ian C. Dodd	UK	1996	Male
WG 3 Vice leader	Roni Cohen	Israel	1987	Male
WG 4 Vice leader	Carmina Gisbert	Spain	1997	Female

Action website: <http://www.vegetablegrafting.unitus.it/>

¹The number does not include the MC members and substitutes who expressed the interest to one or more WG

I.B. Achievement of MoU objectives and deliverables and additional outputs

MoU objectives

MoU objective	Achieved	Evidence of (partial) achievement
1) to list the current genetic variability existing in each vegetable species as well as the current breeding programs in COST and non-COST countries	Yes	Enhancement of the knowledge on current genetic variability existing in each vegetable species and interesting germplasm for developing new rootstocks and ongoing breeding programs. Current genetic variability has been listed during the meetings and in particular during the meeting in Antalya, Turkey (see presentations in COST Action Website). Moreover, round tables with stakeholders (breeding companies, and nurseries) have been organized during the Murcia, Antalya, and Pula meetings in order to improve the network and to understand the needs of specific rootstock breeding programs. Questionnaires have been submitted to stakeholders for meeting the above goals (see questionnaires and presentation of results in COST Action Website). The results achieved by the WG1 have been presented in the final Conference in Pula by the WG Leader (see presentations in COST Website). The WG activities summarized the knowledge on germplasm and breeding program for developing new rootstocks in two chapters of the COST Book on vegetable grafting (chapter 2 –‘Genetic resources for vegetable rootstock breeding’; chapter 3 - ‘Rootstock breeding: current practices and future technologies’). Finally, the WG activity provided the inputs on germplasms and commercial rootstocks for the database (see database presentation in COST website).
2) to define major physiological and genetic determinants of root and shoot development and compatibility of rootstock-scion	Yes	Improvement of the knowledge about rootstock-scion interaction responsible for the success of rootstock-scion compatibility. Scion-rootstock interaction has been presented during all COST meetings and especially during the meetings in Jerusalem and Bleiswijk (see meeting reports and power point presentations on the COST Action Website). Moreover, round tables with stakeholders (breeding companies, and nurseries) have been organized during the Murcia, Antalya, and Pula meetings in order to improve the network and to better understand the rootstock-scion interaction and possibilities to elucidate so-called biomarkers which can be used for selective breeding of complex rootstocks traits like vigour and abiotic-stress tolerance. Questionnaires have been submitted to stakeholders for meeting the above goals (see results of questionnaires on the COST Action Website). The main results achieved by WG2 have been presented during the final Conference in Pula by the WG Leader (see presentation on COST Website). Moreover, the WG summarized the state-of-the art knowledge on scion-rootstock interaction and grafting compatibility in two chapters of the COST Book on vegetable grafting (chapter 4 - Rootstock-scion signalling: rootstock-mediated key factors for scion performance; chapter 5 - Physiological and molecular mechanisms underlying graft compatibility). Finally, the WG activity provided the inputs on grafting compatibility for the database (see database presentation in the COST website).
3) to determine the current status of knowledge about rootstock-mediated crop improvement so as to mitigate the impact of biotic, abiotic and combined stresses, thus	Yes	Enhancement of the knowledge about the rootstock mediated improvements of (a)biotic stress resistance in grafted plants. Mitigation of biotic and abiotic stresses in grafted plants has been presented during all COST Meetings and especially during the meeting in Jerusalem, and Berlin (see book of abstracts, meeting report in COST Action Website). A protocol controlling pathogens for producing high quality grafted plants in nursery has been presented (see presentation in COST Action Website). Moreover, round tables with stakeholders (breeding companies, and nurseries) have been organized during the meetings in order to improve the network and to understand the most critical stress factors to be addressed through rootstock breeding programs. Questionnaires have been submitted to WG participants on the use of grafted plants in each country to cope with environmental stresses. Moreover, the WG summarized the knowledge in two chapters of the COST Book on vegetable grafting chapters 6 (‘Grafting as agro-technology for

improving resource use efficiency		reducing disease damage'), and 7 ('Grafting as a tool to tolerate abiotic stress'). Finally, the WG activity provided the inputs on abiotic stress tolerance and biotic stress resistance of germplasms and commercial rootstocks for the database (see database presentation in COST website).
4) to list the effects of rootstocks on fruit quality in order to define strategies for a better understanding and exploitation of the signalling processes involved	Yes	Improvement of the knowledge about the influence of rootstock on nutritional quality. Effects of rootstocks on fruit quality and shelf-life have been presented during all COST Meetings and especially during the meeting in Antalya (see book of abstracts, and meeting reports in COST Action Website). During the meetings, nutraceutical value and aroma compounds of fruits have been emphasized especially in melon and watermelon. Moreover, round tables with stakeholders (breeding companies, and nurseries) have been organized during the Murcia, Antalya and Pula meeting in order to improve the network and to understand the most critical quality aspects to be addressed through rootstock breeding programs. Questionnaires have been submitted to WG participants for gathering information concerning the most important quality aspects influenced by grafting. The results of WG activity have been summarized in one chapter of the COST Book on vegetable grafting (chapter 8 - 'Quality of grafted vegetables'). Finally, the WG activity provided the inputs on the effects of rootstocks on fruit quality for the database (see database presentation in COST website).
5) to create an international database with the information generated by the COST Action (eg. disease resistance of rootstocks, abiotic stress tolerance of rootstocks, compatibility issues, sources of rootstocks, vigour effects on scion, grafting techniques, etc.)	Yes	The database was developed thanks to the WG activities and two STSMs (see STSM reports in COST website).The database was created from an Excel spreadsheets by collecting the following information for the grafted crops (tomato, watermelon, eggplant, cucumber, melon, globe artichoke, and pepper): disease resistance of rootstocks, abiotic stress tolerance of rootstocks, compatibility issues, sources of rootstocks, vigour effects on scion, grafting techniques, yield and quality variation of different grafting combinations. The database represents an effective and easy to use tool for the scientific community, private companies, vegetable growers, extension specialists and other institutions involved in vegetable grafting. The database file is available upon request as reported in the COST website.
6) to define classical and biotechnological breeding strategies to prepare the generation of new rootstocks improving desirable traits in crop varieties of selected	Yes	Classical and biotechnological breeding strategies have being reported in chapter 3 –'Rootstock breeding: current practices and future technologies' of the COST book. Additional information have been presented during COST meetings (see book of abstracts in COST Action Website) and especially in the final Conference in Pula by the WG 1 Leader (see presentation in the COST Website).

species		
7) to transfer available knowledge into the practice	Yes	<p>The transfer of knowledge into the practice was carried out especially through meetings, training schools and STSMs. During the COST Action, the following events have been organized to promote the transfer of available knowledge on vegetable grafting: 8 meetings with the participation of stakeholders of the grafting industry during round tables and technical visits (see book of abstracts and conference reports in COST Action Website), two training schools on vegetable grafting in Catania (Italy) and Bleiswijk/Wageningen (The Netherlands) with 15 and 19 participants, respectively (see training school reports on COST Action Website), and 19 STSMs (see STSMs' topics in COST Action Website). Moreover, three dissemination events have been carried out to promote interaction with scientists from COST Action FA1105 'Biogreenhouse' (presentation at the 2nd International Symposium on Organic Greenhouse held in Avignon from 28 to 31 Oct. 2013 - https://www.amiando.com/OGH_Symposium2013.html), scientists from China and other East Asian Countries (presentation at 1st International Symposium on Vegetable Grafting - ISVG2014 held in Wuhan, Hubei Province (China) from March 17, to 21, 2014 - http://www.ishs.org/ishs-book/1086), scientists from Middle East (presentations at the MERC-COST Workshop in Viterbo on 10 November 2015). Results of WG activities have been presented in several national meetings (eg. presentation of dr. K. Zanic, MC member, on 25 May 2016 in the COST Programme Day at University of Split, Croatia; seminar of dr. E. Balacheva, WG member, on 18 December 2015 at Sofia, Bulgaria; presentations of Prof. Ian Dodd, WG2 vice-leader, at the SEB Annual Meeting, Prague, Czech Republic from 30 June to 3 July 2015, and at the SEB Annual Meeting, Manchester, UK from 1 to 4 July 2014) or in non-COST countries (e.g., seminar of Prof. R. Rodeva, MC member, on 30 November 2015, AVRDC, Taiwan; presentations of Prof. Ian Dodd, WG2 vice-leader, at the Genetic integration of prokaryotes and eukaryotes Conference, St Petersburg, Russia from 24 to 26 June 2015, and at the Gordon Research Conference 'Salt and Water Stress in Plants', USA from 3 to 8 August 2014, and at the Interdisciplinary Plant Group Root Biology Conference, Columbia, USA from 29 to 31 May 2013). An EPSO Newsletter (N° 32 / September 2013 http://www.epsoweb.org/newsletter/newsletter-september-2013), and a brochure (http://www.vegetablegrafting.unitus.it/iframe/trifold_brochure_cost_2014_final.pdf) have been prepared and distributed during the dissemination events and meetings, and two videos (see COST website). Finally, a chapter in the COST Book entitled 'Practical applications and speciality crops' has been written by some WG members to promote the dissemination of the practical aspects of vegetable grafting.</p>
8) to use all the information collected to identify particular topics which could be used to develop new research projects	Yes	<p>The COST Action facilitated the identification of research topics and preparation of the following research proposals: ENPI-CBCMED proposal; FACCE-ERA-NET proposal; several bilateral research proposals among WG participants.</p> <p>During last H2020 call for proposals SC2 SFS-5-2015, a Consortium of organisations mainly composed by COST Action members (12 out of 20) presented a proposal entitled 'Unravelling Rootstock x Scion x Environment Interactions to Increase Yield Stability and Quality in Horticultural Crops (ROSE)'. The pre-proposal passed the first step but the full proposal was not approved.</p> <p>A new proposal entitled 'Rootstock breeding for a more sustainable and resilient horticulture (ROOTBREED)' was prepared by some of COST Action members and it was submitted on 17-02-2016 in the frame of the call H2020-SFS-2016-2 but it was not approved.</p>

MoU deliverables

MoU deliverable	Delivered	Evidence of (partial) delivery achievement
D1 – Information about the current status of vegetable grafting in Europe compared with other non-COST countries.	Yes	The current status of vegetable grafting in COST and non-COST countries has been addressed during the meetings (see presentations and book of abstracts on COST website). Moreover, the final overview of vegetable grafting in Europe and other non-COST countries has been reported in chapter 1 of COST Book entitled 'Introduction to vegetable grafting' (see attached book file).
D2 – Information about potentially interesting germplasm for developing new rootstocks.	Yes	Potentially interesting germplasm for developing new rootstocks has been identified during the Meetings (see attached book file). Moreover, WG 1 members reported much of the information generated during the WG activity in the the COST Book chapter 2 entitled 'Genetic resources for vegetable rootstock breeding' where a complete view of germplasm for developing new rootstocks is described (see attached book file).
D3 – Information about current rootstock breeding activities.	Yes	Current rootstock breeding strategies have been discussed during the meetings and round tables with stakeholders (see books of abstracts on COST website). Moreover, WG 1 members wrote the COST book chapter 3 entitled 'Rootstock breeding: current practices and future technologies' where a complete presentation of current rootstock breeding programs is reported (see attached book file).
D4 – Identification of the major physiological and genetic determinants of root and shoot interaction and compatibility.	Yes	Major physiological and genetic determinants of root and shoot interaction and compatibility have been discussed during the meetings (see books of abstracts in COST website). Several STSMs have been carried out to elucidate the key factors involved in rootstock-scion interaction under several abiotic stresses (see STSM reports in COST website). Moreover, WG 2 members wrote two chapters of the COST book (chapter 4 – 'Rootstock-scion signalling: key factors mediating scion performance'; chapter 5 - Physiological and molecular mechanisms underlying graft compatibility) where a complete up-to-date review of the major physiological and genetic determinants of root and shoot interaction and compatibility are reported (see attached book file).
D5 – Identification of the main factors limiting vegetable crop productivity.	Yes	Major limiting factors of vegetable crop productivity in COST and Non-COST countries have been identified especially through the activity of WG 3. The yield-limiting factors, mainly soilborne pathogens (e.g., <i>Fusarium</i> spp., <i>Verticillium</i> spp., <i>Phytophthora capsici</i> , nematodes), salinity, and thermal stresses (cold stress in early planting of Cucurbits or heat stress in late planting of Cucurbits and Solanaceous crops), have been presented during the meetings together with research data showing the potential use of certain rootstocks to overcome these problems. This information has been used to write the COST Book chapters 6 ('Grafting as agro-technology for reducing disease damage'), and 7 ('Grafting as a tool to tolerate

		abiotic stress') (see attached book file).
D6 – Information about rootstock effects on biotic/abiotic stress resistance and resource use efficiency.	Yes	Information about rootstock effects on biotic/abiotic stress resistance/tolerance and resource use efficiency have been discussed during the meetings (see books of abstracts in COST website). Several STSMs have been carried out on elucidating effects of rootstocks on (a)biotic stress tolerance/resistance (see STSM reports in the COST website). Moreover, WG participants wrote chapters 6 ('Grafting as agro-technology for reducing disease damage'), and 7 ('Grafting as a tool to tolerate abiotic stress') where a complete description of rootstock mediated improvement of (a)biotic stress tolerance/resistance is reported (see attached book file).
D7 – Information about the rootstock effects on fruit quality with particular emphasis on nutritional quality.	Yes	Information about the rootstock effects on fruit quality have been discussed during the meetings (see books of abstracts in COST website). Several STSMs have been carried out to elucidate the effects of rootstocks on fruit quality (see STSM reports in COST website). Moreover, WG participants contributed to the COST Book by writing the chapter 8 entitled 'Quality of grafted vegetables' where a complete description of rootstock effects on fruit quality attributes is reported (see attached book file).
D8 – Identification of further rootstock breeding strategies to generate new rootstocks and to improve desirable traits in crop varieties of selected species.	Yes	Future rootstock breeding strategies have been discussed during the meetings and round tables with stakeholders of the grafting industry (see books of abstracts in COST website). A summary of the outcome of the main grafting and rootstock-related problems faced per crop can be found on the COST website. These findings have also been used to prepare H2020 proposals in the frame of the call SC2 SFS-5-2015 and SFS-2016-2. Moreover, WG members wrote the chapter 3 entitled 'Rootstock breeding: current practices and future technologies' where a complete presentation of rootstock breeding strategies is reported (see attached book file).
D9 - Creation of a database containing the main information about vegetable grafting, available to the scientific community, private companies, vegetable growers, and other institutions.	Yes	The COST database has been realized, including information collected by all WG members (see presentation of database in COST Action website). The database has been built thanks to two STSMs (see reports in COST Action Website).
D10 - Providing opportunities for research groups to develop joint research programmes.	Yes	The COST Action generated several research projects and joint research programmes among COST participants. This is demonstrated by the high number of STSMs and the submission of two H2020 proposals, and a FACCE-ERA-NET proposal and several bilateral research projects on vegetable grafting.
D11 - Information sharing through workshops and meetings, internet, scientific publications in journals and books	Yes	The D11 deliverable has been fully achieved through the organization of eight meetings in which the grafting industry was involved during round tables and technical visits, one workshop, two training schools, 19 STSMs, several scientific publications and a final book (see COST website; and attached book file).

Co-authored publications and FP7/ H2020 proposals

The co-authored publications and FP7/ H2020 proposals/ projects resulting from the Action are listed on the page following the “Additional outputs and achievements” section

Additional outputs and achievements

Please describe any other outputs and achievements that have resulted, focusing in particular on those that contribute to the COST mission of “COST enables break-through scientific developments leading to new concepts and products and thereby contributes to strengthen Europe’s research and innovation capacities.”

- Identification of germplasm available in germplasm banks of COST Countries (e.g., in Greece, Turkey, Spain, Bulgaria, Portugal) potentially interesting for developing new rootstocks.
- Understanding of some biochemical and physiological mechanisms related to biotic/abiotic stress resistance/tolerance of rootstocks and scion-rootstock interaction to be used in breeding programs.
- Knowledge of the influence of rootstocks on nutritional quality and especially aroma volatile compounds.
- Application of grafting in new vegetable crops (artichoke, common bean).
- Advanced strategies for reducing pathogen transmission during grafting (LASER cutting and protocol for production of grafted plants).
- Advanced methodologies to study grafting compatibility (electric impedance measurements; SEM analysis).
- Identification of signalling compounds (e.g. hormones, mRNA, ions) involved in root to shoot communication (and *vice versa*) during plant development and (a)biotic stress through the use of ‘omics’ technologies (metabolomics, proteomics, ionomics, transcriptomics) to be used as biomarkers for selective rootstock breeding.
- A list of vegetable crop specific practical problems that are currently faced by modern rootstocks and grafting technologies, which can be a startpoint to develop new joint research initiatives among private companies and public research institutes.

Co-authored publications and FP7/ H2020 proposals

Co-authored publications

Enter in the table below only publications on the topic of the Action, co-authored by at least two Action participants from two different countries participating in the Action and for which the Action networking added value. A maximum of ten publications may be entered. If the Action has more than ten such publications the Core Group should select the ten most significant ones to include in the table below.

NO.	Bibliographic data (including: Title, Authors, Title of the periodical or the series, Issue number or volume, Publisher, Year of publication, Relevant pages)	Main author	Number of authors	Action participants listed among the authors (Name, country and role ²)	WGs involved in publication	Date of submission (must be after Action start date)	Expected date of publication (if not already published)	Persistent link to publicly available version of the paper (if available) or the abstract	Is/Will open access ³ provided to this publication?	Is/ will COST be cited/ acknowledged in the publication?	Are/ will COST funds (be) implicated in this publication	Relevance to H2020 Societal Challenges ⁴ ?	Is it peer-reviewed?	Was the added value of the Action Networking necessary for the publication	Impact Factor (if applicable)
1	Albacete, A., Martínez-Andújar, C., Martínez-Pérez, A., Thompson, A.J., Dodd, I.C., Pérez-Alfocea, F. 2015. Unravelling rootstockxscion interactions to improve food security. <i>Journal of Experimental Botany</i> , 66 (8), pp. 2211-2226.	Pérez-Alfocea, F.	6	Albacete, A. (WG member), Pérez-Alfocea, F. (vice-Chair), Spain. Thompson, A.J. (WG1 leader), Dodd, I.C. (WG2 co-leader), UK	1, 2,3,4	2014		http://jxb.oxfordjournals.org/content/66/8/2211.abstract	No	No	No	Yes	Yes	Yes	5.526
2	Schwarz, D., Thompson, A. J., & Kläring, H.-P. (2014). Guidelines to use tomato in experiments with a controlled environment. <i>Frontiers in Plant Science</i> , 5, 625. doi:10.3389/fpls.2014.00625	Schwarz D.	3	Schwarz, D., (WG3 Leader), Germany Thompson, A. J., (WG1 Leader), UK	1, 3	2014		http://journal.frontiersin.org/article/10.3389/fpls.2014.00625/full	Yes	No	No	Yes	Yes	Yes	3.9
3	Ntatsi, G., Savvas, D., Kläring, H.-P., Schwarz, D. (2014). Growth, yield, and metabolic responses of temperature-stressed tomato to grafting onto rootstocks differing in cold tolerance. <i>Journal of the American Society for Horticultural Science</i> , 139 (2), pp. 230-243.	Schwarz, D.	4	Ntatsi, G., (Editorial Board Coordinator), Greece Savvas, D., (STSM Coordinator), Greece Schwarz, D. (WG3 Leader), Germany	1, 2, 3	2013		http://journal.ashspublications.org/content/139/2/230.abstract	No	No	No	Yes	Yes	Yes	1.05
4	Ntatsi, G., Savvas, D., Huntenburg, K., Druège, U., Hinch, D.K., Zuther, E., Schwarz, D. (2014). A study on ABA involvement in the response of tomato to suboptimal root temperature using reciprocal grafts with notabilis, a null mutant in the ABA-biosynthesis gene LeNCE1. <i>Environmental and Experimental Botany</i> , 97, pp. 11-21.	Schwarz, D.	7	Ntatsi, G., (Editorial Board Coordinator), Greece Savvas, D., (STSM Coordinator), Greece Schwarz, D. (WG3 Leader), Germany	1, 2, 3	2012		http://ac.els-cdn.com/S0098847213001408/1-s2.0-S0098847213001408-main.pdf?_tid=da48fce4-3755-11e5-a36e-00000aabb0f6c&acdnat=1438327937_e39b4507ec553b5f4201444068134b4f	No	No	No	Yes	Yes	Yes	3.36
5	Kumar, P., Lucini, L., Roupheal, Y., Cardarelli, M., Kalunke, R.M., Colla, G. (2015). Insight into the role of grafting and arbuscular mycorrhiza on cadmium stress tolerance in tomato. <i>Frontiers in Plant Science</i> , 6, 16 p.	Colla, G.	6	Colla, G., (Chair), Italy Roupheal, Y. (WG 4 participant), Lebanon Cardarelli, M., (MC Substitute) Italy Kumar, P., (WG 3 participant) India	2, 3, 4	2015		http://www.ncbi.nlm.nih.gov/pmc/articles/PMC4481154/pdf/fpls-06-00477.pdf	yes	No	No	Yes	Yes	Yes	3.9
6	Colla, G., Fiorillo, A., Cardarelli, M., Roupheal, Y. (2014). Grafting to improve abiotic stress tolerance of fruit vegetables. <i>Acta Horticulturae</i> , 1041, pp. 119-126.	Roupheal, Y.	4	Colla, G., (Chair), Italy Roupheal, Y. (WG4 participant), Lebanon Cardarelli, M., (MC Substitute) Italy	3	2014		http://www.ishs.org/ishs-article/1041_12	No	No	No	Yes	Yes	Yes	0.0
7	Orsini, F., Sanoubar, R., Oztekin, G.B., Kappel, N., Tepecik, M., Quacquarelli, C., Tuzel, Y., Bona, S., Gianquinto, G. (2013). Improved stomatal regulation and ion partitioning boosts salt tolerance in grafted melon. <i>Functional Plant Biology</i> , 40 (6), pp. 628-636.	Gianquinto, G.	9	Orsini, F. (WG3 participant), Italy Öztekin, G.B. (WG 3 participant), Turkey Kappel, N. (MC Member), Hungary Tüzel, Y. (WG3 participant), Turkey	2,3	2012		http://www.publish.csiro.au/?act=view_file&file_id=FP12350.pdf	No	No	No	Yes	Yes	Yes	2.57

²MC Member/ MC Substitute/ MC Observer/ WG Member/ Training School Trainee/ STSM Recipient/ Other Action Participant

³Open Access is defined as free of charge access for anyone via Internet. Please answer "yes" if the open access to the publication is already established and also if the embargo period for open access is not yet over but you intend to establish open access afterwards.

⁴ H2020 Societal Challenges are "Health, demographic change and wellbeing"; "Food security, sustainable agriculture and forestry, marine and maritime and inland water research, and the Bioeconomy"; "Secure, clean and efficient energy"; "Smart, green and integrated transport"; "Climate action, environment, resource efficiency and raw materials"; "Europe in a changing world - inclusive, innovative and reflective societies"; "Secure societies - protecting freedom and security of Europe and its citizens"

8	Colla, G., Roupael, Y., Jawad, R., Kumar, P., Rea, E., Cardarelli, M. (2013). The effectiveness of grafting to improve NaCl and CaCl ₂ tolerance in cucumber. <i>Scientia Horticulturae</i> , 164, pp. 380-391.	Colla, G.	6	Colla, G., (Chair), Italy Roupael, Y. (WG4 participant), Lebanon Cardarelli, M., (MC Substitute), Italy Kumar, P. (WG3 participant), India	3,4	2013	http://ac.els-cdn.com/S0304423813004822/1-s2.0-S0304423813004822-main.pdf?_tid=b9378690-375c-11e5-9a7f-00000aacb35e&acdnat=1438330888_f4b2e14b1241e9681c17321442974320	No	No	No	Yes	Yes	Yes	1.36
9	Dasgan, H.Y., Balacheva, E., Yetisir, H., Yarsi, G., Altuntas, O., Akhoundnejad, Y., Coban, A. (2015). The effectiveness of grafting to improve salt tolerance of sensitive melon when the tolerant melon is use as rootstock. <i>Procedia Environmental Sciences</i> , 29, 268.	Dasgan H.Y.	7	Dasgan, H.Y. (WG1 Participant) Turkey, Balacheva E. (WG3 Participant), Bulgaria Yetisir, H. (MC member and WG1 co-Leader) Turkey Yarsi, G., Altuntas, O., Akhoundnejad, Y. and Coban, A. (trainee at second vegetable grafting training school), Turkey	1, 3	2015	http://www.sciencedirect.com/science/article/pii/S1878029615004156	Yes	No	No	Yes	Yes	Yes	0.0
10	Roupael, Y., Rea, E., Cardarelli, M., Bitterlich, M., Schwarz, D., Colla, G. (2016) Can Adverse Effects of Acidity and Aluminum Toxicity Be Alleviated by Appropriate Rootstock Selection in Cucumber? <i>Frontiers in Plant Science</i> , 7, 1283.	Colla G.	6	Roupael, Y. (WG4 participant) Italy Rea, E. (WG3 participant) Italy Cardarelli, M. (MC substitute) Italy Bitterlich, M. (WG3 participant), Germany Schwarz, D. (WG3 Leader) Germany Colla, G. (Chair) Italy	3,4	2016	http://journal.frontiersin.org/article/10.3389/fpls.2016.01283/full	Yes	No	No	Yes	Yes	Yes	4.49

FP7/ H2020 Proposals and projects

This table contains FP7/ H2020 proposals/ projects spinning off from Action activities and including in the proposing consortium at least three Action participants from at least three different countries participating in the Action.

NO.	Title	Name and country of main proposer	Number of proposers	Action participants listed among the proposers (Name, country, role ³ in the Action)	Funding agency submitted to	Date submitted	Date results expected	Result	Call identifier	Relevance to H2020 Societal Challenges ⁴ ?	Was the added value of the Action Networking necessary for the proposal / project?
Projects											
1	List FP7/ H2020 projects resulting from the Action in this section of the table										
Proposals											
	Horizon 2020Topic: SFS-03-2016 - Type of action: RIA Proposal ID: SEP-210339659 - Proposal acronym: ROOTBREED - Title: Rootstock breeding for a more sustainable and resilient horticulture	Dr. Francisco Perez Alfocsa, Agencia Estatal Consejo Superior de Investigaciones Cientificas -CSIC. Spain	20	1.CSIC. Spain (Vice Chair) 2. CRANFIELD UNIVERSITY United Kingdom (MC Member) 3. UNIVERSITAT POLITECNICA DE VALENCIA Spain (WG Member) 4. LANCASTER UNIVERSITY United Kingdom (MC Member) 5. AGRICULTURAL RESEARCH ORGANIZATION Israel(MC Member) 6. UNIVERSITA DEGLI STUDI DELLA TUSCIA Italy (Chair - MC Member) 7. AGRICULTURAL UNIVERSITY OF ATHENS Greece(MC Member) 8. INSTITUTO POLITECNICO DE VIANA DE CASTELO Portugal(MC Member) 9. LEIBNIZ-INSTITUT FUR GEMUSE- UND ZIERPFLANZENBAU GROSSBEEREN/ERFURT EV Germany (MC Member) 10 UNIGENIA BIOSCIENCE SLU Spain (WG1 member) 11. Rootility Ltd. Israel (WG2 and WG3 members and Observers members) 12 Huazhong Agricultural University China (People's Republic of) (Other participants accepted the MoU)	Interspecific hybridization and hybrid seed yield	17.02.2016	September 2016	Rejected	Horizon 2020 Topic: SFS-03-2016	"Food security, sustainable agriculture and forestry, marine and maritime and inland water research, and the Bioeconomy"	Yes, the proposal is mainly originated by the Action Networking
	Horizon 2020Topic: SFS-05-2015 - Type of action: RIA Proposal number: 678910-2 - Proposal acronym: ROSE - Title: Unravelling	Dr. Francisco Perez Alfocsa, Agencia	20	1.CSIC. Spain (Vice Chair) 2. CRANFIELD UNIVERSITY United Kingdom (MC	European Commission -	11/06/2015	October 2015	not financed	Call: H2020-	"Food security, sustainable	Yes, the proposal is

	Rootstock x Scion x Environment Interactions to Increase Yield Stability and Quality in Horticultural Crops	Estatat Consejo Superior de Investigaciones Cientificas -CSIC. Spain.		<p>Member)</p> <p>3. UNIVERSITAT POLITECNICA DE VALENCIA Spain (WG Member)</p> <p>4. LANCASTER UNIVERSITY United Kingdom (MC Member)</p> <p>5. AGRICULTURAL RESEARCH ORGANIZATION Israel(MC Member)</p> <p>6. UNIVERSITA DEGLI STUDI DELLA TUSCIA Italy (Chair - MC Member)</p> <p>7. AGRICULTURAL UNIVERSITY OF ATHENS Greece(MC Member)</p> <p>8. INSTITUTO POLITECNICO DE VIANA DE CASTELO Portugal(MC Member)</p> <p>9. LEIBNIZ-INSTITUT FUR GEMUSE- UND ZIERPFLANZENBAU GROSSBEEREN/ERFURT EV Germany (MC Member)</p> <p>10 UNIGENIA BIOSCIENCE SLU Spain (WG1 member)</p> <p>11. Rootility Ltd. Israel (WG2 and WG3 members and Observers members)</p> <p>12 Huazhong Agricultural University China (People's Republic of) (Other participants accepted the MoU)</p>	Research				SFS-2015-2	agriculture and forestry, marine and maritime and inland water research, and the Bioeconomy"	mainly originated by the Action Networking
	FACCE-ERA-NET 'Exploring novel Cucurbit germplasm for rational rootstock breeding under a changing climate'	Prof. Giuseppe Colla, University of Tuscia, Italy	14	<p>1.University of Tuscia, CRA-RPS, Italy</p> <p>2.Agricultural Research Organization, Israel</p> <p>3.Agricultural Research Institute, Cyprus</p> <p>4.Leibniz Institute of Vegetable and Ornamental Crops, Germany</p> <p>5.Institute of Experimental Botany Academy of Sciences of the Czech Republic</p> <p>6.University of Lancaster, UK</p> <p>7.Cranfield University, UK</p> <p>8.Agroscope, Switzerland</p> <p>9.CTIFL (Centre technique interprofessionnel des fruits et légumes), France</p> <p>10. Research and Development Institute for Industrialization and Marketing of Horticultural Products – HORTING, Romania</p> <p>11. Universitat Politècnica de València, Spain</p> <p>12. Consejo Superior de Investigaciones Cientificas-Centro de Edafología y Biología Aplicada del Sgura (CSIC-CEBAS), Spain</p> <p>13. La Semiorto Sementi, Italy</p> <p>14. Unigenia Bioscience, Spain</p>	European Commission - Research	1/12/2013	February 2014	Rejected	FACCE-JPI Call for proposals on Climate Smart Agriculture	yes	yes

I.C. Networking

Added value of the Networking

The interdisciplinary network permits a better understanding of genetic resources available for rootstock breeding, the mechanisms behind the rootstocks resistance against environmental stresses, the grafting compatibility, and the influence of rootstocks on fruit quality.

The members of the COST action cover all the key disciplines: breeding, genetics, physiology, molecular biology, biochemistry, biotechnology, plant pathology, agronomy, and food science. The different expertises were fundamental for developing inter-disciplinary research projects in the field of vegetable grafting. Two proposals on vegetable grafting in the frame of Horizon 2020 (Topics SFS-05-2015 and SFS-03-2016) have been submitted and unfortunately were not approved. Moreover, another research proposal in the frame of FACCE-ERA-NET call has been submitted but it did not pass the first step of evaluation. COST Action has also allowed collaborations among scientists with exchange of germplasm for studying scion-rootstock interaction and for developing new rootstocks. STSMs have allowed establishment of cooperations among COST Action participants fostering the achievement of WG goals. Exchange of scientists among COST Institutions have been promoted by the COST Action networking (e.g., dr. R. Cohen (WG 3 vice-leader) visited in summer 2014 the research group of dr. D. Schwarz (WG3 leader) at the IGZ, Grossbeeren, Germany, to develop research activities on vegetable grafting using Cucurbit germplasm of Volcani Center, Israel; dr. M. Edelstein (WG 3 member) visited in 2016 for 6 months the research group of dr. D. Schwarz (WG3 leader) at the IGZ, Grossbeeren, Germany to conduct research activities on vegetable grafting and abiotic stress tolerance; dr. D. Schwarz and Mr. P. Förster from IGZ, Grossbeeren, Germany visited in 2016 the research group of dr. R. Cohen in Volcani Center, Israel to discuss possible collaborations in the field of vegetable grafting). Cooperation among COST Action participants allowed the development of several bilateral research projects like the 2014 China-Israel joint research project entitled 'Exploration, innovation and application of excellent *Cucurbita* rootstock germplasm from China and Israel' involving the Agricultural Research Organization, Volcani Center (Israel) with the research group of dr. Roni Cohen (WG3 vice-Leader), and the Huazhong Agricultural University (China) with the research group of Prof. Zhilong Bie (MC Observer). Many results achieved from cooperations among COST members have been published in scientific and technical journals.

The COST Action network permitted the establishment of a team of skilled trainers and the organization of two training schools for improving the knowledge and research skills of trainees (primarily PhD-students) on vegetable grafting field. The COST Action network provided the expertises for the teaching activity needed in the first training school organized in Sicily (Italy) with 15 trainees. Moreover, the COST network between scientists and private companies allowed the organization of a practical part of the training school at the Centro SEIA Nursery, Ragusa, Sicily, Italy and the organization of a round tables with seed companies to discuss practical aspects of vegetable grafting.

During the second training school, organised in The Netherlands, four top scientists (members of COST Action) in the field of root-shoot signalling were invited as teachers. The theoretical part in the form of lectures was combined with a practical part during which the participants (19 Trainees) learned the techniques needed for rootstock-scion signalling research. In addition, a technical tour through the Dutch horticultural chain (grafting nursery, rootstock breeder and tomato grower) was organized (see COST website). This tour was possible thanks to the COST network which involved not only scientists from public institutions but also participants from private companies (seed companies, nurseries, etc.)

Interactions between breeding companies/nurseries/growers and academic researchers increased during the COST Action and permitted the understanding of the practically and commercially most important traits to target in rootstock breeding programs.

The table below shows the extent to which it would have been possible to achieve each of the Action's objectives without the Action networking.

MoU objective	Possibility of achievement without Action networking		
	Fully	Partially	Impossible
1) to list the current genetic variability existing in each vegetable species as well as the current breeding programs in COST and non-COST countries			X
2) to define major physiological and genetic determinants of root and shoot development and compatibility of rootstock-scion		X	
3) to determine the current status of knowledge about rootstock-		X	

mediated crop improvement so as to mitigate the impact of biotic, abiotic and combined stresses, thus improving resource use efficiency			
4) to list the effects of rootstocks on fruit quality in order to define strategies for a better understanding and exploitation of the signalling processes involved		X	
5) to create an international database with the information generated by the COST Action (e.g. disease resistance of rootstocks, abiotic stress tolerance of rootstocks, compatibility issues, sources of rootstocks, vigour effects on scion, grafting techniques, etc.)			X
6) to define classical and biotechnological breeding strategies to prepare the generation of new rootstocks improving desirable traits in crop varieties of selected species			X
7) to transfer available knowledge into the practice		X	
8) to use all the information collected to identify particular topics which could be used to develop new research projects		X	

Extent of the networking

The extent of the networking among the participants in the COST Action showed a good integration of all participants into the network as demonstrated by the high numbers of presentations from COST members during the COST meetings, the high number of STSMs, the good number of proposals/projects and publications. Below are reported some data about the extent of the networking.

1. Number of WG Participants from Inclusiveness Countries (ITCs) in WG1: 12; in WG2: 6; in WG3: 16; in WG4: 5.
2. 15 ESRs involved in the 1st Training School, 19 ESRs in the 2nd Training School, 43 Early Career Investigators (ECIs)/ Young Researchers involved in the networking activities;
3. Gender balance assured a good percentage of women in the network: 35%

I.D. Impacts

The impacts that have resulted, or might result from the Action are described in the following table.

Description of the impact	Type of impact ⁴	Timing of impact ⁵
Establishment of collaborations between scientists, public research institutions and private companies (seed companies, nurseries, vegetable grower associations) through the organization of meetings, STSMs, training schools, research projects, technical visits and website. Scientific information on vegetable grafting available for scientists, professionals and practitioners working in the grafting industry (e.g. book of abstracts, database, final book).	Scientific/ technological	Achieved
Development of new rootstocks which minimize negative impacts of biotic/abiotic stresses on yield, increase resource use efficiency thus reducing agriculture's environmental footprint, and significantly improve commercial and nutritional quality of the product, thus opening new market opportunities. Increase on the production and use of grafted plants belonging to Solanaceous crops and Cucurbits. Improvement of the quality of grafted plants in nurseries thanks to the knowledge generated during the COST Action. Scientific and technical information on vegetable grafting generated during the COST Action will be used to generate new research projects. Increase of publications on vegetable grafting due to the establishment of collaborations among scientists.	Scientific/ technological Economical	Foreseen 2-5 years
Identification of the utility of grafted plants in different European vegetable production areas with particular emphasis on how	Scientific/ technological	Foreseen 5-10 years

⁵Achieved/ Foreseen within 2 years/ Foreseen 2-5 years/ Foreseen 5-10 years/ Foreseen 10+ years

<p>grafted plants can ameliorate the efficiency of resource use, yield stability under changing environmental conditions, the quality of rural life reducing the needs of chemical applications (e.g. pesticides), and improve the food quality and safety from the consumer/citizen perspective.</p> <p>Increase on the production and use of grafted plants in specialty crops (artichoke, common bean).</p> <p>Increase on the use of automation in the grafting process thanks to the implementation of semi- or fully-automated grafting robots.</p>	Economic Societal	
-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------	----------------------	--

I.EDissemination and exploitation of Action results

Describe the Action's dissemination and exploitation approach as well as all activities undertaken to ensure dissemination and exploitation of Action results and the effectiveness of these activities.

Many dissemination activities have been carried out during the COST Action. These include the creation of a website, the organization of 4 steering committee meetings and 4 annual conferences, the organization of a MERC-COST Workshop, the participation of the Chair and other COST members at several international and national conferences where the results of COST Action were presented, the publications of articles, a newsletter, a brochure, and especially a final book containing the knowledge generated during the COST Action by the WG activities, the production of three Videos (one educational video on vegetable grafting by the Chair, and the two others addressed to present the COST Action results by the WG leaders). Several round tables have been organized during the meetings to promote the interaction between scientists and private companies (seed companies, and nurseries).

Item/ activity	Target audience	Result	Hyperlink
Meetings, round tables	Scientists, agronomists, breeders, nurserists, horticulturists	Presentations of COST Action results, and book of abstracts	http://www.vegetablegrafting.unitus.it
ISHS Conferences	Scientists, breeders, nurserists, horticulturists	Presentations of COST Action results	https://www.amiando.com/OGH_Symposium2013.html http://www.ishs.org/ishs-book/1086
EPSO Newsletter	General	Dissemination of COST Action	http://www.epsoweb.org/newsletter/newsletter-september-2013
Tri-fold flyer	General	Dissemination of COST Action	http://www.vegetablegrafting.unitus.it/iframe/trifold_brochure_cost_2014_final.pdf
Videos	Scientific Community and vegetable grafting value chain	3 Videos available	Availables embedded in website from FA1204 youtube channel: https://www.youtube.com/user/fa1204
MERC-COST Workshop	Scientists, agronomists, breeders, nurserists, horticulturists	Presentations of COST Action results	http://www.vegetablegrafting.unitus.it
Book	Scientists, agronomists, breeders, nurserists, horticulturists	Presentations of COST Action results	http://www.cabi.org/bookshop/book/9781780648972

I.F. Action success(es)

COST regularly communicates the successes of Actions. At this point in time what aspect(s) (outcomes and/ or impacts, rather than activities) of this Action is/ are the most suitable for communication.

Description of the success story	Dimension of the success <ul style="list-style-type: none"> ■ Breakthrough: scientific, technological or socioeconomic ■ Policy implementation (specify which policy) ■ Capacity building
1. Identification of germplasm available in COST Countries germplasm banks (e.g., in Greece, Turkey, Spain) potentially interesting for developing new rootstocks.	Scientific breakthrough
2. Understanding of biochemical and physiological mechanisms related to biotic/abiotic stress resistance/tolerance of rootstocks and scion-rootstock interaction and graft compatibility.	Scientific breakthrough
3. Identification of rootstocks that can improve stress resistance/tolerance in grafted plants to biotic (soilborne pathogens like <i>Fusarium</i> spp. <i>Verticillium</i> spp., <i>Rhizoctonia solani</i> , viruses) and abiotic (salinity, drought, nutrient deficiency, toxic elements like aluminum and arsenic, and organic pollutants) stresses.	Scientific breakthrough
4. Understanding of the influence of rootstocks on nutritional quality and especially aroma volatile compounds in Cucurbits and Solanaceous crops.	Scientific breakthrough
5. Development of breeding strategies for generating new rootstocks	Scientific breakthrough
6. Definition of production procedures to increase the quality of grafted plants at nursery level.	Scientific and technological breakthrough
7. Application of grafting in new specialty crops (eg. artichoke, common bean).	Scientific breakthrough

II. Management Report

II.A. Overview of expenditure

The table below summarises the Action's expenditure throughout its four year life.

	Grant Period 1	Grant Period 2	Grant Period 3	Grant Period 4	TOTAL
GP start and end dates	01/02/2013 01/06/2014	02/06/2014 31/05/2015	01/06/2015 30/04/2016	01/05/2016 30/09/2016	TOTAL
Grant Holder institution	University of Tuscia - DAFNE (IT)	University of Tuscia - DAFNE (IT)	University of Tuscia - DAFNE (IT)	University of Tuscia - DAFNE (IT)	
Meetings	€ 132.896,98	€ 78.534,35	€ 50.897,17	€ 54.163,44	€ 316.491,94
Training Schools	€ 0,00	€ 18.702,83	€ 18.478,80	€ 0,00	€ 37.181,63
STSMs	€ 20.742,00	€ 6.250,00	€ 15.500,04	€ 2.500,00	€ 44.992,04
Dissemination	€ 3.669,00	€ 12.000,00	€ 0,00	€ 0,00	€ 15.669,00
OERSA	€ 721,14	€ 509,14	€ 1.400,00	€ 144,00	€ 2.774,28
Total Scientific Expenditure	€ 158.029,12	€ 115.996,32	€ 86.276,01	€ 56.807,44	€ 417.108,89
FSAC	€ 22.847,58	€ 16.854,17	€ 12.941,40	€ 8.521,12	€ 61.164,27
TOTAL	€ 180.876,70	€ 132.850,49	€ 99.217,41	€ 65.328,56	€ 478.273,16

¹ OERSA = Other Expenses Related to Scientific Expenditure (e.g. bank charges)

² FSAC = Amount received by Grant Holder for Financial Scientific and Administrative Coordination

II.B. Budget and Participation management

II.B.1 Budget spent in relation to individuals/ institutions outside participating COST countries

STSMs from or to institutions from countries other than Participating COST countries

The table below describes the added value STSMs to approved institutions in IPC or NNC or Specific Organisations and any STSMs from an approved institution in an NNC to a participating COST country.

Grantee		Host		Date	Topic and value added to the Action
Institution	Country	Institution	Country		
Lebanese University, Dekwaneh, Lebanon		University of Tuscia, Italy		2013- 07-01 to 2013- 09-30	Reduction of nickel translocation from roots to shoots in tomato by grafting onto Solanum rootstocks. The Researcher granted by a STSM conducted a scientific investigation in the host institution, aimed at reducing the translocation of nickel, a harmful heavy metal, from roots to shoots in tomato by grafting onto Solanum rootstocks.

<i>Invited Speakers</i>					
The table below highlights the added value of Invited Speakers from COST countries that have not accepted the MoU and/ or non-participating NNC, IPC or Specific Organisations whose participation at a meeting or Training School was reimbursed by the Action.					
Participant name	Institution	Country	Event date	Topic and added value to the Action	
Add	Add	Add	Add	Describe the speaker's topic and the added value to the Action	
<i>Dissemination meetings</i>					
The table below highlights the added value of Dissemination Meetings financed from Action funds.					
Participant name	Role	Country	Date	Location	Topic and added value to the Action
Add	Add	Add	Add	Add	Describe the speaker's topic and the added value to the Action

II.C. Participants

Management Committee		
Name	Country	Email address
Chair and Vice-Chair		
Giuseppe COLLA	Italy	giucolla@unitus.it
Francisco PEREZ ALFOCEA	Spain	alfocea@cebas.csic.es
MC Members		
Lieve WITTEMANS	Belgium	lieve.wittemans@proefstation.be
Justine DEWITTE	Belgium	justine.dewitte@proefcentrum-kruishoutem.be
Nikolay VELKOV	Bulgaria	velkov_n@abv.bg
Rossitza RODEVA	Bulgaria	r.rodeva@abv.bg
Smiljana GORETA BAN	Croatia	smilja@krs.hr
Katja ZANIC	Croatia	katja@krs.hr
Marios KYRIACOU	Cyprus	m.kyriacou@ari.gov.cy
George SOTERIOU	Cyprus	soteriou@ari.gov.cy
Pavel VITAMVAS	Czech Republic	vitamvas@vurv.cz
François VILLENEUVE	France	villeneuve@ctifl.fr
Sarah COOKSON	France	sarah.cookson@bordeaux.inra.fr
Dietmar SCHWARZ	Germany	Schwarz@igzev.de
Rita GROSCH	Germany	Grosch@igzev.de
Georgia NTATSI	Greece	gntatsi@aua.gr
Dimitrios SAVVAS	Greece	dsavvas@aua.gr
Noémi KAPPEL	Hungary	noemi.kappel@uni-corvinus.hu
Noemi LUKACS	Hungary	noemi.lukacs@uni-corvinus.hu
Menahem EDELSTEIN	Israel	medelst@volcani.agri.gov.il
Roni COHEN	Israel	ronico@volcani.agri.gov.il
Cherubino LEONARDI	Italy	cherubino.leonardi@unict.it
Alberto BATTISTELLI	Italy	alberto.battistelli@ibaf.cnr.it
Līga LEPSE	Latvia	liga.lepse@puresdis.lv
Charles ZAHRA	Malta	czahra.malta@gmail.com
Jan Henk VENEMA	Netherlands	j.h.venema@rug.nl
Anja DIELEMAN	Netherlands	anja.dieleman@wur.nl
Ivan PAPONOV	Norway	ivan.paponov@nibio.no
Carl SPETZ	Norway	carl.spetz@bioforsk.no
Isabel MOURAO	Portugal	isabelmourao@esa.ipvc.pt
Elvira FERREIRA	Portugal	elvira.ferreira@iniav.pt
Marian BOGOESCU	Romania	bogoescumarian@gmail.com
Victor LACATUS	Romania	victorlacatus@gmail.com

