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EGFV - Ecophysiologie et génomique fonctionnelle de la vigne

Rapport Hcéres

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HCERES

High Council for the Evaluation of Research
and Higher Education

Research units

HCERES report on research unit:

Ecophysiology and Grape Functional genomics

EGFV

Under the supervision of
the following institutions
and research bodies:

Institut National de la Recherche Agronomique - INRA

Université de Bordeaux

Bordeaux Sciences Agro

HCERES

High Council for the Evaluation of Research
and Higher Education

Research units

In the name of HCERES,¹

Didier HOUSSIN, president

In the name of the experts committee,²

Evelyne COSTES, chairwoman of the
committee

Under the decree N°2014-1365 dated 14 november 2014.

¹ The president of HCERES "countersigns the evaluation reports set up by the experts committees and signed by their chairman." (Article 8, paragraph 5)

² The evaluation reports "are signed by the chairman of the expert committee". (Article 11, paragraph 2)

Evaluation report

This report is the result of the evaluation by the experts committee, the composition of which is specified below. The assessments contained herein are the expression of an independent and collegial deliberation of the committee.

Unit name:	Ecophysiology and Grape Functional genomics
Unit acronym:	EGFV
Label requested:	UMR
Present no.:	1287
Name of Director (2014-2015):	Mr Serge DELROT
Name of Project Leader (2016-2020):	Mr Serge DELROT

Expert committee members

Chair:	Ms Evelyne COSTES, INRA Montpellier (representative of the CSS INRA)
Experts:	Mr Christophe BERTSCH, universit� de Haute Alsace, Colmar (representative of the CNECA) Mr Marco BINDI, Universit� degli Studi di Firenze, Italie Mr Jean-Pierre JACQUOT, Universit� de Lorraine, Vandoeuvre (representative of the CNU)

Scientific delegate representing the HCERES:

Mr Philippe MEROT

Representatives of the unit's supervising institutions and bodies:

Ms Anne Fran oise ADAM-BLONDON, INRA, Biologie et Am lioration des Plantes
Mr Pierre DOS SANTOS, Universit  de Bordeaux
Mr Roger MARTHAN (representative of the Doctoral School "Sciences de la Vie et de la Sant " - ED n  154)
Mr Patrice REY, Bordeaux Sciences Agro
Mr Guy RICHARD, INRA, Environnement et Agronomie

1 • Introduction

History and geographical location of the unit

The scientific aim of the Joint Research Unit 1287 'Ecophysiology and Grape Functional genomics' (UMR EGFV) is to predict the development of the grapevine plant, the ripening of the berries, their metabolism in response to environmental constraints and genetic background. More precisely, it aims at understanding and modeling the physiological, genetic and molecular components of the response of grapevine plant and berry composition to abiotic factors. The unit is structured in two main themes, one dealing with the rootstocks and their interactions with the scion (Theme 1: Grafted Plant), the other one related to the effect of climate and microclimate on berry development and composition (Theme 2: Fruit Quality and Environment).

UMR EGFV has been created in January 2007 by putting together different research teams from Bordeaux and Poitiers. This creation involved a major restructuration of the research potential in Bordeaux on viticulture, since it merged the following groups:

(i) 'Grapevine Ecophysiology and Agronomy': a group led by Mr Jean-Pierre GAUDILLÈRE then Mr Philippe VIVIN, formerly attached to Joint Research Unit 1219 'Oenology-Ampelology', INRA Bordeaux, EA division.

(ii) 'Rootstock Genetics': a group led by Ms Nathalie OLLAT, formerly attached to the Research Unit 419 'Fruits and Grapevine', INRA Bordeaux, BAP Division.

(iii) 'Functional Genomics and Quality of Grape Berry': a group led by Mr Saïd HAMDÏ, formerly attached to the Joint Research Unit 619 'Fruit Biology', UB1 (molecular and cell biologists)

(iv) 'Sugars, signalling and secondary metabolites': a group led by Mr Serge DELROT, formerly attached to the Joint Research Unit 3091 'Assimilate Transport', University of Poitiers, transferred to the University of Bordeaux 2 (molecular and cell physiologists).

In addition to this association of different skills, the unit gathered people from different institutions: two INRA divisions 'Environment and Agronomy' (EA) and Plant Biology and Breeding (BAP), two Universities (Bordeaux 1 & Bordeaux 2, that merged as the University of Bordeaux in January 2014), and the National Agricultural Engineering School of Bordeaux (ENITA, called Bordeaux Sciences Agro, BSA, since January 2011).

In January 2009, the whole EGFV unit has been located at the INRA Grande Ferrade campus in Villenave d'Ornon, but in four different buildings. EGFV was part of the Institut des Sciences de la Vigne et du Vin Bordeaux-Aquitaine (ISVV), a cluster of structures dedicated to basic and translational research, and teaching in the area of grape and wine. In January 2014, ISVV became an autonomous institute within the University of Bordeaux, and a new building gathering all the EGFV staff was created.

Presently, all EGFV staff is located into this new building (1115 m²) in which the *in vitro* culture facilities and the growth cabinets for grapevine plantlets have been transferred. EGFV runs for its own use 2000 m² of greenhouses and associated equipment, among which 290 m² are shared with another laboratory (UMR ISPA). In addition, they will have access soon to 150 m² of a new S2-rated greenhouse. The laboratory also set up a platform equipped with 150 balances in a greenhouse in order to impose the same level of water stress to a wide range of plants, and uses 2 controlled growth chambers. In addition, several plots dedicated to long term research programmes have been planted or will be planted in 2015.

Within ISVV, EGFV develops collaborations with other Joint Research units, particularly 'Oenology', 'Plant Health' (SAVE), and the 'Polyphenols and health' (GESVAB) laboratories. EGFV also interacts with several laboratories belonging to the SFR 'Integrative Biology and Ecology' (BIE, a federative structure, called IFR 103 'Integrative Plant Biology' until January 2011), and most regularly with the Joint Research Unit of 'Fruit Biology'. The ISVV is an active part of the 'Green Campus' of the Bordeaux University which gathers, mainly on the INRA campus, all the laboratories involved in plant research. It is also member of the COTE Labex which gathers scientists working in biology, physics, chemistry, and socio-economical sciences.

Management team

EGFV is directed by Pr Serge DELROT, assisted by a direction board (CoDir). The board is presently composed of Mr Philippe VIVIN (INRA scientist, deputy director), Mr Eric GOMÈS (Pr UB, in charge of theme 2, deputy director), Ms Nathalie OLLAT (research engineer, in charge of theme 1), Ms Ghislaine HILBERT (engineer, representative of ITA), and

Ms Catherine CHABIRAND and Ms Catherine THILOULOUSE (secretaries). The CoDir meets about twice a month. Since 2014, a report is written and e-mailed to all the EGFV staff. This CoDir assists the director in the decision process (science, finance, management,...) and in some of the administrative work.

A scientific council (15 members, part elected, part nominated by the director) meets about 4 times per year. These meetings, which are open to all the staff, give general information, as well as short scientific progress reports for the two scientific themes. Scientific, financial and organizational issues are also discussed. A report is then dispatched by e-mail and on the intranet of EGFV.

Laboratory internal meetings are organized twice a month for each theme. The scientists in charge of the research themes, are also invited to attend the meetings of the other theme to ensure coordination and interactions. Meetings of the staff involved in the technical platforms are also organized whenever needed. Important and strategic issues (such as the present EGFV project) are discussed at the CoDir but also in dedicated assemblies of permanent scientists.

Internal presentations and seminars are organized twice a month, in addition to talks and seminars given by outside scientists in the laboratory, in the ISVV and at SFR BIE.

HCERES nomenclature

Principal domain: SVE2_LS9 Sciences et technologies du vivant, Biotechnologie

Secondary domains: SVE1_LS2 Génétique, Génomique, Bioinformatique, Biologie des systèmes; SVE2_LS3 Biologie cellulaire, Biologie du développement Végétal

Unit workforce

Unit workforce	Number as at 30/06/2014	Number as at 01/01/2016
N1: Permanent professors and similar positions	11	12
N2: Permanent researchers from Institutions and similar positions	5	5
N3: Other permanent staff (without research duties)	20	20
N4: Other professors (Emeritus Professor, on-contract Professor, etc.)	1	
N5: Other researchers from Institutions (Emeritus Research Director, Postdoctoral students, visitors, etc.)	1	
N6: Other contractual staff (without research duties)	2	
TOTAL N1 to N6	40	37

Unit workforce	Number as at 30/06/2014	Number as at 01/01/2016
Doctoral students	6	
Theses defended	13	
Postdoctoral students having spent at least 12 months in the unit	1	
Number of Research Supervisor Qualifications (HDR) taken	3	
Qualified research supervisors (with an HDR) or similar positions	5	5

2 • Overall assessment of the unit

Global assessment of the unit

EGFV had a positive evolution since the previous AERES evaluation in 2009. The academic production is in progress, with a significant increase of impact factors of the journals in which papers have been published.

The unit has also improved its international visibility by organising international conferences. New models and phenotypic tools have been developed which provide interesting perspectives for the unit. EGFV has access to platforms for molecular studies, an experimental unit, S2 greenhouses in their close environment, especially in UMR BFP.

The unit is organised into two thematic axes, which were already proposed in 2009. This organisation has been reinforced and an equilibrium between the two axes has been obtained, in terms of persons and contracts.

The announced arrival of a novel group in January 2016 is a very necessary development in EGFV. It will allow new scientific results in epigenetics on the adaptation on grapevine grown in abiotic stress conditions.

Recommendations / perspectives:

Despite the existence of some joint projects, the links between the two themes still need to be reinforced. The organisation in the two axes was very helpful in the merging of the former institutes and the creation of EGFV. But, crosscutting works and initiatives should be supported and sponsored for the optimisation of EGFV's future development. This was already pointed out by the previous evaluation committee and still requires specific efforts from the direction.

A key point concerns the EGFV budget which amounts to 530 k€ per year. Even though correct, this budget could be one of the reasons that limit the possibility to have Post docs positions in the unit. After several unsuccessful applications, the unit has experienced a decrease in funding sources during 2014. New applications have already been submitted in order to renew the contracts and budget available for the unit. The committee encourages the unit to amplify this effort and to dedicate part of the acquired budget to recruit post-docs.

Since the epigenetics domain is and will be very competitive, the absence of dedicated budget could be a main limitation to start this new activity in the unit. The committee supports the director in his decision to mutualise some funding to help launching activities on epigenetic in grapevine. However, the committee underlines the necessity to carefully prepare the positioning of the persons within EGFV. The choice to distribute the epigenetic activities into the two themes could be risky and maybe not the best solution considering the number of people involved. Defining a priority between the different topics could facilitate the integration of the scientists and their necessary investment on grapevine.

Strengths and opportunities in relation to the context

The grafted plant certainly constitutes an excellent and original biological system, in which the unit could acquire an international leadership. Presently however slightly more scientific papers stem from theme 2 (berry quality).

One of the main strengths of EGFV is the large number of infrastructures, scientific equipments and facilities available, that make this unit attractive to external researches (e.g. the new research group led by Mr Philippe GALLUSCI).

Bordeaux and ISVV context are local contexts in which the EGFV research is fully meaningful. The unit benefits from a strong local and regional support where numerous socio-professional relationships exist.

The academic production has been improved and reaches a very good level.

The arrival of a new group for developing epigenetic studies is a good opportunity for EGFV.

Weaknesses and threats related to the context

Even though all EGFV researchers study a single biological model, the grapevine, there is a threat of dispersion within each research theme and a lack of mutualisation between themes. This is particularly true for the modelling approaches which are numerous and would certainly benefit to be inter-connected.

Since EGVF is a relatively new research Unit (created in 2007), the increase of academic production may be considered as a natural consequence of the institute's consolidation.

A main weakness and threat for the unit is its limited number of post-docs. Even though this situation maybe due to a limited budget dedicated to such recruitments from projects, the increase in the unit international visibility should also allow an increase in the number of post-doc positions and international fellowships.

The constant increase in dataset generated by the unit in phenotypic, genetic and genomic studies requires to develop a strategy to reinforce BioInformatic analyses.

A lack of connections between units within ISVV could limit the capability of the unit to increase its international visibility

Recommendations

The committee appreciates the positive dynamics of the unit which has improved its scientific publication record, in quantity and quality, and its international visibility. The theme dealing with berry quality has yet provided the best scientific outputs and should be continued. Also, the grafted plant project certainly constitutes an excellent and original biological system, in which the unit could acquire an international leadership. However, and as pointed out in 2009 by the previous evaluation committee, the committee suggests to define a restricted number of topics in order to gain true international leadership. This would allow the unit to develop a leading position on a limited number of topics. Considering that 16 scientists are equally split between the two research themes, too many research lines are carried out to allow a leading position at national and international levels with such limited human resources. This prioritisation is necessary within each Theme. In Theme 1, the committee suggests to clarify the links between experimentations on biomass allocation and responses to drought on the one hand, and between modelling approaches on the other hand. However, the complementary between the two themes should also be stimulated. This may be done through the co-supervision of PhD students and/or the co-construction of research projects for joint funding applications. Organising scientific groups in relation to abiotic stresses (water stress vs nitrogen deprivation) rather than to plant organs (root/scion vs fruit) could also be considered.

In this context, the opening of new themes such as the response to biotic stress does not appear to be a priority, despite its scientific interest. Rather, reinforcing collaborations with other units present in the proximity, in particular SAVE, could certainly benefit to EGFV and to the research on grapevine in Bordeaux.

The committee encourages the unit to continue increasing the quality of the scientific papers. The quality of the research in EGFV allows the unit to ambition some publications in journals of outstanding IF in the coming years. The committee also encourages the unit to promote the publication of already available datasets. The recruitment of experienced post-doc fellows is likely to help the researchers in this perspective.

The committee supports the Director in his wish to develop Bioinformatics skills within the unit. The Centre for Bioinformatics in Bordeaux (CGFB) connected to the Labri unit, constitutes an excellent context to face the Big Data era, and the committee encourages the unit to continue developing collaborations in this context.

3 • Detailed assessments

Assessment of scientific quality and outputs

The originality of EGFV stands in the two themes studied which altogether cover most aspects of grapevine vegetative and reproductive life. In theme 1, the biological object under study, the grafted plant and the explicitation of the relationship between scion and rootstock constitute two scientific topics of high originality. The goal of Theme 2 is to analyze and model the responses of berry composition to physical environment factors and nutrient flow in order to gain more physiological knowledge about the mechanisms involved in berry quality and their regulation by abiotic factors. It aims at providing answers and advice in response to major challenges for viticulture.

During the period, the major progress concerned methodological developments, the development of new experimental materials, the introduction of high-throughput phenotyping for root studies and berry metabolism (rhizotrons, in vitro berry culture system), the high-throughput enzymatic analysis, the set-up of fluxomic approaches, and the implementation of new molecular and functional approaches (GoldenBraid, VIGS- Virus-induced gene silencing ...).

Significant results have been obtained in genetics, transcriptomics and metabolic analyses and in QTL detection for a range of traits of interest. Genomic regions or genes that may be useful for breeding programmes have been identified and characterised for sex determinism and downy mildew resistance, tolerance to water stress, and lime-induced chlorosis. Genes involved in the control of berry growth (VvCEB1), in ABA signalling (VvABF2) and responsible for the last step of methoxypyrazine synthesis (VvOMT3) have been identified.

Also the development of modelling approaches at various scales (phenology, distribution of nutrients between the rootstock and the scion, berry microenvironment and metabolism) is making significant progress, even though still too dispersed.

The scientific output of EGFV has been improved during the last contract, with respect to the number of scientific articles produced and the mean 5-Year impact factor. Over the period, 93 original papers (16.7/yr) have been published in 42 international peer-reviewed journals (with IF), among which 29 journals have an impact factor above 3.0 in the 'Journal Citation report 2013'. This yields a mean publication rate of 1.25 papers /full-time scientist per year. We noticed several journals of high quality (3 Plant Physiology, 2 New Phytologist, 13 J. Exp. Bot, 3 Theor. App. Gen.).

Short appreciation on this criterion

Depending on the Theme, the scientific quality and output of EGFV unit ranged between very good to excellent.

Assessment of the unit's academic reputation and appeal

EGFV is a French leading group for studying the interactions of grapevine with the environment, in the context of climate change, as demonstrated by their coordination role in the INRA meta-programme LACCAVE (Impacts et adaptations à long terme de la filière viti-vinicole au changement climatique). EGFV has strong and regular interactions and collaborations with many laboratories in France (in particular with the INRA research groups in Montpellier, Versailles, Colmar, Angers and with CNRS in Rennes).

The unit plays a major role at the international level through the coordination of a WP in the KBBE Innovine project, on the adaptation of grapevine to climate change, and through the coordination of COST 858 on viticulture. EGFV members are frequently invited for opening lectures, plenary lectures, keynote addresses or invited talks in many meetings all over the world (USA, Bolivia, Chile, China, South Africa, Germany, Italy ...). During the present contract, they have organized several important international meetings, and will organize the next ISHS (International Society for Horticultural Science) International Conference on Grapevine Breeding and Genetics (2018).

EGFV members participate to several journals as Editor (Journal International Des Sciences de la Vigne et du Vin), Associate Editor (Australian Journal of Grape and Wine Research, Plant Molecular Biology Reporter, Horticultural Science), Member of the Editorial Board (Journal of Experimental Botany), or Reviewers.

The main international scientific collaborations are with Germany, Italy, Spain and Portugal (Innovine project). The unit seems attractive as a total of five foreign visiting scientists are recorded for stays exceeding 6 months each

and also several PhD students and one Agreenskills post-doc. In this respect they also co-directed several theses, especially with Germany. The members of the unit, from both themes, also participated to a large number of international conferences. The invitations as speakers in national and international conferences (scientific or professional) are impressive.

Short appreciation on this criterion

The unit has an excellent reputation that could be improved by acquiring a leading position in international project applications.

Assessment of the unit's interaction with the social, economic and cultural environment

EGFV interacts with the grape industry through regular meetings at the national (IFV, Institut Français du Vin) and local (CIVB, Conseil Interprofessionnel du Vin de Bordeaux) levels. The unit has applied goals and strong connections with professional partners. One of these applied goals is to breed new rootstocks for the XXIst century that should combine the ability to control phylloxera and Grapevine Fan Leaf Virus (GFLV) contamination, with improved adaptation to the new environmental conditions expected from the climate change. For rootstocks, drought tolerance will be the most important trait.

As EGFV participates in a programme aiming at genetic improvement of rootstocks, members are regularly invited to deliver talks to professional representatives of viticulture and wine industry, and are often interviewed by different media (newspapers, radio, TV) concerning the issue of climate change and its effect on viticulture, and their activities at ISVV in general.

EGFV members gave several lectures in many grower association meetings all over France. They have released articles in specialised press for growers and wine makers. They actively contribute to several training sessions for growers and extension services. A workshop about rootstocks for nurseries and growers was organized by EGFV in April 2013 in collaboration with the extension service of ISVV.

EGFV members also participated to articles dedicated to a non-scientific audience, to several boards and committees mixing academic scientists and professionals from the grape and wine industry, such as Permanent Technical Committee for Crop Selection (CTPS), and Scientific and Technical Committee of the Grape and Wine industry (CST Vigne). Several EGFV researchers participate to press release, interviews, radio or TV broadcasts. They also published a position letter in PNAS on climate change on grapevine.

Short appreciation on this criterion

The unit interaction with the social, economic and cultural environment is excellent since extensive contacts exist with the wine industry. The unit is very well integrated in this environment and UB is a perfect place for developing the type of research developed at EGFV.

Assessment of the unit's organisation and life

The director is assisted by a direction board (CoDir, composed of 6 persons) in the decision making process for science, finance, management and in some of the administrative work. Since 2014, a report is written and e-mailed to all EGFV staff. A scientific council (15 members, part elected, part nominated by the director) meets about 4 times a year for giving general information, short scientific progress reports, and discussing the scientific, financial and organizational issues of the unit. A report is dispatched by e-mail and on the intranet of EGFV.

Internal meetings are organized twice per month for each research theme. The scientists in charge of the research themes, are invited to attend the meetings of the other theme to ensure coordination and interactions. Meetings for the staff involved in the technical platforms are also organized whenever needed.

Internal presentations and seminars are organized twice a month, in addition to talks and seminars given by outside scientists in the laboratory, in the ISVV and at SFR BIE. A website (<http://www6.bordeaux-aquitaine.inra.fr/egfv>) allows external communication as well as sharing of internal resources via intranet (publications in pdf, seminar presentations, protocols, meeting reports, guidelines for health & safety).

Transversal collective tasks have been assigned to many staff members and engagement letters have been written for all of them, as for the deputy directors and the theme coordinators (Appendix 2).

Reports concerning Health & Safety, and Quality Assessment in EGFV have been written in 2013 (in French) by the colleagues in charge, and are available on the intranet. An audit on Quality Assessment was made at the end of 2012. Efforts for developing tools for quality assessment are under progress. The committee noticed some difficulties in the reporting for Health and Safety with UB and support the efforts of the unit to improve the situation.

Specific procedures have been set up to welcome visitors, which are all under the direct supervision of a staff member. A brochure for health & safety rules at work is dispatched to incoming permanent and non-permanent staff and available on the intranet.

Training efforts have concerned scientific, technical and administrative aspects, and are based on the offer of the INRA center's "permanent training". Most needs are answered and more specific needs have been addressed by universities, other labs or private companies. However, the reinforcement of transversal life between common pools and a mutualisation of part of the budget could help set up a more global plan, in particular for the planification of travels abroad for PhD and young scientists.

Short appreciation on this criterion

The unit's organisation is very good.

Assessment of the unit's involvement in training through research

EGFV includes 9 professors and assistant professors who are involved, as well as several INRA staff, in Biology, Plant Biology and Oenology teaching for the University of Bordeaux, and Bordeaux Sciences Agro. EGFV members are involved in 14 different courses at the Bachelor level, and in 20 different courses at the master level. Teaching activities include both lectures, practical sessions, and cover a wide range of domains (Plant Biology, Plant Physiology, Genetics, Biochemistry, Molecular Biology, Agronomy, Ecophysiology, Modelling). Several members are responsible for specific courses outside Bordeaux (e.g. EuroMaster Vinifera in SupAgro Montpellier).

In 2014, one Professor from EGFV set up a new master of Business and Science in Vineyard and Winery Management (in English). Three assistant Professors are in charge of a section in Master Vinifera at SupAgro Montpellier, and of a section of Master Vigne et Vin in Bordeaux.

During the last contract 3 EGFV members obtained their HDR, and the total number of HDRs is now 6.

19 PhDs have been hosted during the period, among which 12 theses were defended from January 2009 to June 2014. PhD production ranges from 1 to 5 scientific papers (2.4 peer-reviewed papers on average) All PhD graduates continued in scientific research, mainly abroad (Germany, USA, New Zealand). In addition, during the period, 13 visiting PhD students have been hosted for a short-term period. One PhD received the award of the best thesis from the French Society of Horticulture.

20 Master2, 28 Master1 and about 45 miscellaneous undergraduate students have been trained by research. A steady increase in EGFV's drawing power for University Master students is observed. All M2 students successfully passed the selection of the doctoral school (Life and Health Sciences) from the University of Bordeaux.

EGFV members also participated in 30 PhD and Habilitation committees, including 5 outside France.

The involvement in the doctoral school (ED 154) is excellent. The committee encourages the head and the unit members to improve the student involvement in "monitorat and ATER" positions, when possible, as well as the involvement of researchers in teaching.

Short appreciation on this criterion

The unit's involvement in teaching through research is very good.

Assessment of the strategy and the five-year plan

The goal of the project for the next five years is to amplify the progress in the scientific domains and experimental approaches that are already under development at EGFV, i.e. on (a) rootstock physiology and adaptation to water stress, (b) modelling at different scales (climate, phenology, interorgan distribution of dry matter, metabolomics and fluxomics, (c) molecular basis of fruit ripening and adaptation to stress. While maintaining a balance between the two themes, the unit ambitions to improve the interactions between them, through the

elaboration of joint projects. This project is thus consistent from a scientific point of view since it extends the present research directions with a re-inforcement of links between the two themes.

The unit also aims at maintaining its interdisciplinary approaches, coupling eco-physiology, genetics and genomics. New topics will be opened with a new group joining EGFV for studying the epigenetic regulation of adaptation to changing climatic conditions.

The collaborations already existing should allow the unit to reach their objectives in further developing a combined model of sugar and anthocyanin fluxes in berries, and articulating it with the functions of the root and the whole plant canopy. Also, the recent obtention of a S2 greenhouse and progress made in VIGS will facilitate studying the function of major candidate genes.

Presently, the project of EGFV is built mostly on a number of ANR or European projects to which they participate (INNOVINE, DURAVITIS, EPIWINE) or that they lead or have led in the past (VITAROMA). The project is in direct continuation of what has been done in the present contract, especially concerning the aspects related to the physiology of the plant and its response to environmental constraints. Novel aspects concern epigenetics with the arrival of a small group coming from BFP and having experience in this domain. This group essentially proposes to translate their technical and scientific competence from tomato to the grape model. Another innovative research concerns the development of the graft interface. Even though it may be risky, this research topic has a high potential value. A third novel aspect will concern the identification and characterization of key molecular players involved in berry quality buildup. A number of potential targets have already been selected including transcription factors, cyclases and reductases linked to secondary metabolism. Of particular interest is a section related to the study of volatile thiol precursors which might become an important field of research in the future.

The major risk for EGFV unit in the near future is a possible effort dilution if many research lines are maintained without links. This is particularly true for Theme 1 in which 4 future directions are proposed with many overlaps. Since an evolution was noticed between the report and the oral presentations, the committee suggests an additional effort of the unit for outlining the project. This could help the unit to reconsider some points of the defined strategy, in particular the overall organisation of the unit in two themes which may be not presently the most efficient for joining the efforts on environmental conditions effects on the grafted plant development and berry quality. Also the unit could consider studying dedicated plant materials (clones, or progenies or mutants) in a mutualised way in phenotyping studies on the one hand, physiological and molecular analyses on the other hand. The committee points out that, with the development of new techniques such as genome editing technology and genetic transformation, the projected tasks could exceed the unit staff capacities. Moreover, a specific effort must be put on securing funds to insure the feasibility of the project and to increase the ability of the unit to attract post-doc fellows.

Short appreciation on this criterion

The unit's strategy for the next five years is considered good. Some progress can be expected in the definition of priorities, in the integration of the epigenetics group and in the possibility to elaborate a more integrated project between the two themes. Since the director plans to step down during the next contract, the new direction must be prepared.

4 • Theme-by-theme analysis

Theme 1: Grafted PLANT
Manager's name: Ms Nathalie OLLAT (IR INRA)

Workforce

Theme workforce in Full Time Equivalents	As at 30/06/2014	As at 01/01/2016
FTE for permanent professors	1	
FTE for permanent EPST or EPIC researchers	2	
FTE of other permanent staff without research duties (IR, IE, PRAG, etc.)	5	
FTE for other professors (PREM, ECC, etc.)	5	
FTE for postdoctoral students having spent at least 12 months in the team	1	
FTE for other researchers (DREM, etc.) excluding postdoctoral students		
FTE for other contractual staff without research duties	1	
FTE for doctoral students	2	
TOTAL	17	

• Detailed assessments

Assessment of scientific quality and outputs

The permanent positions in the group are 1 professor-BSA, 4 associate professors (3 UB, 1 BSA), 2 CR-INRA, 2 IR-INRA, 1 IE BSA, 3 AI (2 INRA, 1 BSA).

The objective of the 'Grafted Plant' theme is to analyze which mechanisms are affected by rootstocks at the root or shoot levels (e.g. biomass allocation, source-sink relationships, etc.). Thus, a dedicated research program has been carried out and high-throughput phenotyping tools have been developed. These research activities contribute to the finalised objective to select new rootstocks and to improve the use of the existing ones to maintain high quality grapes in a changing environment.

For addressing these objectives, Theme 1 focused on three reasearch lines: i) understanding the effects of rootstocks on whole plant biomass allocation in grafted grapevines; ii) studing the rootstock effect on the water use efficiency of a grafted plant; iii) carrying out a rootstock breeding program.

The effects of rootstocks on whole plant biomass allocation in grafted grapevines have been studied analysing physiological and molecular basis of biomass allocation in grapevine in response to C/N ratio and rootstock (e.g. rootstock impacts on the transcriptome and metabolome of the scion, source-sink model of biomass allocation at the level of the grafted plant). A particularly innovative research is being carried out on the graft interface development, examining the molecular changes occurring in the days and months after grafting, analysing the development of symplastic connectivity through the use of fluorescent proteins and BIFC (Bimolecular fluorescence complementation). Moreover, the genetic determinism of rootstock effects on scion development and scion/rootstock interactions (e.g. rootstock effects on CS (Cabernet-Sauvignon) grown under different environmental

conditions and scion-rootstock interactions) has been investigated on a F1 progeny and has led to the identification of QTL zones.

The rootstock effect on the water use efficiency of a grafted plant has been analysed working on rootstock control of short term responses to drought. The plant water relations have been modelled, taking into account the rootstock effect and evaluating the variability among rootstocks for chemical and hydraulic signaling). The long term adaptation responses to drought have been studied through the analysis of molecular responses in roots of various rootstocks, through the rootstock control of scion transpiration and growth and their acclimatation to edaphic water deficit. New promising materials have been prepared such as a F2 progeny obtained by self-fertilization, new F1 progenies with diverse genetic backgrounds adapted to water stress, and RNA sequences of the most contrasted genotypes.

The rootstock breeding program aims at breeding new rootstocks for the XXIst century combining the ability to control phylloxera and fan leaf virus contamination, with improved adaptation to the new environmental conditions applying modern selection methods to rootstock breeding (e.g. diversity among wild germplasm resources, evaluation of segregating population). Even though this activity is very promising for the future of viticulture in Bordeaux and France, its progressive transfer to IFVV is considered. The committee supports this view.

The scientific production of the group is distributed in 24 + 3 papers in international peer reviewed journals with IF and without IF and 6 in book chapters. The publications range from plant biology and physiology (e.g. Plant Cell and Envir., J. of Plant Physiol.), agronomy (Agron. J.) to viticulture (Australian J. of Grape and Wine Res., Scientia Horticulturae). The IF of the journals is ranging from 6 to 1, with a mean IF of 3.5. These values can be considered high for the viticulture research community.

Short appreciation on this criterion

The scientific quality and output is very good.

Assessment of the team's academic reputation and appeal

This group is implicated in different public (national and european programme) and private projects. More specifically, the activity on the effects of rootstocks on plant biomass allocation is mainly supported by grants from the INRA department GAP, Bordeaux University, the SFR 'Biologie Intégrative et Écologie', the 'Conseil Interprofessionnel des vins de Bordeaux' and the Aquitaine Region Council. The research line on rootstock effect on the water use efficiency is funded by the ANR (VITSEC project), the Aquitaine region, the Conseil Interprofessionnel des Vins de Bordeaux, the LACCAVE and AVA2C projects and is carried out with the collaboration with the Research Institute of Geisenheim (Germany) and the support of the Region of Hessen. In the period considered in this evaluation Theme 1 was involved in a total of 17 contracts on public/private fundings for a budget of around 1030 k€. Moreover, Theme 1 has applied for several national and international calls for funding (INRA, FranceAgrimer, Aquitaine Region, Arimnet, ITN Marie Curie, etc.).

Members of the team have organized several international meetings, in particular the COST 858 final meeting "What's up in viticulture?" (2009, 200 participants, 20 countries), the MacroWine "Macrovision of viticulture, wine making and markets" conference (2012, 150 participants, 16 countries), and the VIth International ISHS Conference about Phylloxera and other rootstock aspects (2013, 75 scientists, 10 countries). The proceedings book as Acta Horticulturae issue is under editing process (OLLAT and PAPURA, 2014).

Short appreciation on this criterion

The academic reputation and appeal of researchers in Theme 1 is very good.

Assessment of the team's interaction with the social, economic and cultural environment

A workshop about rootstocks for nurseries and growers was organized by EGFV in April 2013 in collaboration with the translational research office of ISVV. Several staff members have given lectures for civil society organizations about this issue.

EGFV theme 1 researchers participate in a programme of genetic improvement of rootstocks. They are often interviewed by different media (newspapers, radio, TV) concerning the issue of adaptation to climate change by the

use of appropriate rootstock and scions combinations. EGFV members also participate to several boards and committees mixing academic scientists and professionals from the grape farmers, e.g. Permanent Technical Committee for Crop Selection (CTPS).

The activity on the effects of rootstocks on plant biomass allocation is as previously said supported by grants from the 'Conseil Interprofessionnel des Vins de Bordeaux' and the Aquitaine Region Council.

EGFV theme 1 researchers have given several lectures in many different grower association meetings all over France. They also participated to several articles dedicated to a non -scientific audience and actively contributed to several training sessions for growers and extension services.

Short appreciation on this criterion

The theme 1 researchers have excellent interactions with social, economic and cultural environment communities. The possibility to have well adapted rootstocks under future environmental conditions will be particularly important for worldwide viticulture.

Conclusion

▪ Overall opinion of the theme

- successful positioning on plant tolerance to water stress;
- development of innovative approaches for phenotyping segregating populations used for both root-shoot biomass allocation and response to drought;
- the links between biomass allocation and water stress response should be reinforced, as well as the corresponding models;
- the study of the coordination between root hydraulics and ABA signals on the one hand and the control of leaf stomatal aperture on the other hand appears a particularly interesting perspective which could benefit from the originality of the grafted plant system;
- working on rootstock-scion is a very challenging topic.

▪ Strengths and opportunities

- the grafted plant is a unique biological system for studying root-shoot interactions;
- very innovative - but risky - approach for evaluating how rootstock and scion are connected via plasmodesmata (via combining fluorescent proteins);
- genetic and genomic resources are available;
- successful combination of phenotyping, genotyping and molecular studies.

▪ Weaknesses and threats

- too many subjects are developed simultaneously and links between them do not appear clearly;
- different models are developed or used in the theme, but the overall strategy of modelling is not explicit.

▪ Recommendations

- concentrate on a limited number of questions and gather the human resources on these questions;
- reinforce leadership by increasing the number of papers with authorship in first or last positions;
- make explicit the overall strategy regarding modelling and develop links between the different models that are developed or used in the theme;
- some topics could be merged with Theme 2: carbon modelling, water stress and nitrogen supply.

Theme 2: Berry quality and environment

Manager's name: Mr Eric GOMES (Professor)

Workforce

Theme workforce in Full Time Equivalents	As at 30/06/2014	As at 01/01/2016
FTE for permanent professors	X	3 (Pr)+ 3(MCF)
FTE for permanent EPST or EPIC researchers	X	3
FTE of other permanent staff without research duties (IR, IE, PRAG, etc.)		3
FTE for other professors (PREM, ECC, etc.)		
FTE for postdoctoral students having spent at least 12 months in the team		
FTE for other researchers (DREM, etc.) excluding postdoctoral students		2
FTE for other contractual staff without research duties		
FTE for doctoral students		
TOTAL		14

• Detailed assessments

Assessment of scientific quality and outputs

The different permanent positions of the group will be 2 professors-UB, 1 professor-BSA, 3 associate professors-UB, 2 CR-INRA, 1 -CR CNRS, 1 IE BSA, 1AI INRA and IE INRA.

The objective of Theme 2 “Berry quality and environment” is to analyze and model the responses of berry composition to physical environment factors and nutrient flow. The idea is to gain more agronomical and physiological knowledge about the mechanisms involved in berry quality and their regulation by abiotic factors. They focus on the effect of light, temperature, water, UV-B, CO₂ levels, carbon and nitrogen availability. In the context of climate change, this research should help producing berries with optimal oenological quality in the next decades.

For this, the group developed different studies: i- Studying the impact of abiotic factors on grapevine phenology and berry metabolism, in the context of climate change, ii- Studying and modelling trophic fluxes modifications on sugar berry metabolism and iii- Identifying key molecular players for berry quality buildup.

Concerning the impact of abiotic factors on grapevine phenology and berry metabolism, with respect to climate change, the main results highlight the impact of temperature on berry phenolic and sugar metabolism. This information is important as they show great variability of temperature sums inside the Saint-Emilion region for example. They also focus on the regulation of the transcription factor VvSFA2 and a putative galactinol synthase VvGOLS. In the context of a global climate change they also start to evaluate the impact of combinations of stress (UV-B doses, elevated temperature, CO₂ levels and water stress) on berry metabolism and grape leaf physiology. The impact of rootstock/scion combination on berry quality under water deficit was also evaluated. They also established the precocity of flowering and véraison for 100 grapevine cultivars.

Concerning the second topic “Studying and modelling of trophic fluxes modification on sugar berry metabolism”, they have started an integrated and comprehensive framework for sugar import and carbon metabolism

in the berry. This was done with a focus on anthocyanin biosynthetic pathway response to nitrogen supply using cell lines or with field experiments.

The last part concerns the identification of key molecular players in berry quality focusing on the genetic and molecular determinants of methoxypyrazine biosynthesis in grapes and the molecular players regulating fluxes in berry primary and secondary metabolism.

The group reported 43 + 5 articles published or in press between 2009 and 2014 in international peer reviewed journals. This scientific production is very good for the vine and wine domains. The majority of the publications is in journals with excellent reputation in the different categories. Most publications are in plant sciences, they publish also in agronomy, horticulture and ecology journals (for example: Journal of Experimental Botany, Plant Physiology Ecological Modelling, Australian Journal of grape and Wine Research, Plant and cell Physiology, , Plant science, Agricultural and forest Meteorology, Phytochemistry....). The mean impact factor of this output is in the 3.5 range.

The different results are original and important concerning the impact of climate change on the production of berries with optimal oenological quality in the future. The different approaches and the proposed perspectives will allow to make progress in this field.

Short appreciation on this criterion

The scientific output of theme 2 is excellent for vine and wine research. The different results generated should be important for the understanding of the impact of climate change.

Assessment of the team's academic reputation and appeal

This theme is implicated in different national and european scientific programs (ANR Sweetkaligrape, KBBE Innovine...). They have also developed research programs with "Wine and Vine Interprofessionet" (Vitadapt, Climviti, Newvine...) and different private companies (project Qualibaie, PhD thesis). The team is also involved in a Idex program of the Université de Bordeaux. Members of the team organized and carried out international congresses (Macrowine 2012 and Cost 858 Viticulture). The main international scientific collaborations are with the University of Geisenheim (Germany), University of Lincoln (New-zeland), University of Pampelona (Spain), Catholic University of Santiago de Chile (Chili), Université of Braga (Portugal), Oregon University (USA). The theme seems attractive as a total of 5 five foreign visiting scientists have stayed for over 6 months each and also different post-doc and PhD students. In this respect theme members have co-directed several theses . Members of the theme are involved in scientific journal editing (Editor in chef of JISVV, IF:1.022 and Associate Editor for Frontier in Plant Science, IF:3,6). The invitations as speakers in national and international conferences (scientific or professional) are impressive.

In the contract one professor was promoted PR1, and several AI were promoted IE.

The absence of partners could be negative but the perspectives of the theme should favor the development of new international connections in the future.

Short appreciation on this criterion

Theme 2 has an excellent reputation in their field. Their recognition in France and also worldwide is very good.

Assessment of the team's interaction with the social, economic and cultural environment

This part is very good. They have very important links with professional vinegrowers because it will be essential to find solutions to minimize the effect of climate change on grapevine.

Assessment of the team's involvement in training through research

Theme 2 is composed of researchers and university members. All permanent staff members are involved in teaching. Nevertheless, they have trained different post-dotorals researchers and 15 PhD students (10 foreigners). We have to underline that all PhD students have published (first authors). Some of them are now researcher or MCF in the team or post doc (ie: Max Plant Institut). This activity can be considered very good.

Assessment of the strategy and the five-year plan

The research project on theme 2 is a direct continuation of the work that has been done in the present contract. It deals with aromas and berry quality in the frame of climate change and environmental stress response. The tasks will be focused on three main actions:

- characterization of three LBD proteins related to anthocyanin biosynthesis;
- characterization of candidate “genes” for the biosynthesis of methoxypyrazine;
- deciphering volatile thiol precursors in grape.

All those projects are quite focused and they avoided the risk of scattering into too many research axes. The characterization of new sulfur compounds is a promising avenue of research and should be encouraged.

Conclusion

▪ Overall opinion of the theme

- berry quality is an essential topic for wine making;
- the effect of abiotic stress needs to be evaluated for maintaining berry quality in the future.

▪ Strengths and opportunities

- in this theme, genetics, physiology and molecular biology are combined to investigate the ripening of berries and their phenolic content;
- a list of candidate genes of interest, including a series of transcription factors, has been identified which should lead to relevant and outstanding results;
- including epigenetics in these studies may become very useful;
- the maturity of the theme leader is evident from the excellent oral presentations he did;
- the group has an excellent international recognition and network;
- the group contributes to many international and INRA programs.

▪ Weaknesses and threats

ANR funding may become more difficult to obtain as for the other French labs. The group should try to diversify sources of funding and to get more grants from the wine industry.

▪ Recommendations

- cooperation between theme 1 and 2 researchers should be further encouraged;
- the cooperation with neighboring groups in Bordeaux on wine pathogens (viruses, fungi) should be increased;
- RNA seq could help identifying key molecular players for veraison and berry development and ripening;
- maintaining a strong cooperation with the Metabolomics platform in Biologie du fruit et Pathologie Bordeaux unit is essential to this program.

5 • Conduct of the visit

Visit date

Start: 22, January, 2015, at 8:45 a.m.

End: 22, January, 2015, at 6:20 p. m.

Visit site:

Institution: INRA

Address: 71 Rue Edouard Bourloux, 33140 Villenave-d'Ornon

Conduct or programme of the visit:

8:00	Welcome
8:15	Welcome (closed-door): visiting committee with the HCERES scientific delegate
8:45	HCERES representative: the role and procedures of HCERES (Mr Philippe MEROT)
9:00	Director of the unit: presentation of the past activities and project
9:50	<i>Break</i>
10:05	Theme 1 Grafted Plant
10:55	Theme 2 Fruit quality and environment
11:45	Meeting with the head of the doctoral school
12:00	<i>Lunch</i>
1:15	Discussion with the representatives of the managing bodies
1:40	Meeting with the staff
	Meeting with the permanent researchers and teachers
	Meeting with the engineers, technicians, administrative
	Meeting with students and post-docs
2:55	Discussion with the head of the unit
3:25	Private meeting of the visiting committee (in presence of the HCERES scientific delegate)
6:25	End of the visit

Specific points to be mentioned:

The evaluation of EGFV unit was held at the Institut des Sciences de la Vigne et du Vin de Bordeaux (ISVV). During the morning, The Director of the unit, Mr Serge DELROT, presented the historical evolution of the unit and its organisation and context at local, national and international levels. Then, the main results and perspectives of two research themes which structure the unit, were presented by Ms Nathalie OLLAT and Mr Eric GOMES, respectively. Each presentation was followed by discussions between the committee and the unit members. In the early afternoon, the committee has met the institutions which have clarified their analyses and expectations regarding the EGFV unit. Several meetings were organised with different colleges of colleagues from the unit, technicians, post-doctorants and CDD, PhD students. The last meeting was dedicated to the two themes, with their respective leaders, and with the director of the unit. The committee members have largely debated, in presence of HCERES delegate to elaborate the report.

6 • Supervising bodies' general comments

Bordeaux, le 8 avril 2015

We thank very much the members of the HCERES panel for their time, and for insightful and useful comments.

Our answer is divided in 2 parts, the points on which we agree, those on which we disagree.

I. Points on which we agree.

While other items were ranked very good or excellent, the future organization and project was considered good, and was therefore the less strong point of the evaluation. The panel indicates that too many topics are addressed by EGFV, which was already pointed out by the former AERES panel in 2010. The panel also suggests that the present organization in two themes based on plant structure which was justified a few years ago, may not be optimal for integrative approaches. The panel clearly states that further efforts should be made to focus on a smaller number of questions, that would help in progressing one step higher in international leadership, and to foster integrative projects.

1. Organization and integration of UMR, interactions with other laboratories

The comments on the lack of integrated research may be due in part to some errors from our side and/or some misunderstandings:

- we did not present a slide showing the interactions and continuity between the two themes; 5 topics are listed for theme 1 in the written document, but the presentation showed that they are interconnected into 3 main questions; the committee writes that theme 2 develops 4 topics, while it is clearly stated throughout our written report that 3 topics are developed by theme 2).
- experimental systems that would allow us to study integrative responses at the plant level would be essentially destructive (if we want to monitor the root system) and therefore useless if we want to study the time courses on the canopy and fruits. Also, the rootstock/scion combinations optimal (or suitable) to address issues related to root physiology and berry quality are not always identical.
- we appreciate that the arrival of the group of P. Gallusci on epigenetics is encouraged. Concerning its positioning in the laboratory, and considering the HCERES comments, we have rediscussed this issue, and finally decided that this group will merge with theme 1 on the grafted plant. This will avoid the splitting of this small group in two parts, reinforce theme 1 with 1 Professor, 2 HDR, and University staff, thus improving the internal INRA/non-INRA balance of staff in this theme. Small funded projects are already going between P. Gallusci and theme 2, so that the interactions are already efficient. Immersing

this group in theme 1 will allow them to interact more with theme 1 and should contribute to integrated actions, as for example the epigenetic response of the plant to water stress or nitrogen status.

- While the organization in two themes may not be optimal for the future, it has allowed us to consolidate national and international recognition, as well as to improve our publication activity, and to be attractive, as acknowledged by the committee. Nonetheless, we also feel that we still have a margin to improve the organization and the integration of the laboratory. In the next months, further incentives for integrated discussions and projects will be set and in-depth brainstorming will be organized in order to define a shared conceptual framework, and eventually re-organize our structure around a limited range of integrated goals at the whole plant level. However, care should be taken that this transition does not stop the positive dynamic that we have succeeded to impulse. This change requires some time, thinking, negotiation and incentive. The recent arrival of Junqi Zhu (Innovine post-doc) already initiated discussions on integrated modelling of plant function. Additional shared tools and experimental plots are being set up, and the arrival of Gregory Gambetta and Philippe Gallusci brings new perspectives in terms of integrated research.

2. Too many topics addressed.

The risk of dispersion is real, as in many laboratories, and will be given even more attention. It is partially due to the personal history and positioning of the staff members, and to funding for which a delicate balance of success must be reached between projects consolidating our direct line of research and more innovative projects directly in the scope of call for proposals.

3. Not enough post-docs.

We agree that the efficiency of the unit would be improved by hiring more post-docs. But post-doc positions are more expensive than Ph.D. and funding possibilities are quite limited and/or require co-funding (ANR, EU, Region, INRA). Our applications have met relatively little success for a wide range of reasons (see point 4). But we presently host 2 chinese post-docs and 3 foreign scientists on sabbatical leave (from Chile, China, USA), in addition to 4 foreign Ph.D. students (2 from China, 1 from Italy, 1 from Chile). We hosted for 18 months the only Agreenskill post-doc (from Spain) allowed for the BAP INRA division in 2012.

4. Leadership in projects.

In the past years, several of us have invested a significant part of their time in collective efforts which were demanding in terms of organization and communication (COST 858, ISVV, LACCAVE, BAG Alliance) and were very successful in terms of networking. However, they brought little tangible benefit in terms of money or positions. In the future, we will pay more attention to projects that will be more directly beneficial to EGFV in terms of post-docs and funding.

We have led the VISEC ANR project. An integrated project at the whole plant level (VINTAGES, coord. P. Vivin) has been submitted twice at the ANR and was well evaluated but not selected in the final list. This was also the case for several other projects submitted to ANR (GRAPESKIN, coord E. Gomès; EPIWINE, coord P. Gallusci...), and may explain why we do not hire many post-docs. Concerning EU projects, Vineroot.net (coord N. Ollat) is presently submitted and under evaluation. Working on a perennial complex system is not always competitive with projects based on short-cycling, easy transformed plants. Cutting-edge and risky projects are difficult to be pursued in the long term (e.g.: CELL-TALK (BAP Starter 2014), Viti-tools (BAP Starter 2015)).

We also think that we have the scientific background needed to coordinate an EU proposal. However, such proposal requires both efficient lobbying at EU level, and enough administrative staff to help in the preparation. Up until May 2014, we only had one secretary to run all the administration in the

unit, which was detrimental for scientific efficiency. INRA is limited in the number of proposals it may support/promote on a given topic. Finally, many UMR members spend part of their time in teaching and organization of teaching, which leaves little time for writing big proposals when time is also needed to run the experiments and analyze the data

5. Publication activity

We agree that the laboratory has now reached a level that should be recognized in major international journals, but we had first to rise our impact factor, and some of the journals in which we publish frequently already have an IF > 5. We will try to publish some articles in journals with IF in the 10 range (Plant Cell or similar) during the next contract for the data that fit those journals.

II. Points on which we disagree.

While part of budget was already shared to support some expenses (equipments, repairs ...) based on mutual agreement, this was not yet written in the text governing the functioning of the lab. This has been done at the end of 2014, and everybody agreed that 20 % of the lab cost money of the contracts will be devoted to share expenses (with probably some difficulties and necessary adjustments in terms of financial report). We will also have to devote part of the budget to support the initial efforts of P. Gallusci, who on his side applies to several competitive resources for funding and to promote integrated projects.

We do not really understand the remark concerning the support for travel of Ph.D students and young scientists. We already develop an active policy for sending staff, and in priority Ph.D. students abroad for short periods, especially through COST actions, bi-lateral exchanges, or with our own budget : Noé Cochetel, Virginie Lauvergeat → Santiago de Chile (Ecos-Sud) ; Anthony Peccoux, Mariam Berdeja → Geisenheim, Germany (Aquitaine Region); Eric Soubeyrand → ASBP meeting 2013 (USA); J. Martinez-Lüscher → COST FA 0906 meeting (Czech Republic) Aude Habran → Verona, Italy (COST FA 1106) ; Pierre Helwi → Lincoln (NZ); Roberta Triolo → Sicily; Claudine Trossat, Sabine Guillaumie ---> Lincoln (NZ) ; David Lecourieux → Valencia, Spain ; COST FA 1106) ; ...)

Again, we thank the committee for pinpointing the areas where we can still improve, and it will be the challenge for the Director, the Direction Committee and all members of the Unit to improve even more our past achievements in the future.



Serge Delrot,
Directeur
UMR 1287 EGFV