LRSV - Laboratoire de recherche en sciences végétales

Rapport Hcéres

agence d'évaluation de la recherche
et de l'enseignement supérieur

Section des Unités de recherche

AERES report on the research unit:

Laboratoire de Recherches en Sciences Végétales

LRSV- UMR 5546

From the:

Université Paul SABATIER-TOULOUSE 3

CNRS

Mai 2010

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Le Président
de l'AERES

Jean-François Dhainaut

Section des unités
de recherche

Le Directeur

Pierre Glorieux

Mai 2010

Research Unit

Name of the research unit: Laboratoire de Recherche en Sciences Végétales LRSV

Requested label: UMR UPS/CNRS

N° in the case of renewal: 5546

Name of the director: Mrs Elisabeth JAMET (previous Dir. G. BECARD)

Members of the review committee

Committee chairman:

M. Jean-Pierre JACQUOT, University of Nancy

Other committee members:

M. Alistair M. HETHERINGTON, University of Bristol, UK

M. Leendert. C. VAN LOON, University Utrecht, the Netherlands

M. Jörg KUDLA, Universität Münster, Germany

M. Daniel WIPF, UMR CNRS/INRA/Université Dijon

M. Nicolas BOUCHE, INRA, Versailles

M. Patrice LEROUGE, Université de Rouen

Committee members suggested by CNU, CoNRS, CSS INSERM, CSS INRA, INRIA, IRD

CNU: M. Michel HERZOG

CoNRS : Mrs Françoise VEDELE

Observers

AERES scientific advisor

M. Alain PUGIN

University, School and Research Organization representatives

CNRS : D. EXPERT

Délégation régionale CNRS : C. DESAULTY

Université Paul Sabatier Toulouse : Président : G. FOURTANIER, VP recherche : B. MONTSARRAT

INRA (observateur) : directeur adjoint du centre INRA, H. de ROCHAMBEAU

Report

1 • Introduction

- **Date and execution of the visit :**

The visit of two days and a half took place in the lab (Toulouse-Castanet-Tolosan) on 16th to 18th December 2009. The committee members had received, about one month ahead, a set of clear and well presented documents including the detailed assessments of the 2005-2009 period for the unit and teams and the research projects. The visit took place as planned: presentation of the committee and the evaluation procedure, global presentation of the data and the future unit and project by the director and futur director respectively, presentation of each unit/team by the group leaders and discussion, meeting with the laboratory council, the administrative and technical staff, the PhD and post-doctoral fellows and the researchers/faculty members, and meeting with the University, CNRS and INRA representatives.

- **History and geographical localization of the research unit, and brief presentation of its field and scientific activities:**

The SCSV (LRSV) lab is located in Toulouse; institutions are CNRS and University Paul Sabatier. It comprises 26 teaching staff members (professors and assistant professors) and also 12 CNRS researchers (directeurs de recherche and chargés de recherche). There are currently 20 PhD students and only one postdoc (this is a weakness that has been pointed out by the committee). The technical staff comprises 26 members ranging from Ingénieur de recherches to AJT, they are doing technical work but they also participate to the management. One of the originalities (and success) of this lab is that much of the technical staff is shared among common technical platforms. Overall the staff turnover has been reasonable as 13 permanent staff have left during the contract and 15 new members joined. The budget of the lab is in the 760 k€ range per year.

- **Management team :**

For the next contract the lab has chosen to propose a new "diumvirat" at the head of the Unit. The commission has debated this proposal and concluded that this combination is close to being ideal. First of all, it is backed by all the scientific staff; second, the future director has privileged access to CNRS (one of the two sponsors of this lab) and the deputy director has privileged contacts with University Paul Sabatier the other funding sponsor. Last but not least, after meeting with these two individuals the AERES commission has become convinced that they can effectively work together in a concerted way and that they have indeed the capacity to manage the group and scientifically lead this research facility.

The present director has presented the achievements of the SCSV lab during the last contract and its organization. All along this presentation (and also later) the researchers of this lab have stressed their attachment to IFR 40 (some of the technical staff of this lab is working on the platforms of this IFR). They have also expressed concern that this IFR should be renewed (perhaps in the form of a Federation de Recherches) and its financing maintained. We wish to relay that concern in the present report. This IFR is also essential for scientific contact with the neighbouring LIPM lab, with which there are already many fruitful collaborations. We will discuss in more detail the relations between SCSV and LIPM but also INRA in a later section of this report.

- **Staff members (on the basis of the application file submitted to the AERES):**

	Past	Future
N1: Number of researchers with teaching duties (Form 2.1 of the application file)	18.5	22.5
N2: Number of full time researchers from research organizations (Form 2.3 of the application file)	12	12
N3: Number of other researchers including postdoctoral fellows (Form 2.2 and 2.4 of the application file)	3.6	0.4
N4: Number of engineers, technicians and administrative staff with a tenured position (Form 2.5 of the application file)	23.7	24.7
N5: Number of other engineers, technicians and administrative staff (Form 2.6 of the application file)	5.5	3.3
N6: Number of Ph.D. students (Form 2.7 of the application file)	32	16
N7: Number of staff members with a HDR or a similar grade	16	25

2 • Overall appreciation on the research unit

- **Achievements under the present contract:**

During the last contract the lab was organized along 8 research projects. One of the groups has now left or will soon leave SCSV and we have not evaluated its achievement. On the other hand, a new professor was recently appointed and will start a research project dealing with bioinformatics and peroxidases. In the present report, we have evaluated individually the scientific achievement of the 7 remaining groups but also those of the new groups that will join in the next contract (see later sections).

The major scientific themes covered are cell wall properties, xylogenesis, calcium signalling, pathogenic and symbiotic interactions. Overall, more than 130 papers in international peer-reviewed scientific journals have been produced by SCSV which leads to an average value of 6 articles per 4.5 years per researcher, taking into account that the teaching staff spends only halftime in research. Some of these papers are definitely scientific breakthroughs (Nature, PNAS, Plant Cell, TIPS, Plos Biology). The median impact factor of the papers is 4.6. 17 book chapters have been written and at least 5 patents obtained.

Under the supervision of the present director the lab has been organized around core technical facilities that can be used by all the researchers. They concern in particular Bioinformatics (7 data bases have been generated and are being maintained) and Biochemistry equipments and it is estimated that 80% of the technical staff is directly affected to those platforms. Generally the staff has expressed satisfaction concerning this mode of organization but it has also been pointed out that this results in some cases in a deficit in direct technical help for the individual research groups. One concern is that the QTOF equipment that has been essential for some of the major scientific achievements of this lab has recently been moved to another site. Another concern that has been mentioned several times in the interviews that we have conducted is the future of the staff working on the platforms of IFR 40 in case this structure would become under threat.

SCSV has paid much attention to the dissemination of scientific knowledge with the publication of papers in journals of general interest and also with local TV interviews. The SCSV lab has also created and maintained close contacts with industrial partners and at least 9 companies of the agroindustry have contributed financially to the functioning of this lab (in particular 6 CIFRE contracts were financed). In terms of applied science, there is one biotech startup company that deals with fertilizing through the use of microorganisms.

SCSV has clearly a very good international recognition (by the way 3 international experts agreed to participate in the committee, one from the UK, one from the Netherlands and one from Germany). All of them are prominent leaders in their field, this being living testimony to the interest they pay to the work conducted in Toulouse. SCSV has scientific cooperations with 40 different countries. Staff members have been invited speakers in international meetings at least 20 times and they have co-organized 4 international conferences. They participate in 12 international programs (EC contracts, EGIDE etc…) and they have obtained 13 ANR grants.

As SCSV is a joint venture between CNRS and University Paul Sabatier and as much of its staff are teachers they participate heavily in the teaching programs in Toulouse with direct responsibility of several Master programs. They are also very much involved in the local Graduate School.

- **New organization, scientific project :**

As explained above, in the new contract the lab will change name (to become Laboratoire de Recherches en Sciences Végétales, LRSV), it will be reorganized along several lines (discussed below) and the current director will be replaced by a new director (DR CNRS) supported by a deputy director (Pr, UPS). We have already in this report expressed confidence that this "changing of the guard" is going to be a success. In the new contract one has decided not to join, one researcher being an INRA employee will go to LIPM (which is an INRA CNRS lab) and the other one is going to the Faculty of Pharmacy. On the other hand, two new teams will join LRSV, one is headed by a recently hired professor and the second one formerly an ERT will join forces with another group. The AERES committee essentially agrees with the new proposed organization. However it recommends that the newly created Eucalyptus group which is still of limited size should concentrate its efforts on well focused projects. In particular it would be extremely desirable that the two subteams should define clear common scientific goals along the next contract. One other concern is the project of the group Evolution and expression of peroxidases which in the present state seems to be quite disconnected from the projects of the rest of the lab. While the bioinformatics part of this project is rather well defined and should integrate rather quickly in the overall research scheme of LRSV, the ROS peroxidase part should be more closely linked to the groups working on cell wall and lignification and also plant microbe interactions. A last point in this section is that the committee recommends that if the new lab leadership wants the creation of a new research group, they have to back the leader with sufficient staff support. At present it seems insufficient. There is a third aspect that could be improved in the next contract: in the present form there are two groups working on calcium signalling, one of them being of limited size. We recommend that these two groups embark on discussions aimed at exploring opportunities for synergistic interactions and examining, without prejudice, whether merger would be a route to establishing even greater international research impact.

- **Meetings with the staff :**

The committee has met with three different staff groups (students and post doc, technical staff, teaching and research staff). None of the groups has expressed important negative feelings concerning the management of the current director, and on the contrary his policy has been praised time and again. In particular the core technical facilities are highly appreciated (especially bioinformatics, cellular biology and biochemistry).

The students have expressed concern that there are not enough post docs in the lab. On the other hand they seem to be quite satisfied with their training programs and relations with their supervisors. They seem to have easy access to international congresses. The students have complained about the poor functioning of the product ordering procedures (large delays). They appreciate having thesis committees, they have to give 2 department presentations during their PhD training program. The students are happy about the help they get from the technical staff. Not surprisingly, the only post doc feels a bit lonely in this lab.

The technical staff has also praised the overall organization and functioning of the lab. On the other hand, they have also expressed concern about the future of the agents working on the platforms and especially those linked to IFR 40. They have indicated that the security management of SCSV is adequate. They seem to have easy access to training programs but they have indicated that the financing of those programs by CNRS is ever decreasing, which is a concern. They have also questioned the possibility of having access to INRA training, which at present seems restricted. The technical staff has the feeling that the increasing number of agents hired as CDDs is detrimental to keeping the know how in the lab. Finally they have expressed concern at having an academic facility increasingly tied to private funding and also concerning the functioning of the Committees in charge of the promotions of the technical staff.

The researcher and teaching staff have also highly praised the scientific environment in Toulouse and the functioning of the platforms. Overall they are satisfied with the management of the structure, with the scientific animation and the opportunities of continuing education. On the other hand they have indicated that the Website of the department is outdated and they would like a centralized database of products and seeds to be set up. As the other groups they have indicated their high appreciation of IFR 40 and their wish to see that structure continued. It has been mentioned that the sharing of technical staff results in some research groups deprived of direct technical help. Finally it has been indicated that the ANR funding although highly appreciated has side effects. It entices the research groups to work separately from one another and makes it more difficult to build a common research strategy for LRSV.

- **Meetings with the sponsors (CNRS, UPS and INRA):**

The committee has then met with the established and putative scientific sponsors (CNRS, Université Paul Sabatier and INRA as on observer). The president of UPS has indicated his strong attachment to SCSV/LRSV, and together with the CNRS representative they have pledged their interest in funding IFR40. From the discussion the committe had with these individuals it shares the feeling that there is an application running to renew this IFR. It is unclear at present whether the colleagues of SCSV have been associated to the writing of this proposal which is a concern (the project seems to be headed rather by LIPM). The committee has expressed support to the SCSV lab and specifically UPS and CNRS were asked not to weaken the lab by suppressing either research/ teaching or technical positions. Both the CNRS and UPS representatives have been reassuring in this respect.

The INRA representative has expressed interest in establishing structural ties with SCSV/ LRSV. They envisage the possibility to create a structure of the USC type.

- **Relations SCSV/ LRSV with LIPM :**

At least one member of the committee has participated to both LIPM and SCSV evaluations (not mentioning the AERES and CNRS representatives). It appears that some scientific projects are already shared by the two labs (they essentially concern plant/ microbe interactions and plant pathogens). Nevertheless the two labs have their own specificities, LIPM being a CNRS INRA consortium and SCSV a UPS CNRS consortium. SCSV is heavily involved in student training, while LIPM plays a minor role in this respect. As a consequence the scientific output of SCSV is a bit lower (not much in fact) because much of the staff has also teaching duties. Overall the two labs seem to perform equally well scientifically taking into account this specificity of SCSV. The current director of SCSV has expressed interest at having the two structures coming closer together and this view seems to be shared by a majority of the scientist of this lab. As both structures have proposed separate projects a junction will not occur in the present contract. The possible creation of an INRA USC structure could help closing the gap that still remains between the two labs. Obviously a merger would place this lab in a world leading position in the field of plant biology, particularly in plant microbe interactions.

- **Overall rating of SCSV/ LRSV :**

The committee has not observed any strong weaknesses in the achievements and project of SCSV/ LRSV. The minor negative points all relate to organizational aspects that can be easily fixed.

- **Production results :**

(cf. http://www.aeres-evaluation.fr/IMG/pdf/Criteres_Identification_Ensgts-Chercheurs.pdf)

A1: Number of permanent researchers with or without teaching duties (recorded in N1 and N2) who are active in research	29.5
A2: Number of other researchers (recorded in N3, N4 and N5) who are active in research	3.6
A3: Ratio of members who are active in research among permanent researchers [(A1)/(N1 + N2)]	0.85
A4: Number of HDR granted during the past 4 years	4
A5: Number of PhD granted during the past 4 years	37

3 • Appreciation team by team and/or project by project

Team 1: "Cell wall protein and development"

Leader: Elisabeth JAMET

- **Quality of the group :**

The team is composed of three full-time scientists (1DR, 2 CR) and two teaching researchers (1 MC, 1 PR), one Assistant-Ingenieur (UPS), 4 PhD students (currently 2) and 7 Master students. The group hired a non-permanent "ingénieur" (March 2009). Recently, a young Professor was recruited in the group (Sept 2009). During the period of evaluation, one Professor became Emeritus (Sept 2009), and one full-time researcher retired (July 2007). The group contributed 1600h of teaching at UPS.

The group published 12 papers in international journals since 2005. The group was the major contributor for 9 of these papers with IF ranging from 2 to 9.2 (mean IF 4.3). Major journals are: Trends in Plant Science, Plant Physiology, Proteomics, BMC Plant Biology. Also to be mentioned the publication of 4 book chapters and the constitution of three public protein databases. Four presentations were given in International meetings, 2 at national level and about 14 poster presentations at national or international meetings. The group was very successful in obtaining external funding, such as two ANR contracts and one European program (trilateral KBBE program).

During the period of the evaluation, the group has gained an international recognition in the field of cell wall proteomics. The group co-organized the "Journées du Réseau Français des Parois" (March 2008) together with team 2. Three projects were conducted during this period mainly dealing with the improvement in the purification procedures and the identification of cell wall proteins (CWPs) involved during the cell elongation as well as the functional studies of some selected protein classes (lecRK, proline and cystein rich protein, DUF 642). Major efforts have also been carried out to investigate by mass spectrometry analysis the post-translational modifications (proline hydroxylation, O- and N-glycosylation) of some selected CWPs.

- **Strategy, integration in the overall project of the lab:**

No negative points have been identified concerning team management.

- **Project rating :**

In continuation of preliminary results obtained during the previous contract, the main objectives of the research project concern the biological characterization of the cell wall proteins identified by proteomic analysis during the period of evaluation and the involvement of their post-translational modifications. We encourage the group to now focus their efforts on these functional aspects in order to unravel the role of these CWPs during the cell wall elongation process.

- **Staff members (on the basis of the application file submitted to the AERES):**

	Past	Future
N1: Number of researchers with teaching duties (Form 2.1 of the application file)	1.8	3.6
N2: Number of full time researchers from research organizations (Form 2.3 of the application file)	2.5	2
N3: Number of other researchers including postdoctoral fellows (Form 2.2 and 2.4 of the application file)		
N4: Number of engineers, technicians and administrative staff with a tenured position (Form 2.5 of the application file)	0.8	0.8
N5: Number of other engineers, technicians and administrative staff (Form 2.6 of the application file)	0.25	0.9
N6: Number of Ph.D. students (Form 2.7 of the application file)	2	1
N7: Number of staff members with a HDR or a similar grade	3	5

Team 2: "Secondary walls: role in development and plant-microbe interactions"

Leader: Deborah GOFFNER

- **Quality of the group :**

The team is composed of 3 full time researchers (1 DR , 2 CR) and 2 teaching researchers, 1 technician and 4 PhD students (currently two). 6 non-permanent engineers or post-docs (currently one) were hired during the previous four year contract in the frame of specific ANR projects.

The group (3.7 full time equiv person/year) published 14 papers in international journals since 2005, and in 10 articles they are major contributors. IF is ranging from 2.3 to 6.7 (mean IF is 4.2). Representative papers were published in Plant Physiology (4), Plant Journal (2).

Scientific interests: the team is involved in genomic and functional studies of mechanisms that govern the formation and degradation of cell walls. Three major experimental models have been investigated (Zinnia, Arabidopsis and maize). Novel signaling mechanisms involved in protoxylem and metaxylem formation were elucidated. Candidate genes were identified from late xylogenesis library and functional characterization was conducted mainly in Arabidopsis. Main efforts concerned functional analyses of ARAF, an arabinofuranosidase potentially involved in pectin remodeling, and WAT1 a potential drug/metabolite exporter with homology to nodulin 21 that regulates auxin homeostasis and its potential involvement in plant-microbe interaction.

Novel genes involved in lignin biosynthesis were analyzed in Maize in the frame of two ANR-Genoplante projects. Genetic resources including a Maizewall database have been developed for identifying novel candidate genes involved in cell wall metabolism in monocots.

- **International and national recognition :**

The group has been very successful in obtaining international recognition with more than 14 papers in international journals, 7 Invited talks at international (3) and national (4) conferences, as well as in obtaining national (4 ANR) and 1 European FP7 grant (currently 4). The team has also been able to develop two industrial partnerships (ASEDIS, Promais). The group leader is a committee member at CNRS (section 28). The group co-organized the "Journées du Réseau Français des Parois" (March 2008) together with team 1.

- **Assessment of the research :**

The group has produced excellent work on cell wall formation and function during the past four year contract and it has earned international recognition in the field. Novel mechanisms in secondary cell wall formation were discovered – a transporter-like function and a link between Trp/auxin homeostasis and secondary cell wall formation – as well as development of novel resources and data base for maize cell wall biology, and original contributions to maize cell wall applications (silage digestibility, second generation biofuels) in collaboration with industrial partners.

The committee has been favourably impressed by the dynamism of this group, also reflected in the research project for the next contract.

- **Project rating :**

Efforts will concentrate on four main goals linked to secondary cell wall formation: (1) identification of novel regulators of SCW formation, (2) elucidation of WAT1 function in fiber development and plant-pathogen interactions (3) cellular bases of maize cell wall digestibility, (4) the role of plant cell walls in endosymbiotic interactions between maize and Glomus. The evaluation committee is convinced that the group has the necessary scientific and human potentials, well established national and international collaborations, and successful funding to meet these goals and secure its position in the international SCW community.

- **Staff members (on the basis of the application file submitted to the AERES):**

	Past	Future
N1: Number of researchers with teaching duties (Form 2.1 of the application file)	1.6	1.8
N2: Number of full time researchers from research organizations (Form 2.3 of the application file)	2.8	2.8
N3: Number of other researchers including postdoctoral fellows (Form 2.2 and 2.4 of the application file)		
N4: Number of engineers, technicians and administrative staff with a tenured position (Form 2.5 of the application file)	0.8	0.8
N5: Number of other engineers, technicians and administrative staff (Form 2.6 of the application file)	3	
N6: Number of Ph.D. students (Form 2.7 of the application file)	4	1
N7: Number of staff members with a HDR or a similar grade	1	2

Team 3 : "Functional genomics in Eucalyptus"

Leaders : Jacqueline GRIMA-PETTENATI / Chantal TEULIERES

Group 3a « Transcriptional and post-transcriptional regulation of xylem formation» Jacqueline GRIMA-PETTENATI

- **Quality of the group :**

The group is composed of one DR CNRS, one CR working on the transversal project between teams 3a and 5, two MCF who moved to other places and a technician. Five students (four completed their PhD, including three in cotutelle with different countries), three post docs (two left the group now). One MCF was hired in September 2009.

The research developed was focused on the study of the promoters of CCR and CAD, the study of MYB transcription factors involved in lignin biosynthesis plus functional genomics of xylogenesis. A database related to ESTs in Eucalyptus was developed and made available to the community.

10 of the 13 articles were published as either first or last author. Mean impact factor 3.5.

The scientific production is very satisfactory both in terms of numbers and quality.

- **International and national recognition :**

There are a total of 10 communications in international conferences, 6 as invited speakers with 2 invited plenary lecture talks. There have also been 6 communications in national conferences and 5 invitations to give seminars in France.

Grants: 1 ANR (with another team of the unit), 1 European contract (with another team of the unit), one ERA-PG trilateral project as coordinator. We notice a strong cooperation with labs from Québec (the PI has spent a year in Quebec as an invited professor). The group is internationally well positioned and recognised. The two MCF gave 384 hours of teaching per year.

- **Strategy, integration in the overall project of the lab:**

At present the two subteams of the Eucalyptus team look like separate entities. The management of this group should be improved.

- **Project rating :**

The research project described by the group 3a includes three main orientations:

- functional analysis of two different MYB transcription factors will be carried on: promoter analysis, cellular localisation, identification of protein partners and target genes.

- functional analyses of five new secondary wall regulators essentially by several classical functional approaches (mutant analyses, target identification...).

- a new project (not yet granted) dedicated to the identification of microRNA specific of wood and their associated targets in collaboration with groups already involved in that field.

First, we have noticed that the group 3a and group 4 have been collaborating on a topic related to calcium regulation of the MYB factor activities (see Report of the AERES committee on team 4, p.12, Project rating lines 1-5). However, this needs to be clarified: the goals need to be well defined and preliminary experiments need to be completed. For instance, the link between tobacco and eucalyptus MYB factors is unclear.

The first part of the project is very straightforward and is related to MYB factors already studied in the lab since several years. The genomic tools and the necessary skills to work on Eucalyptus are well established in the lab.

We therefore have not doubt that the research will be carried on successfully. The second part of the project is more ambitious and will probably require more people and post-docs. Thus we strongly encourage the group to open post-doc positions (included for instance in ANR projects) and the number of target genes studied should be adapted to the number of post-docs recruited. For the last part of the project, we noticed that the group has no particular experience in the miRNA field, thus acquiring the scientific expertise and the technical skills to work in such a competitive field will require time and technical investment. Therefore, we express some concerns about the success of this project in a short period of time.

Group 3b: « Control of development by stress through CBF pathway» (ex ERT 2045) TEULIERES Chantal

- **Quality of the group :**

The group is composed of one PR and one MCF. Four PhD students (three already completed their PhD and one in the first year of the PhD), four CDD (2 IR, 2 IE not in the group anymore), no post-doc. The group contributed 1800 h of teaching at UPS.

The research developed was focused on the identification of potential candidate genes involved in cold tolerance of Eucalyptus, including the functional analysis of CBF genes, identification of SNP markers.

Four articles with either first or last author out of a total of four were published. The mean impact factor is 3.2.

The scientific production is satisfactory.

- **International and national recognition :**

Three national communications and one international were recorded. One international ERA-PG trilateral project, two research grants from the Regional Council (APRTT) as coordinator, and several PhD grants (MRES, Regional Council) were obtained, and funding from private partners was successful.

- **Strategy, integration in the overall project of the lab:**

At present the two subteams of the Eucalyptus team look like separate entities. The management of this group should be improved.

- **Project rating :**

The research project described by the group 3b is based on the transcriptomic and metabolomic analyses of cold acclimated and CBF over expressing Eucalyptus lines. In particular, genes involved in the control of growth and the control of wax synthesis will be identified. During the last contract, the group has produced a large collection of genomic tools: over-expressing lines, databases, efficient procedures to transform Eucalyptus. However, we noticed that the CBF field is very competitive and difficult to investigate especially with a model uneasy to handle. Two groups within the lab are currently working with the Eucalyptus model. We noticed that they wish to collaborate and we strongly encourage those teams to find common research projects instead of simply relying on general common tools.

- **Staff members (on the basis of the application file submitted to the AERES):**

	Past	Future
N1: Number of researchers with teaching duties (Form 2.1 of the application file)	1.6 2	1 2
N2: Number of full time researchers from research organizations (Form 2.3 of the application file)	1.5 -	1 -
N3: Number of other researchers including postdoctoral fellows (Form 2.2 and 2.4 of the application file)	1 -	0.4 -
N4: Number of engineers, technicians and administrative staff with a tenured position (Form 2.5 of the application file)	0.8 -	0.8 -
N5: Number of other engineers, technicians and administrative staff (Form 2.6 of the application file)	0.1 0.8	- 0
N6: Number of Ph.D. students (Form 2.7 of the application file)	5 3	1 2
N7: Number of staff members with a HDR or a similar grade	1.5 2	1 2

Team 4: "Cytosolic and nuclear calcium signalling in plants"

Leader: Christian MAZARS

- **Quality of the group :**

The group comprises three CNRS researchers (3 CR1), one Assistant professor and a full time Professor at the University. During the period of the evaluation the number of full time equivalent staff decreased from 4.8 to (a planned 3.5) at the next contract. 3 PhD students are currently under training and 1 student graduated during the period of evaluation. In addition there is one technician (80%). The group contributed 1800 hours of teaching at Toulouse University. The changes in personnel are due to retirements, the promotion of an individual to a post of group leader and the transfer of another person to the proteomics platform. Members of the group published 23 articles in international journals (average IF = 5.2). Of the 23 papers, group members were senior authors on 9 publications. The most significant publications were in general journals such as Cell Calcium, BBA and in high profile plant journals such as New Phytologist, Plant Physiology and Plant Journal. In addition they wrote several significant invited reviews in New Phytologist.

There are three major research themes 1) the autonomy of the nucleus in calcium signalling 2) the role of calcium and sphingolipids in programmed cell death 3) the control of gene transcription by calcium. There is also a minor theme in space plant biology. The group has provided an impressive number of contributions at both national and international meetings. In addition they will be involved with team 5 in the organisation of international meetings (including the organization of the European Calcium Meeting to be held in Toulouse in 2012). The group was very successful in obtaining external funding (ANR, CNRS, University Paul Sabatier and CEA-CNRS-INSERM) including industrial support (Society PRP-SAS).

- **Assessment of the research and research plan:**

This group has undergone a major transition during the period of the evaluation. The founding director of this group retired and the leadership was handed over to a colleague of the team. The members of the evaluation group were very impressed by the new leadership. There was clear evidence of vision, strategy and scientific excellence. On the basis of international profile (papers, conferences, grants) this is a very successful group. A clear and innovative strategy for the future was presented based on 1) research on the role of the nucleus in calcium signalling and 2) the role of calcium and sphingolipids in programmed cell death. In this latter context it was good to see the group exploiting their position at the forefront of international plant sphingolipid research. Positively the group is acquiring new technologies allowing them to move their work from populations of cells to the level of the single cell.

The evaluating group very much applauded this development which is essential to the success of the future activities. The use of mathematical modelling to gain insights into the fundamental aspects of calcium signalling was also highly appropriate and timely. This group was also aware of the opportunities within Toulouse for collaborating with others to investigate nuclear calcium signalling. Overall this is an excellent group. The group will want to consider exploiting synergistic opportunities by working more closely with the second group working on calcium (Calcium calmodulin-mediated signalling during environmental stress). If the resources allow, interaction with this group could be further developed through agreement to exploit common model plants such as Arabidopsis as this will facilitate interaction, increase synergy and will allow the maximum exploitation of genetic and reverse genetic resources.

- **Project rating :**

The project comprises three topics, cell death signalling induced by sphingolipids, calcium regulation of gene transcription in response to sphingolipids and calcium regulation of the activity of Myb factors. The questions to be investigated are clearly delineated and the project is a follow up of the work that has already been carried out successfully by the group. The Myb project is a joint venture between this group and Team 3. The team appears to have all competences and collaborations needed to progress on the proposed research plan in the next contract.

- **Staff members (on the basis of the application file submitted to the AERES):**

	Past	Future
N1: Number of researchers with teaching duties (Form 2.1 of the application file)	2	1.25
N2: Number of full time researchers from research organizations (Form 2.3 of the application file)	3.7	3
N3: Number of other researchers including postdoctoral fellows (Form 2.2 and 2.4 of the application file)		
N4: Number of engineers, technicians and administrative staff with a tenured position (Form 2.5 of the application file)	0.8	0.8
N5: Number of other engineers, technicians and administrative staff (Form 2.6 of the application file)		
N6: Number of Ph.D. students (Form 2.7 of the application file)	2	1
N7: Number of staff members with a HDR or a similar grade	2.7	3

Team 5: "Calmodulin-mediated signalling in environmental stress responses"

Leaders: Jean Philippe GALAUD and Benoit RANTY

- **Quality of the group :**

The group comprises one researcher (1 CR1) and two Assistant Professors at the University and a Ingenieur (80%). This small group equates to 2 full time equivalent members of staff, nevertheless they are currently training 3 PhD students and had one graduate during the period of evaluation. The group contributed 1600 hours of teaching at Toulouse University. Members of the group published 6 articles in international journals. Of these papers, group members were senior authors in 5 out of 6 publications. The most significant publication was in the internationally recognised Plant Journal in 2008.

This group focuses on the involvement of calmodulin-like proteins in drought (ABA-signalling) and in defence against pathogens. A novel and promising area of work is the study of CML-target proteins and their involvement in transcriptional control. The group actively contributed to international meetings and both group leaders contributed to the organisation of international workshops. They were successful in securing funding from ANR and CNRS.

- **Assessment of the research :**

During the evaluation period the group established themselves successfully in the international plant calcium community. The evidence to support this can be found in the published papers and participation in conferences. In addition the evaluation committee was particularly impressed by the group's successful identification and characterization of CML9 target proteins (GRAS and PRR2). Overall this is a good group with excellent potential for achieving international success. This judgement is based on their unique position for exploring CML proteins (these have recently been recognized as important players in calcium signalling).

- **Project rating :**

Plans outlined during the evaluation involved the further characterization and investigation by genetic, biochemical and cell biological means of additional CML proteins. The fact that CML proteins are increasingly recognized internationally as being important in the control of transcription regulatory circuits supports the significance of this emerging field and the position and the credibility of the proposal of the Toulouse group.

This group was also aware of the opportunities within Toulouse for collaborating with others to investigate calcium signalling and develop joint technical platforms.

This group should consider exploiting synergistic opportunities by working more closely with the group working on nuclear calcium because of the exciting opportunities for investigating more details of CML function in the nucleus and ensure that the roles of other CMLs are not neglected.

- **Staff members (on the basis of the application file submitted to the AERES):**

	Past	Future
N1: Number of researchers with teaching duties (Form 2.1 of the application file)	2	2
N2: Number of full time researchers from research organizations (Form 2.3 of the application file)	1	1
N3: Number of other researchers including postdoctoral fellows (Form 2.2 and 2.4 of the application file)		
N4: Number of engineers, technicians and administrative staff with a tenured position (Form 2.5 of the application file)	0,8	0,8
N5: Number of other engineers, technicians and administrative staff (Form 2.6 of the application file)		
N6: Number of Ph.D. students (Form 2.7 of the application file)	4	1
N7: Number of staff members with a HDR or a similar grade	2	3

Team 6: "Evolution and expression of peroxidases"

Leader: Christophe DUNAND

- **Quality of the group :**

The group comprises currently two members (one Professor and one assistant Professor). The group leader who was very recently recruited in Toulouse has had an excellent scientific production in Switzerland. He has published 20 papers since 2005. He is either first or last author in 18 of them. The average impact factor of these papers is close to 3. Most importantly, he has generated a much used Peroxibase dataset.

- **National and international recognition :**

From his previous record, the project leader has the ability to lead and define a research program. He has also the potential to strengthen the bioinformatics platform of LRSV (there are already strong ties between this group and the bioinformatics facility). This colleague has clearly a very good international recognition on his subject.

- **Strategy, integration in the overall project of the lab:**

At present the fitting of this new group in the LRSV scheme is unclear. Whether the two participants of this group will fit together is yet untested (there is actually no reason to worry about that at this point). This group should get help from the Bioinformatics facility and in the same time the competence acquired by the group leader should strengthen this facility.

- **Project rating :**

This is the weak point of the application of this group. It is not clear how this new group will integrate in the overall strategy of LRSV. We suggest that as peroxidases are important in lignin polymerisation and plant defence, improved cooperation should be thought with the groups of LRSV working in these domains. Also the committee feels that the proposed new group is too small in size. If this project is to work, the managers of LRSV should pay extreme attention at strengthening it especially in terms of staff.

- **Staff members (on the basis of the application file submitted to the AERES):**

	Past	Future
N1: Number of researchers with teaching duties (Form 2.1 of the application file)		1.8
N2: Number of full time researchers from research organizations (Form 2.3 of the application file)		
N3: Number of other researchers including postdoctoral fellows (Form 2.2 and 2.4 of the application file)		
N4: Number of engineers, technicians and administrative staff with a tenured position (Form 2.5 of the application file)		
N5: Number of other engineers, technicians and administrative staff (Form 2.6 of the application file)		
N6: Number of Ph.D. students (Form 2.7 of the application file)		1
N7: Number of staff members with a HDR or a similar grade		1

Team 7: "Endomycorrhizal symbiosis and cell signalling"

Leader: Guillaume BECARD

- **Quality of the group :**

The group comprises 5 Enseignants-chercheurs (1 PR1, 1 PR2 and 3 MC, of which 1 will leave) (2.5 full time researchers), 1 CNRS researcher (CR2) (since autumn 2009), 1 Ingénieur, leading to 3 full time equivalent staff in 2011. The group has contributed about 5000 hours of teaching at Toulouse University. 3 Ph.D. students finished and 3 are ongoing. The group had 6 Master2 students, all finished by now.

Members of the group published 13 articles in international journals and contributed to two book chapters: 2005: 4 (IF 4-8: 3; IF 8-12 : 1: 9.64 - PNAS) + 1 OS; 2006 : 1 IF>12 :1: 13.5 - PLoS Biology) + 1 ACLN; 2007: 3 (1 in a journal currently w/o IF ; IF 0-4 :1; IF 4-8 :1) + 1 OS + 2 ACL not linked to the team programme (IF 8-12 :2); 2008: 4 (IF 0-4 :1; IF 4-8 :2; IF>12 :1: 28.75 - Nature) + 2 ACLN; 2009 : 1 in a journal currently w/o IF. Team members were first or last author on 8 articles (average IF = 8.54). Three patents were obtained (1 in 2004, 2 in 2008). The group was involved in the organization of one international and two national meetings.

- **Assessment of the research and research plan:**

There are three major research themes that will be continued; 1) strigolactone, 2) Myc factors, and 3) commercial inoculum production. The team is focussing on the early molecular communication between plants and AM fungi and developed a collaborative and complementary approach to identify factors secreted by plants to attract mycorrhizal fungi, as well as by the mycorrhizal fungi to induce and establish an efficient endosymbiosis with host roots. To this end they used physiological, biochemical, cell biological and genetic analyses, culminating in the identification and characterization of the chemical structure and physiological function of these compounds. This approach has been highly successful as they have identified both the compound secreted by sorghum and other plant species to attract the fungal partner and the factor secreted by the fungus Glomus intraradicis to establish a successful symbiosis with Medicago trunculata. These are major achievements that have a high impact on the field, even though the nature of the Myc factor has not yet been disclosed. These discoveries will open up a new area of research of worldwide importance and in addition will allow the development of new biotechnological applications. The commercial inoculum production is a spin-off of the work that has been carried out in the past years and testifies as to the applied value of the research of this team.

- **National and international recognition :**

The strigolactone project was developed in partnership with two teams from the Toulouse campus, reflecting efficient collaborations at the local level. The group has further joint projects with researchers and industrial companies in France (1 ANR-RIB 2006-2009 (372 k€); 1 CS-UPS 2009-2010 (5k€); 1 FUI – DOCIS (459k€); 4 industrial contracts) and developed a technology to commercially produce AM fungal inoculum on an industrial scale, for which a start-up company was created. Team members gave 7 invited lectures at international congresses (6 outside France), 1 non-invited lecture at an international congress and various seminars nationally and internationally.

- **Strategy, integration in the overall project of the lab:**

The quality of the leadership of the group director has greatly contributed to the success of the group and to the overall success of the institute.

- **Project rating :**

The time is now right to unravel the molecular and cellular events that are central to the establishment of the endomycorrhizal symbiosis. The group will exploit its recent discoveries by extending research to fungal and host plant physiology, the negative regulation of the symbiosis by phosphate, and new symbiotic regulatory factors using a combination of genomics, (micro)transcriptomics and metabolomics. This is a logical continuation, which will also increase the knowledge fungal-plant mycorrhizal symbioses in plants in general under natural and field conditions.

This group is an excellent position to take leadership in the field. There will be intensive competition notably from a Japanese group which could be countered provided sufficient support is allocated to the team and the nurturing of effective collaborations.

- **Staff members (on the basis of the application file submitted to the AERES):**

	Past	Future
N1: Number of researchers with teaching duties (Form 2.1 of the application file)	5	4
N2: Number of full time researchers from research organizations (Form 2.3 of the application file)		1
N3: Number of other researchers including postdoctoral fellows (Form 2.2 and 2.4 of the application file)	0.6	
N4: Number of engineers, technicians and administrative staff with a tenured position (Form 2.5 of the application file)	1	1
N5: Number of other engineers, technicians and administrative staff (Form 2.6 of the application file)	1.2	0.6
N6: Number of Ph.D. students (Form 2.7 of the application file)	6	5
N7: Number of staff members with a HDR or a similar grade	2	3

Team 8: "Plant-Microbe Interactions: Microbial effectors and plant immunity"

Leader : B. DUMAS

- **Quality of the group :**

The group currently comprises one CNRS researcher (CR1, recently promoted to DR2), 5 Enseignants-chercheurs (4 MC and 1 emeritus professor) (2.5 full time researchers), 1 Ingénieur and 1 Assistant Ingénieur (50%), leading to 3.2 full time equivalent staff in 2011. The group contributed 5000 hours of teaching at Toulouse University. 2 post-docs came and left. 7 Ph.D. students finished and 2 are ongoing. The group had 10 Master2 students, all finished by now. In addition, 1 invited professor and 1 invited researcher joined the group for short stays.

Members of the group published 21 articles in international journals, as well as three book chapters and one database (AphanoDB): 2005: 4 (IF 0-4 :1; IF 4-8 :3); 2006: 3 (IF 0-4 :2; IF 8-12 :1: 9.6 – Plant Cell) + 1 OS; 2007: 6 (IF 0-4 :3; IF 4-8 :3) + 1 OS + 1 ACL not linked to the team programme (IF 10.9); 2008: 4 (1 in a journal currently w/o IF; IF 0-4 :1; IF 4-8 :1; IF 8-12 :1: 9 – Trends in Plant Science) + 1 OS + 1 ACL not linked to the team programme (IF 1,2); 2009: 4 (IF 0-4 :1; IF 4-8 :3) + 1 OS. Team members were first or last author in 17 articles (average IF = 4.85). Two patents were obtained in 2005. The group was involved in the organization of two international and one national meetings.

- **Assessment of the research and research plan:**

There are two major research themes: 1) microbial effectors, and 2) plant immunity. This research has evolved from a broad interest in plant-pathogen interactions to a focus on the model plant Medicago trunculata as a host plant. Previous studies using Colletotrichum spp. as the pathogen have been concluded and research is now entirely concentrated on the root rot-causing oomycete Aphanomyces euteiches. This has turned out to be a unique system since very few groups worldwide are studying pathogen effector genes and plant resistance reactions in roots. Accordingly, this oomycete has been shown to employ strategies different from the ones that have been identified for Phytophthora spp, using novel genetic and genomic analyses. New oomycete biosynthetic pathways were discovered and novel surface cell wall-interacting proteins were identified that may be important for fungal pathogenicity. Cellulose-binding domains have been identified as MAMPs on Arabidopsis and their significance is currently being explored. Resistance of Medicago to Aphanomyces is quantitative. Two lines differing in the level of resistance have

been crossed to generate collections of inbred lines which allowed the definition of a major QTL containing genes pointing to a so far unknown mechanism of resistance. The group has developed various tools and resources to functionally analyse the significance of the putative effectors and determine the mechanisms of resistance. This brings the group in an excellent position to make major contributions by elucidating novel mechanisms of resistance.

- **International and national recognition :**

The group is productive and has several collaborations with various researchers and industrial companies (1 ANR 2009-2012 (153 K€); 1 IP-GLIP 2004-2008 (85K€); 3 EGIDE; 4 industrial contracts). Team members gave 12 invited lectures at international congresses (9 outside France), 4 invited seminars (3 outside France), and presented a large number of posters at international meetings and various seminars.

- **Strategy, integration in the overall project of the lab:**

After the retirement of the previous group leader, the group is progressing successfully under the new leadership.

- **Project rating :**

The group will further explore the perception of PAMPs in both Medicago and Arabidopsis, as well as the genetic determinants of quantitative resistance. The previously identified carbohydrate-binding module and chitosaccharides that can be used to find the corresponding receptors, allowing a comparison of the molecular perception mechanism with that of Nod factors and will likewise allow comparisons to plant root – mycorrhizal fungus interactions. Further analyses of the resistance mechanisms against Aphanomyces will make use of a large set of Medicago lines differing in the level of resistance; these are currently being sequenced and will allow a rapid identification of genetic determinants that contribute to quantitative resistance. Because quantitative resistance is notoriously difficult to analyze, the current situation provides a unique opportunity to become leading in this field.

The use of algal polysaccharides to induce resistance broadens the analysis of the significance of carbohydrates as elicitors of defence reactions, while at the same time providing good potential for commercial applications.

- **Staff members (on the basis of the application file submitted to the AERES):**

	Past	Future
N1: Number of researchers with teaching duties (Form 2.1 of the application file)	4.5	5
N2: Number of full time researchers from research organizations (Form 2.3 of the application file)	1	1
N3: Number of other researchers including postdoctoral fellows (Form 2.2 and 2.4 of the application file)	2	
N4: Number of engineers, technicians and administrative staff with a tenured position (Form 2.5 of the application file)	1.5	1.5
N5: Number of other engineers, technicians and administrative staff (Form 2.6 of the application file)	1	1
N6: Number of Ph.D. students (Form 2.7 of the application file)	9	3
N7: Number of staff members with a HDR or a similar grade	4	5

Note de l'unité	Qualité scientifique et production	Rayonnement et attractivité, intégration dans l'environnement	Stratégie, gouvernance et vie du laboratoire	Appréciation du projet
A+	**A**	**A+**	**A+**	**A**

Nom de l'équipe : *CELL WALL PROTEIN AND DEVELOPMENT*

Note de l'équipe	Qualité scientifique et production	Rayonnement et attractivité, intégration dans l'environnement	Stratégie, gouvernance et vie du laboratoire	Appréciation du projet
A	*A*	*A*	*non noté*	*A*

Nom de l'équipe : *SECONDARY WALLS : ROLE IN DEVELOPMENT AND PLANT-MICROB INTERACTIONS*

Note de l'équipe	Qualité scientifique et production	Rayonnement et attractivité, intégration dans l'environnement	Stratégie, gouvernance et vie du laboratoire	Appréciation du projet
A+	*A*	*A+*	*non noté*	*A*

Nom de l'équipe : *FUNCTIONAL GENOMICS IN EUCALYPTUS (GROUP A)*

Note de l'équipe	Qualité scientifique et production	Rayonnement et attractivité, intégration dans l'environnement	Stratégie, gouvernance et vie du laboratoire	Appréciation du projet
A	*A*	*A*	*non noté*	*B*

Nom de l'équipe : *FUNCTIONAL GENOMICS IN EUCALYPTUS (GROUP B)*

Note de l'équipe	Qualité scientifique et production	Rayonnement et attractivité, intégration dans l'environnement	Stratégie, gouvernance et vie du laboratoire	Appréciation du projet
B	*B*	*B*	*non noté*	*B*

Nom de l'équipe : *CYTOSOLIC AND NUCLEAR CALCIUM SIGNALLING IN PLANTS*

Note de l'équipe	Qualité scientifique et production	Rayonnement et attractivité, intégration dans l'environnement	Stratégie, gouvernance et vie du laboratoire	Appréciation du projet
A+	*A*	*A+*	*non noté*	*A+*

Nom de l'équipe : *CALMODULIN-MEDIATED SIGNALLING IN ENVIRONMENTAL STRESS RESPONSES*

Note de l'équipe	Qualité scientifique et production	Rayonnement et attractivité, intégration dans l'environnement	Stratégie, gouvernance et vie du laboratoire	Appréciation du projet
B	*B*	*B*	*non noté*	*A+*

Nom de l'équipe : *EVOLUTION AND EXPRESSION OF PEROXIDASES*

Note de l'équipe	Qualité scientifique et production	Rayonnement et attractivité, intégration dans l'environnement	Stratégie, gouvernance et vie du laboratoire	Appréciation du projet
A	*A*	*A*	*non noté*	*B*

Nom de l'équipe : *ENDOMYCORRHIZAL SYMBIOSIS AND CELL SIGNALLING*

Note de l'équipe	Qualité scientifique et production	Rayonnement et attractivité, intégration dans l'environnement	Stratégie, gouvernance et vie du laboratoire	Appréciation du projet
A+	*A+*	*A+*	*non noté*	*A+*

Nom de l'équipe : *PLANT-MICROBE INTERACTIONS : MICROBIAL EFFECTORS AND PLANT IMMUNITY*

Note de l'équipe	Qualité scientifique et production	Rayonnement et attractivité, intégration dans l'environnement	Stratégie, gouvernance et vie du laboratoire	Appréciation du projet
A+	*A+*	*A+*	*non noté*	*A+*

Université Paul Sabatier
TOULOUSE III

Direction de la Recherche

Toulouse, le 9 avril 2010

Affaire suivie par
Ghislaine MACONE-FOURIO
téléphone
05 61 55 66 05
télécopie
05 61 55 69 53
courriel
seccs@adm.ups-tlse.fr
GF/GMF/FW

Le Président

au

Président du comité d'experts de l'AERES

Monsieur Jean-Pierre JACQUOT

Objet : Observations de portée générale sur le rapport d'évaluation
de l'unité **« Laboratoire de Recherches en Sciences Végétales » - LRSV - UMR 5546**
(actuellement SCSV)
portée par **Guillaume BECARD / Elizabeth JAMET**

We wish to acknowledge the AERES scientific committee for the time and the energy spent in evaluating our laboratory. We also wish to provide some answers to their concerns about the new organization of the laboratory and our 2011-2014 scientific project.

Concerning the third part of the project of team 3a dealing with the regulation of genes involved in secondary wall formation by miRNA, we wish to mention that the recent recruitment in team 3a of a new MCF having expertise in that field, reinforces its capacity to perform the proposed project.

With regard to the project of team 3b dealing with CBF factors of the ligneous model Eucalyptus, ongoing collaborations and efficient networking with scientists in the same area are occurring and will help to be competitive in the field. The team is well recognized to have developed during the past years unique skills and tools that now make possible fine functional genomic investigations in Eucalyptus. As an ERT during the previous contract (2006-2009), the team has proved its capacity to develop tight relationships with local private partners interested in cold resistance of Eucalyptus. This will also contribute to the success of its project.

For the next contract (2011-2014), we completely agree with the comment of the committee concerning the two teams working on Eucalyptus. Both teams 3a and 3b are perfectly aware of the importance of defining common scientific project during the next contract. Indeed, the association of the two groups was proposed as a first step to anticipate this joint venture. Both teams will join their efforts to participate to the annotation of the Eucalyptus genome. Transverse topics have already been identified such as regulation of lignification by CBF/cold stress. Their association during the next contract will reinforce scientific exchanges, making more efficient sharing of data and tools, thus allowing to set up common projects.

.../...

The two calcium teams (team 4 and team 5) have already taken into consideration the recommendation of the AERES committee. Monthly scientific meetings have been set up in order to highlight convergences between them with the aim of developing future common projects on calcium signalling using Arabidopsis as a model plant.

We are aware that the new team (team 6) created by a professor recently hired at UPS needs not only to be fully integrated, but also to be supported by additional staff. The scientific project relies on two topics, one is molecular evolution of peroxidases, second is role of peroxidases in ROS signalling during plant microorganism interactions. With the help of the bioinformatics facilities of the lab, the MCF member of the team is already implementing the first topic, whereas the second one is developed in close collaboration with team 8, through the use of a well defined pathosystem, skill and scientific exchanges. The new managers of the laboratory will do their best to reinforce the staff of this team and help the emergence of its thematic.

The committee has pointed out the low number of post-docs as a weakness of the lab. This situation partly comes from the fact that the research teams preferred to strengthen their technical manpower rather than to recruit post-docs with their grants. This is a consequence of our (well accepted) general organization where 75% of our tenured technical staff is affected to common facilities. We seriously take into account this observation with the aim of significantly increasing the number of post-docs during the next contract.

We hope these answers will shed light on the points which were not clear for the committee. We will remain very watchful to the evolution of the scientific projects of all our research teams so that each of them reaches its ambitious goals during the next contract.

Gilles FOURTANIER

118, route de Narbonne - F-31062 Toulouse cedex 9 - Tel. +33 (0) 5 61 55 66 11 - Fax. +33 (0) 5 61 55 64 70 - www.ups-tlse.fr