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

Section des Unités de recherche

AERES report on the research unit

Institut Sophia Agrobiotech (ISA)

From the

INRA, CNRS, UNSA

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Le Président de l'AERES

Didier Houssin

Section des unités de recherche

Le Directeur

Pierre Glorieux

February 2011

Research Unit

Name of the research unit: ISA, Institut Sophia Agrobiotech

Requested label: UMR INRA, UNSA, CNRS

N° in the case of renewal: UMR INRA 1301-CNRS 6243

Name of the director: M. Pierre ABAD

Members of the review committee

Committee chairman

M. Philippe NORMAND, UMR Ecologie Microbienne, CNRS/UCB, Lyon, France

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Observers

AERES scientific advisor:

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M. Jean-Marc LARDEAUX, University of Nice Sophia, Antipolis

M. André LEBIVIC, CNRS

M. Olivier LE GALL, INRA

M. Guy RICHARD, INRA

Report

1 • Introduction

• Date and execution of the visit

The committee visited the ISA unit in Sophia Antipolis from January 31st to February 2nd 2011. Presentations of the unit's research projects were made in the Amphitheatre of the INRA center in a session open to the whole of the unit. The program for the visit was organized with the Délégué of the AERES, Steven Ball, the committee president, Philippe Normand and the Director of the ISA unit, Pierre Abad. The organization of the visit was totally satisfactory. This holds for oral presentations, all done in English, from the director to the team leaders. Sufficient time was left for questions allowing a direct discussion between the committee and members of the ISA unit. Additional meetings organized during these two days of visit facilitated deep exchanges between the committee members and the different categories of ISA personnel, namely technicians, PhD students, staff scientists, directors, and discussions with the representatives from INRA, the University of Nice Sophia Antipolis (UNSA) and the CNRS.

• History and geographical localization of the research unit, and brief presentation of its field and scientific activities

The ISA is the result of a long series of reorganizations that started with the foundation of the site in its present location in 2000 with scientists from the Antibes INRA station and from the University of Nice-Sophia-Antipolis (UNSA), who study plant microbe and plant animal interactions. It is located near Nice in the scientific park of Sophia Antipolis that is organized as a Technopole of 2300 hectares grouping more than 1400 companies. The ISA buildings consist of 1950 m^2, of which 1360 m^2 are devoted to laboratories, 590 m^2 to offices, besides the 1000 m^2 of greenhouses and 260 m^2 of controlled climate chambers. In 2004, there was thus a large INRA-CNRS-UNSA unit (IPMSV), a smaller INRA-UNSA unit (Rose) and two small INRA units (URIH and UELB). In 2008 the two large units fused to form the IBSV, leaving the two smaller units to be managed independently. The ISA is thus a proposed fusion of all scientists and teams on site to form an entity with 9 teams, and more than 200 staff members.

The ISA scientific activities are focused on the study of plant interactions with micro-organisms and insects, creating a highly favorable multidisciplinary environment for analyzing molecular mechanisms involved in symbiosis and pathogenicity of plants, the integrated biology of insect pests and agro-ecology of greenhouse environment. The ISA is very original in the scientific landscape for its approach that integrates knowledge of plants and their pests from a very high quality basic knowledge viewpoint all the way to applications in biological control and greenhouse horticultural practices.

• Management team

The present director of IBSV is Pierre ABAD (INRA) with one deputy director Alain PUPPO (UNSA). ISA has nine teams and two platforms, each led by one scientist. The ISA management relies on meetings of the Unit Council (21 members, 14 elected and 7 nominated, 4-5 meetings/year), a Strategic Joint Scientific Council (12 meetings/year), as well as general meetings of the unit (twice a year). The proposed director of the ISA unit is Pierre ABAD (INRA) with two deputy directors Christine PONCET (INRA) and Marylène POIRIE (UNSA), a structure and organization which have been approved by vote with a large majority of all staff members.

- Staff members

	Past	Future
N1: Number of researchers with teaching duties (Form 2.1 of the application file)	14	14
N2: Number of full time researchers from research organizations (Form 2.3 of the application file)	32	36
N3: Number of other researchers including postdoctoral fellows (Form 2.2 and 2.4 of the application file)	9	10
N4: Number of engineers, technicians and administrative staff with a tenured position (Form 2.5 of the application file)	97	94
N5: Number engineers, technicians and administrative staff without a tenured position (Form 2.6 of the application file)	12	
N6: Number of Ph.D. students (Form 2.7 of the application file)	18	
N7: Number of staff members with a HDR or a similar grade	16	22

2 • Overall appreciation on the research unit

• Summary

The ISA unit is on the one hand developing cutting edge basic research on the molecular mechanisms involved in interactions between plants/microbes and plants/animals and on the other hand carrying high quality applied research aimed at improving horticultural practices and biological pathogen control. ISA projects are focused on bacterial symbiosis, oomycete and nematode pathogenicity, insect biology and integrated horticulture and biological control. Overall, the ISA has a strong, internationally recognized expertise in plant-microbe interactions and integrative insect biology including population, ecological and evolutionary levels, with very active and productive teams. Its scientific niche on the models chosen and the integrative approach on pests management is without equivalent in France and has very few equivalents elsewhere.

• Strengths and opportunities

The ISA unit develops highly competitive basic research on plant interactions with microbes, nematodes, oomycetes, and insects from the molecular level to the population level.

The ISA unit also develops integrated studies on pathogenicity including the whole omics range of approaches.

The ISA displays a matrix-based organization structure that promotes interactions within the unit. The intense discussions that have accompanied the successive reorganizations have resulted in a consensus around most of the objectives.

Basic biological findings can be immediately applied to greenhouse agronomy and biological control.

The ISA unit is well balanced between research and education to train competitive young researchers in sustainable plant protection.

The teams are highly competitive and the platforms well-equipped but increased interactions and sharing of resources/platforms could bring more synergies.

Proximity of mathematics skills at INRIA and University of Nice-Sophia Antipolis could be an opportunity to analyze complex systems.

• Weaknesses and threats

There is a concern that given the mandate of the team devoted to biological control, there might not be sufficient resources.

There is a concern whether the shear volume of expected data deriving from genomic and ecological projects can be analyzed in a timely fashion.

There is a concern that financial and human resources of platforms (biocellular and bioinformatics) may not be sufficient to fulfill the stated aims.

There is a concern that amalgamation of the INRA administrative support services into a regional Service d'Aide à la Recherche (SDAR), integrating the staff from the former Avignon and Nice INRA centers several years ago, may have resulted in unnecessary complex circuits of decisions, in decreased availability of logistic support staff for ISA research units, in unclear administrative procedures and consequently in impediments for research efficiency and ultimately in lowered motivation of the staff. Negotiations should be pursued to propose novel rules/structures to fully support the Sophia research units.

- Recommendations

If biological control research is to be maintained as an independent team, it needs a full and constant support, in terms of human and financial resources, in particular to facilitate contacts between teams. TEAPEA and RBLD should collaborate even more closely on this theme. Given the switch of RBLD from a UE status (Unité expérimentale) to a full team, the objectives of INRA SPE regarding the expected outputs of the group should be clarified specifically with a “Lettre de Mission”.

Synergies deriving from the original and effective matrix-based perspectives proposed should be continued and deepened, using as levers joint PhD, contract workers, Post-doc fellows and common grant applications.

Bioinformatics for systems biology need to be imbedded in the fabrics of the institute, given the expected massive amount of data expected from genome projects.

A clearer strategy, agreed upon by all, should be defined for sharing costs of common platforms and services. Setting-up of a common plant transgenic service or platform should be considered.

Given the loss of technical staff over the reference period, care must be taken to maintain the workforce to to cope with the missions of the unit.

Discussions should continue with respect to the consequences of human resources integration deriving from the establishment of the TGU (Très grande Unité) and the reorganization of the SDAR. The decision process with the logistics personnel (SDAR) should be fluidified to make it more efficient.

- Production results

A1: Number of permanent researchers with teaching duties (recorded in N1) who are active in research	12
A2: Number of permanent researchers without teaching duties (recorded in N2) who are active in research	36
A3: Ratio of members who are active in research among staff members [(A1 + A2)/(N1 + N2)]	94%
A4: Number of HDR granted during the past 4 years	6
A5: Number of PhD granted during the past 4 years	18

3 • Specific comments

- Appreciation on the results

ISA has developed a large array of research projects in the field of plant microbe interactions and pest biology that are original, relevant and competitive at the international level. The results obtained by the different teams are of high quality and have consistently led to breakthroughs in the corresponding fields. Although these projects may seem quite diverse, they are frequently complementary, as a result of an active policy of matrix-based interactions along axes determined by the different policy making instances of the unit through several years of planning from the previous fusion to the present TGU.

The aim of the unit to do basic science work and to use these results in applied agronomical situations results in numerous improvements in the management of commercial exploitations such as greenhouses, biological control suppliers and plant breeders.

ISA has a high number of high quality publications (352 publications over a 4.5 years span, among which 18 are in journals with an impact factor above 9, and 56 above 5; 215 are the 1st quartile and 118 in the top10%). Major publications have been obtained in the period, including 1 Nature, 1 Nature Biotechnology, 1 PLOS Biology, 2 Annual Review of Phytopathology, 1 Genome Research, 3 Plant Cell, and 3 PNAS. ISA has also produced databases, software for greenhouse operation and maintains several biological collections.

ISA has invested massively in the training of young scientists, with 18 PhD theses defended during the reference period. A large majority of these PhDs have published their results in high ranking journals, and are now undergoing post-doctoral training in international laboratories. A large majority of these PhD students were enrolled at the University of Nice Sophia Antipolis Doctoral School. Also over the period 67 MSc were completed within the unit.

ISA works on a domain that has a wide and deep appeal for the general public. As such, there is an on-going demand for popularization, in the form of participation to general public manifestations (8), interviews in the general press (11) and writing of books and articles targeted at the public (4).

Selected breakthroughs that were obtained in different fields of research at ISA are listed below:

A demonstration that H_2O_2, NO and GSH are redox signaling molecules are necessary for the establishment and functioning of N-fixation in Legumes was provided.

Experiments were carried out that demonstrate that oomycete pathogens activate plants susceptibility genes that facilitate infection.

Biofilm formation was characterized as a step in oomycete infection through induction of mucin-like proteins genes.

A suggestion was made that *M. incognita* genome duplication occurred as an adaptive means, a necessary feature to allow emergence of diversity in a parthenogenetic organism.

Lateral gene transfer was evidenced as an evolutionary strategy of nematodes to adapt to the plant root biotope.

A role for cytoskeleton modifying proteins leading to giant cells formation was evidenced as a means to establish compatibility to nematodes.

Evidence was produced toward the possible use of resistance genes pyramiding for durable protection against nematodes.

Virulence factors affecting success of parasitic wasps were reported while their variability was analyzed.

Genetic and demographic factors were deciphered that govern invasion success of introduced populations.

Insects genomes were explored to understand resistance to insecticides, while those of poaceae were studied to unravel the evolutionary history of a biosynthetic pathway producing insecticidal metabolites.

Cutting edge mathematical models were optimized for the use of natural ennemies to control insects.

Evolutionary ecology concepts and molecular systematics tools were incorporated in biological control approaches.

In addition to these breakthroughs, ISA has a significant level of collaborations with privates companies, which has led to a significant (5) output of patents. There are three startup companies that have emerged from results obtained at the ISA, working on biological control, toxicology and pest diagnostic, respectively, and employing a total of about 14 staff, of which many are former Ph.D. students from the unit.

ISA teams have developed strong partnerships with private companies and public institutions, both at the local and national level.

- Appreciation on the impact, the attractiveness of the research unit and of the quality of its links with international, national and local partners

ISA members are frequently invited to international conferences indicating the high level of scientific recognition of the research performed by the different teams at the international level. There have been 108 such invitations to national and international meetings, including many to the top international meetings (EMBO, International Nitrogen Fixation Meetings, MPMI, ESN, ICN, IUPAC). They have also organized several meetings, both national and international meetings. They organized a European COST program meeting on nematode genomics.

The ESIM team leader was awarded, in 2008, the A.S. Balachowsky Prize attributed by the French National Academy of Sciences for her work on the "Response of organisms to environmental stresses".

ISA has a very good ability to recruit high quality young research scientists (post-docs, young permanent researchers), including some from other European countries. ISA has also some success in CNRS competitive hiring (1 CR2) and a strong support from INRA (1 CR2, 2 CR1, 1 DR2) and University with a "chaire d'excellence".

All the teams from ISA have been successful in raising funds through competitive grant applications (8 EU, 24 ANR, 107 contracts of other types), and a large number of these collaborative projects are coordinated by ISA. The members of the unit have been part of several clusters devoted to the analysis of genomes and transcriptomes, analysis of large data arrays pertaining to management of greenhouses, analysis of effectors.

ISA has a very strong level of scientific collaboration at the national, European and global levels. This is exemplified by the high number of competitive grants coordinated by ISA members, and the number of scientific networks led by ISA members. ISA has a long history of collaboration at the local, national, European and international levels with both their peers in basic science and with private agriculture entrepreneurs with the aim to obtain results on plant pests and to transfer these to "in the field" practices. Three groups (IPN, TEAPEA and RDLB) have explicit objectives and significant activities in transfer of knowledge to professionals.

- Appreciation on the management and life of the research unit

ISA is well organized and its management is efficient both at the organizational and at the communication levels. Collective discussions are organized through two councils (management and scientific) that meet regularly on ongoing projects/problems. These councils take collective decisions that are fully supported by members of the unit.

The ISA unit has only 2 technical platforms, one devoted to microscopy and cell biology (90 m^2) and one for proteomics/metabolomics equipped with a Biacore device, a HPLC-FPLC and a LC-MS/MS (50 m^2). The microscopy and cell biology platform is shared with the Sophia Antipolis Center and belongs to the Nice Cell Biology IBiSA-labelled platform. The other heavy equipments (greenhouses, growth chambers, etc.) are not organized within platforms. Discussions with the staff have shown that the platform concept still needs to mature to gain common acceptance. They are facing funding problems to provide equipment maintenance, to provide updates and to hire technical support staff. Terms of access need to be clarified, for which the committee recommends a thorough reexamination of the strategy, for which the IBiSA recommendations would be appropriate (http://www.ibisa.net/charte.php). Such an accepted and stated platform strategy would emphasize the dynamic development and leveraging of technological competences, providing ISA with an important source of added value.

A distinct administrative unit, called UR1284 Institut Sophia Agropolis was created in 2006 to plan and support the fusion of the existing UMRs and URs into a very large Institute of Plant Protection at Sophia Antipolis.

This small unit carrying the same name (ISA) as the planed future TGU thus was a forerunner for the fusion. As such, ISA-UR1284 has been essential in building up the proposed AgroBiotech institute by promoting and supporting collective thinking and strategic decisions. ISA-UR1284 has been also very active in the field of integrated plant management through the coordination the EU NOE ENDURE and the ANR GéDuPIC. The concepts and critical reviews developed by these two projects have led to important advances in this field of research that have been useful for different research projects of the TGU AgroBiotech institute.

The continuing education policies and the training efforts are significant, covering a large array of domains from scientific to management aspects.

ISA supports different levels of scientific animation. Cycles of invited-speaker seminar series are organized. There have been 61 invited speakers over the period of the last contract, thus at a frequency of about one per month, covering various themes studied at the ISA such as genomics of insects and animals, plant defense reactions, evolutionary ecology of pests, fungal effectors, integrated farming systems.

Classical seminar series allows team's members to present original results. PhD students and Post-doc are thus invited to regularly present their results to the assembly of ISA members but this could be intensified so that all PhD students be obliged to make an oral presentation each year in order to get more practice at oral scientific presentations.

Although only a limited number of ISA members have teaching positions, (14 lecturers and professors), a large number of ISA scientists do teach, mostly at the Master's level. However, a few teams have a comparatively small number of PhD students, a characteristic that could be offset through a determined and sustained participation to teaching at the UNS. Many teams have stated energetically that they intended to intensify their investment in teaching, despite the distance between the ISA Center and the University lecture halls in downtown Nice. The investment in supervision of PhD students is important and has increased over that of the last period.

The establishment of ISA with its university lecturers and with the accompanying investments in terms of platforms and equipments has been a great success from the point of view of the UNS, since it allowed setting up a visible and unique integrated environmental science centre in the Nice area, a theme that is very popular with the students.

- Appreciation on the scientific strategy and the project

The overall scientific project of ISA is focused on deciphering molecular mechanisms at work in insects, oomycetes, nematodes and bacteria and to integrate them into biological concepts to better understand their interactions with plants and their population dynamics. It is built on the more interesting or more promising ongoing projects of each team. ISA teams are following a strategy that is feasible, since they all have strong expertise in the biology and genetics of the plant microbe and plant animals interactions studied, as well as in molecular/genomics tools (bioinformatics, cellular biology, transcriptomics, proteomics, metabolomics). These tools are for the most part all available at the ISA itself or else in nearby units. Internal transversal projects are planned on both symbiosis and pathogenicity topics, for example through shared transcriptomic analyses or mutant collections and their in-depth screening.

ISA has a policy for allocating resources, since all competitive grants are redistributed to the teams after a overhead percentage is levied to allow spending on common tools. This strategy allowed significant investments in novel technologies within dedicated platforms. This is a good strategy giving access to a large set of diverse and efficient experimental facilities. However, the building of a TGU and its consequent reorganizations calls for a reassessment not only of platforms funding but also of the way the necessary expenses should be shared.

ISA is proposing cutting edge projects on bacteria, oomycetes, nematodes and insects biology pertaining to plant biology and interactions. Projects are also proposed to characterize the genetic and demographic factors governing invasion success of introduced populations. Other cutting edge projects concern genomic tools (bioinformatics, cellular biology, transcriptomics, and large scale comparative genomics), experimental evolution (to identify the set of evolutionary events that promoted adaptation to the plant host, methylation analysis of genetic transmission in aphids and comparative genomics to identify set of genes involved in nematode parasitism success.

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

Title of the team : E1-"Symbiose et état redox de la cellule" (Sym)

Name of the team leaders: Didier HEROUART and Alain PUPPO

- Staff members:

	Past	Future
N1: Number of researchers with teaching duties (Form 2.1 of the application file)	8	7
N2: Number of full time researchers from research organizations (Form 2.3 of the application file)	4	5
N3: Number of other researchers including postdoctoral fellows (Form 2.2 and 2.4 of the application file)	2	0
N4: Number of engineers, technicians and administrative staff with a tenured position (Form 2.5 of the application file)	6	7
N5: Number of engineers, technicians and administrative staff without a tenured position (Form 2.6 of the application file)	0	
N6: Number of Ph.D. students (Form 2.7 of the application file)	2	
N7: Number of staff members with a HDR or a similar grade	4	4

- Appreciation on the results

During the 2006-2010 period, using the *Medicago truncatula/Sinorhizobium meliloti* interaction as symbiotic model, this team has studied the role of the cellular redox state and explored the mechanisms leading to nodule senescence in both partners. In this respect, the role of three major molecules involved in the regulation of the cellular redox state was highlighted: glutathione (GSH), hydrogen peroxide (H_2O_2) and nitrogen monoxide (NO). This team has made significant contributions to the understanding of the implication of these three molecules in symbiosis by identifying the cross-talks between H_2O_2, NO and GSH during the initiation of the infection process, integrating transcriptomic data, identifying the origin of the natural breakdown of symbiosis and analysing the post-translational redox-dependent modifications of nodule proteins and the contribution of NO in the energetic functioning of the nodule. The group has over the reference period (2006-2010) a very good number of publications (38) in international journals of high impact (PNAS, JBC, Plant Physiol., New Phytol, PCE, etc.), a good number of scientific communications and its members have been invited to participate as invited lecturers in the most significant international meetings of their field (Belgium, Finland, Italy, Spain, South Africa, Tunisia, etc.).

- Appreciation on the impact, the attractiveness of the team and of the quality of its links with international, national and local partners

The symbiosis team has good interactions with other teams of the unit (IPO and IPN) due to their expertise in redox status and interacts well within the Sophia Agrobiotech Institute and, with several groups in France and abroad. This is reflected in their publication record: 27 papers (out of 38) have been published with collaborators external to the team. The team leader is a productive and energetic researcher. He seems to be supported by all the members of his group and has the required authority/charisma. Over the past four years he successfully demonstrated his ability to run the symbiosis team. This team is well structured with subgroups dealing each with a specific topic on symbiosis. The team has had great success in attracting grants from a variety of national (3 ANR), European (1 Marie Curie Program) and international (China, United Kingdom and Argentina collaborations) sources. Over the 2006-10 period, the team welcomed 7 PhD students, and 7 post-doctoral researchers and 10 Master students. During the same time, the team has had a rather heavy teaching load (2 professors, 4 lecturers).

- Appreciation on the scientific strategy and the project

For the coming years, the team will continue to study mechanisms in the establishment and maintenance of the beneficial symbiotic relationship between *M. truncatula* and *S. meliloti* by focusing on cell redox signaling, and abandoning the study of osmotic stress in symbiotic interactions. This team has set four different objectives: i) identify the potential cross-talks between H_2O_2, NO and GSH during the first steps of the infection process by exploiting transcriptomics data; ii) determine the implication of these molecules in regulatory cascades by analyzing the post-translational redox-dependent modification of nodule proteins; iii) investigate the involvement of NO in the energetic functioning of the nodule by studying the contribution of nitrate-NO and O_2-dependent respirations in N_2-fixing infected cells; and iv) identify the origin of the senescence-induced breakdown of symbiosis by characterizing at biochemical and molecular level two cysteine proteases acting in the senescent zone. As a whole, the project is clear and well presented. To achieve these objectives, the project's strength lies in the large array of expertise the team has developed over the years, including genetic tools to manipulate gene expression in both partners, gene promoters expressed in different zones of the nodules, specific fluorescent probes to detect *in situ* NO, GSH and H_2O_2, different methods of protein biochemistry, etc. This holistic approach combining functional genomics tools (transcriptomics, proteomics, metabolomics) is innovative and original in the field of symbiotic interactions, and this strategy is expected to produce significant results. The project on nitrate respiration showing that an ATP-regenerating and nitrate-NO-dependent respiration, involving NO_3^- reduction to NO_2^- and the subsequent reduction of NO_2^- to NO, occurs in the nodules might lead to an important breakthrough and give very valuable information on the energy sources for the nitrogen fixation process.

- Conclusion

  - Summary

The symbiosis team has a strong historical record in the study of symbiotic interactions. During the evaluated period, the team has greatly contributed to understand the role of GSH, H_2O_2 and NO involved in the regulation of the cellular redox status in the nodule and the mechanisms leading to the nodule senescence in both partners. During the 2006-2010 period, the team has obtained several grants and has been very productive, both quantitatively and qualitatively, with research publications in excellent international journals. The 2012-2015 project is clear, well focused and is likely going to produce important results.

  - Strengths and opportunities

The established cooperations with the other teams are strong and profitable.

The team has demonstrated that GSH, H2O2 and NO are redox signaling molecules involved in the establishment and functioning of N2-fixation in legumes symbiosis.

The group has an excellent capacity to attract funding for hiring post-doc and PhD students.

The group has a consistent and competitive project and an excellent network of collaborations worldwide.

  - Weaknesses and threats

The soon-to-retire team leader will be replaced by a designated successor.

The team comprises the highest proportion of lecturers who spend a lot of time in traffic jams between the Research Center and the University in downtown Nice.

  - Recommendations

The unit and the team should pay attention to the team management after the departure of the present leader in 2012 to ensure a smooth transition.

The number of HDR should be increased.

The team should further improve its publication qualitative level.

The University should help the lecturers by accommodating teaching schedules as much as possible.

Title of the team : E2-“ Interactions Plantes-Oomycètes” (IPO)

Name of the team leader: Franck PANNABIERES

- Staff members

	Past	Future
N1: Number of researchers with teaching duties (Form 2.1 of the application file)	1	1
N2: Number of full time researchers from research organizations (Form 2.3 of the application file)	6	6
N3: Number of other researchers including postdoctoral fellows (Form 2.2 and 2.4 of the application file)	3	0
N4: Number of engineers, technicians and administrative staff with a tenured position (Form 2.5 of the application file)	8	7
N5: Number of engineers, technicians and administrative staff without a tenured position (Form 2.6 of the application file)	0	
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	2	3

- Appreciation on the results

In the last 4 years, the team has developed areas of research which are novel and of potentially high impact: the formation of biofilms by *Phytophtora parasitica* (*Ppa*), and the potential involvement of quorum sensing (QS) in its regulation; the metabolic adaptation of *Ppa* during infection, which may influence host defense and nutrient availability; the development and careful characterization of an Arabidopsis-*Ppa* pathosystem; and the identification of host genes associated with resistance and susceptibility to a range of pathogens. They have also developed genomic resources for *Ppa* (transcriptome, genome sequence on the way for 15 strains and functional tools); and have identified stage-specific effectors associated with penetration, biotrophy and later phases of colonization.

Work on biofilm formation and metabolic adaptation are unique and the group will proceed without significant competition. The connection of the former to QS presents an opportunity to collaborate with bacterial groups, where QS-mediated regulation is well-studied. The development of patents in both areas provides an opportunity to seek industrial support. Of particular significance has been the identification of host genes, manipulated by the pathogen, which contributes to susceptibility. This, and the common search for effectors, links IPO to other teams in the Unit. The group has filed 3 patents (out of 5 for the entire Unit). This is laudable in the absence of a dedicated commercial office at the institute to seek and exploit routes to industrial funding. The patents may have had a negative impact on numbers of publications. Nevertheless, there are 18 publications in high impact international journals (average IF 3.7) plus 3 done in collaboration with other teams, indicating a high quality of research outputs. Strong collaborative links with other teams have been developed, emphasized in the proposed research project for the Unit; nationally for oomycete genomics and bioinformatics; and internationally for genome sequencing, assembly and annotation, and for analyses of plant defenses, especially with Germany.

- Appreciation on the impact, the attractiveness of the team and of the quality of its links with international, national and local partners

Publications are of high quality (average IF 3.7) and there are 4 papers in Journals with an IF $\geq$ 10. Their international profile is good for senior researchers, and this extends beyond the oomycete community to the wider area of plant-microbes interactions. Local, national and international collaborations are highly appropriate and

necessary. They coordinate a national project on oomycete genomics. Local links to IPN are bearing fruit, with projects on the host genes involved in resistance and susceptibility to both plants with promising high impact outcomes. This will be exploited further through coordinated efforts to seek common effector targets. International links (funded) to foreign sequencing consortia (Broad Institute, Virginia Polytechnic Institute, The Sainsbury Laboratory) are of the highest quality, and there are also funded links to the DFG in Germany. The team has few PhD students, potentially due to a lack of exposure to students through teaching. A recent university recruit should have a very promising research future.

- Appreciation on the scientific strategy and the project

Team 2 (IPO) have generated excellent resources to exploit in the future programme, most notably the *Ppa* genome sequences and the establishment of the *Arabidopsis-Ppa* pathosystem. Both offer considerable potential for international collaborations. The overarching strategy (in terms of cross-cutting priorities 1 and 2), based on similar 'biotrophic structures' (nodules, giant cells, haustoria, galls) links IPO to other teams in the Unit. The joint aims are to investigate common effector targets in the host. Whilst this is happening for these pests, pathogens and symbionts in a few labs internationally, the coordinated links to so many biotrophic structures are internationally novel, as is a further focus on host targets that are involved in susceptibility, and not just in defense. In this regard, the links between IPO and IPN are already active and promise considerable synergy in coming years. In addition to this common goal, the areas of biofilm formation and metabolic adaptation will be further pursued, and a new area of host-induced gene silencing for functional genomics has been added. These areas offer novelty and are supported by external funding.

- Conclusion

  - Summary

There is a well-considered progression from previous years, building on the development of unique resources, with novelty and attractiveness for collaborations. Notable synergy is now evidenced with the team 3, in particular, that promises high productivity and impact.

  - Strengths and opportunities

The team has developed unique ressources (genome sequences and *Arabidopsis-Ppa* pathosystem) for international collaboration and functional routes to the model plant.

They have made novel findings in biofilm formation and metabolic adaptation.

There is potential for comparative genomics and collaboration with groups working on oomycete pathogens of *Solanaceous* hosts, specifically to address host-specificity and virulence targets/mechanisms.

There is potential for public (national and international) and industrial funding.

There are strong collaborations with other teams within the Unit.

The team has coordinated national genomics efforts on oomycete genomics.

  - Weaknesses and threats

There is a lack of local, dedicated bioinformatics for advanced analyses (structural and comparative) to exploit *Ppa* and host genomes. The associated threat is the potential for strong international competition. This recommendation should also be considered in terms of their national role as coordinators of oomycete genomics efforts.

There have been few PhD students within the group to date.

  - Recommendations

Bioinformatics expertise for genome analysis should be embedded within the center as a matter of high priority. This concerns also other teams in the Unit.

Team 2 need to be proactive in gaining more PhD studentships. Recommendation is to seek joint studentships with IPN to strengthen the synergy between these teams.

Functional genomics for Team 2 and other teams would benefit from a transgenic facility/platform.

Title of the team : E3-"Interactions Plantes-Nématodes" (IPN)

Name of the team leader: Pierre ABAD

- Staff members

	Past	Future
N1: Number of researchers with teaching duties (Form 2.1 of the application file)	1	2
N2: Number of full time researchers from research organizations (Form 2.3 of the application file)	4	5
N3: Number of other researchers including postdoctoral fellows (Form 2.2 and 2.4 of the application file)	3	0
N4: Number of engineers, technicians and administrative staff with a tenured position (Form 2.5 of the application file)	18	16
N5: Number of engineers, technicians and administrative staff without a tenured position (Form 2.6 of the application file)	1	
N6: Number of Ph.D. students (Form 2.7 of the application file)	3	
N7: Number of staff members with a HDR or a similar grade	3	6

- Appreciation on the results

This team is involved in the study of interactions between plants and nematodes at different complementary levels (nematode genomics and biology, plant response, population biology and plant resistance/susceptibility). This team is internationally recognized for its expertise and breakthroughs in nematode genomics and host plant susceptibility factors resulting in a leading position in these fields. The model under study is the nematode *Meloidogyne incognita* responsible for diseases in crops such as Solanaceae (tomato) and Prunus, and that is also pathogenic on the *Arabidopsis* model plant. The team is using this last plant as an efficient tool to decipher the mechanisms of plant-nematode interactions. In particular, the team is the leader of the *M. incognita* genome project and is now highly advanced in nematode comparative genomics. Several national and international funded projects have led to very important results during this period on plant susceptibility genes (giant cells cytoskeleton), plant resistance genes identification (Ma) and evaluation of their durability. Major results have also been obtained on nematode effectors and tools (cytology, functional validation) for investigating their role during the interaction with the host plant.

This team has an excellent publication record, with a high number of very good scientific contributions. During these last five years, members of this team published (as major contributors) 43 articles (59 when considering collaborative papers) in internationally strongly recognized journals and contributed to 21 book chapters related to the plant and/or the nematode interactions topics. Major journals are top-ranking : 1 Nature Biotechnology, 2 Annual Review of Phytopathology, 3 Plant Cell, 3 New Phytologist, 1 PNAS, 2 PLoS Pathogens with IF ranging from 6 to 27 (the mean IF being 7.4). Two patents were obtained (1 in 2007, 1 in 2010). The team was involved in the organization of two international and one national meeting, and contributed largely to several national and international congresses (43 invited or selected communications at international meetings).

It is noteworthy that beside the 7 full time researchers, 3 ITAs (2 have HDR) largely contributed to scientific communications and student supervision, and seem to play a very active role in the team.

- Appreciation on the impact, the attractiveness of the team and of the quality of its links with international, national and local partners

The ability to recruit high level scientists is excellent, with 7 post-docs joining the team, and seven PhD students (4 French, 2 foreign) who were supervised during the reference period: 4 have already defended their theses

(1 per year from 2007 to 2010) and three will defend their theses before (end of 2011) or at the beginning (March 2012) of the new contract. This group has a very good ability to raise funds, mostly from national sources (ANR, INRA-SPE, region PACA, Genoscope, private companies). For instance, the group has obtained five ANR contracts (including trilateral KBBE program) over the period and participated to international networks in the framework of a European COST program and the REX-ENDURE and to several bilateral collaborations (CAPES-COFECUB project with Brazil, for instance). Furthermore, two patents were obtained (1 in 2007, 1 in 2010) and members of the team participate actively in events regarding nematode management in the fields. Finally, it should be stressed that the team has developed strong local (intra-UMR) and national collaborations (INRA, CNRS, Private partners) that were very fruitful (joint grants, publications, patents). In particular, a joint effort with other teams from this ISA UMR and the Toulouse LIPM UMR has led to an innovative comparative study of plant susceptibility factors across pathogens (nematodes, oomycetes, bacteria) revealing important shared mechanisms (hormone signaling such as sulfokines, cytoskeleton).

- ## Appreciation on the scientific strategy and the project

In its project, the team proposes a change of scale, in order to develop global and integrated approaches for studying plant-nematode interactions, including nematode evolutionary studies for estimating plant resistance durability. This proposal seems feasible and has very important goals, but could be strengthened if skills in population genetics could be implemented within the team. Together with the logical extension of the previous research projects on genomics, molecular and cellular biology of plant nematode interactions, efforts will concentrate on 1) plant genes acting as susceptibility factors, including effector targets, 2) nematode pathogenicity/virulence genes, including those encoding effectors, 3) genetic bases of the durability of plant resistance to nematodes. This group has an excellent position to become a leader in these different fields. The group will exploit its recent discoveries by developing research on nematode adaptation to its host plant under agronomical greenhouse or field conditions. In addition, the team will certainly benefit from the development of research projects on effectors either from nematodes or from others teams (symbiosis, oomycetes) and their plant targets. The overall project is highly promising and should provide an integrated view of nematode pathogenicity and its interaction with host plant susceptibility/resistance factors, as well as keys for resistance management.

- ## Conclusion

  - ### Summary

This is an excellent team that has made a major impact over the last five years, in particular through their characterization of the *M. incognita* genome. The group is highly interactive both with other UMR ISA teams and more widely with the International nematode community. A well-defined project is proposed that has a high potential for deciphering plant-nematode interactions and that should lead to crop resistance management strategy proposals.

  - ### Strengths and opportunities

The group is leading root-gall nematode genomics, including bioinformatics.

There are abundant biological resources and expertise (nematode collections, assays for resistance).

There is recognized expertise in plant pathology, cell biology and genomics of plant-microorganisms interactions.

The group has built highly efficient local and international networks of collaborations.

  - ### Weaknesses and threats

There is a lack of expertise in population genetics and ecology within the team, or collaborations in these fields.

There is a lack of local dedicated bioinformatics expertise to address post-genomic analyses (systems biology, protein-protein interactions, and structural biology).

  - ### Recommendations

Functional tools need to be improved to test/validate candidate genes either from nematode or plant (plant transgenic platform, molecular/biological assays for effectors, medium throughput nematode gene silencing).

The team should develop population genetic approaches through hiring or active collaborations.

The team should apply results from fundamental research to plant protection.

Title of the team : E4-"Résistance des Insectes aux Stress Environnementaux" (RISE)

Name of the team leader: David PAURON

- Staff members:

	Past	Future
N1: Number of researchers with teaching duties (Form 2.1 of the application file)	1	0
N2: Number of full time researchers from research organizations (Form 2.3 of the application file)	6	7
N3: Number of other researchers including postdoctoral fellows (Form 2.2 and 2.4 of the application file)	1	0
N4: Number of engineers, technicians and administrative staff with a tenured position (Form 2.5 of the application file)	6	6
N5: Number of engineers, technicians and administrative staff without a tenured position (Form 2.6 of the application file)	0	
N6: Number of Ph.D. students (Form 2.7 of the application file)	3	
N7: Number of staff members with a HDR or a similar grade	2	2

- Appreciation on the results

Overall, the publication record of the group is good over the reference period, even though it reflects strong heterogeneities.

One of the two groups that will form the team 4 (RISE) of the future ISA has obtained very original and relevant results on the adaptation of lepidopteran insects to chemically adverse environments, combining global approaches such as comparative genomics and transcriptomics as well as specific molecular analyses of the roles of cytochrome P450 enzymes or xenobiotic receptors in the adaptive process. They have studied the responses to xenobiotics as well as to toxic secondary metabolites produced by plants.

In particular, the comparative analysis of the genomes of three lepidopteran species has revealed a high degree of synteny conservation despite a very high rate of local genome rearrangement, and a rapid evolution of gene clusters encoding cytochrome-containing proteins. Interestingly, this group also showed that insects response to xenobiotics involved multiple transduction pathways but that these pathways drive specific rather than global expression changes. Furthermore, a large survey of CYP gene expression in insect strains resistant to insecticides associated resistance to modified activity of trans-regulators targeting several of the differing CYP genes.

During the last five years, members of this group (3 permanent scientists and 2 permanent research engineers) published 16 articles as major contributors in good to excellent specialized journals and one excellent generalist journal (PNAS, collaborative work with INRA Montpellier) and also contributed a book chapter, giving a strong impact to their results. Besides this production, the involvement in the organization of 8 international congresses and six invitations to give seminars in research laboratories abroad testify the strong personal recognition of the former group leader at the international level.

The other group that will form the RISE team carried on two linked research projects on insect resistance and the mode of action of two bacterial entomotoxins, Bin from *Bacillus sphaericus* and Cry from *Bacillus thuringiensis*. The general questions asked are scientifically relevant. However, in contrast to previous findings by the group, limited impact results have been obtained during the evaluated period and only 3 articles (plus one done in collaboration with other teams) have been published in peer-reviewed journals during the evaluation period (for 3 permanent researchers and 1 teacher), plus one in 2011.

Based on homology to the Bin receptor in *Culex*, this group identified and then demonstrated the binding activity of the Bin receptor in *Anopheles*, a species against which the toxin is only moderately active (published in 2008). The group also analyzed the sequence of putative receptors of the Cry3A toxin of *B. turingiensis* in a highly resistant line of the *Coleoptera* species, *Chrysomela tremulae* but did not find any clear explanation for the resistance neither in the sequence nor in the level of expression of the corresponding genes. Larval midgut transcript pyrosequencing has nevertheless identified new families of putative receptor proteins. These results have been reported in a good specialized journal in 2009. More recently (2011), the molecular characterization of three *Chrysomela tremulae* genes encoding one class of putative receptor (aminopeptidase N) has been reported in another good specialized journal (Insect Mol Biol). Cellular biology and biochemistry analyses of the Bin toxin receptor Cpm1, and of the cellular mode of action of this toxin were also carried on. They highlighted the importance of correct display of the receptor at the cellular surface and showed that Bin stimulates autophagy and the vacuolization of autolysosomes. However, these results have not yet been published. Interestingly, this group has shown for the first time that the resistance of a field population to the Bin toxin is associated to different defective alleles of the receptor encoding gene, among which an allele harboring transposon insertion. These original results have been published in a very good specialized journal (Cell Microbiol) in 2007, and usefully illustrate a potential generic mechanism of resistance building in insects, through the dynamics of transposable elements.

- Appreciation on the impact, the attractiveness of the team and of the quality of its links with international, national and local partners

The ESIM-originating group gave 12 oral presentations in international conferences, has been invited to give 8 seminars in foreign research laboratories, and was involved in the organization of 8 congresses. This indicates a strong, internationally recognized, impact of its research. Shared authorship of most of its publications also indicates that this group is well integrated in a large international network of collaborations. Surprisingly, it has obtained only one ANR project; however this project was coordinated by the former group leader and was well funded. With 3 post-docs and 2 PhD students at the moment of the evaluation (although there is no teacher in the group), this group has a solid attractiveness.

By contrast, the Entomotox-originating group gave only 2 oral communications in international conferences and has been invited only twice to give seminars in foreign laboratories. It was involved in three scientific collaborations, among which one internal to the Unit, with the previous leader group. Only one student defended a Ph.D. thesis at the beginning of the reference period. No grant was obtained by the group recently. Alarmingly, 2 permanent scientists, 1 teacher, 1 engineer and 1 technician left the group during the last four years.

- Appreciation on the scientific strategy and the project

The project of the future RISE team is proposed in response to the important need to reduce the use of chemical insecticides. To identify the “best“ chemicals and to find efficient non-chemical alternatives, the team will study the responses of pests (bioagressors) to insecticides and bio-insecticides, on the one hand, and look for and develop new active compounds, on the other hand. To progress towards these objectives, six different programs are identified, most of them in continuity with the projects currently carried out by the two groups that will form the RISE team: (i) to identify the determinants of the resistance of lepidopterans to pyrethroids and especially the role of P450; (ii) to study the resistance of *Coleoptera* to the Bt toxin, looking for new resistance markers; (iii) to characterize the chronic effects of Bt toxin on diverse non-target insects in order to build reliable toxicological indices (new project); (iv) to study the co-evolution of secondary metabolite biosynthesis pathway in plants and corresponding detoxification pathways in insects in order to better evaluate the potential of these natural active compounds; (v) to study the detoxification pathways of chemical insecticides in *Lepidoptera* and propose natural inhibitors; (vi) to identify new Bt strains with different specificity or higher activity (new project).

Many of these projects are scientifically and socio-economically relevant and are based on promising preliminary results. However, the overall proposal seems unrealistic given the modest size of the team. This is especially true for the projects concerning Bt toxins, and the team’s proposal should be more focused and prioritized. The actual proposal does not include any clear integration of the different projects that would be allowed to build on complementarities and synergies between the two former groups. The new proposed program on chronic effects of Bt toxin on non-target insect species is ambitious and promising. Because of its large scale and because not all the necessary competences may be present in the team, this program should benefit from strong collaborations inside and outside ISA (among other on the honey bee model of course), especially to make the most relevant choices for building and estimating a large set of physiological and molecular parameters over time after the exposure to the toxin. Similarly, the screening of newly isolated Bt strains to find more potent toxins and/or new modes of action

could be realistically implemented only if corresponding funding is obtained, which would allow to dedicate supplementary manpower to this project: furthermore its relevance would be significantly strengthened if it were to include from the start a collaborative partner interested in future transfer of the results.

- ## Conclusion

  - ### Summary

The RISE team will be formed by the association of two groups that have had unequal success during the 2006-2010 period. The project should be more focused and prioritized; in particular, projects implying integrated contributions of the two former groups should be favored. As for some aspects of the project, the team could also benefit from collaborative synergies with other teams of the Unit.

  - ### Strengths and opportunities

There is a strong international recognition in evolution and functions of the cytochrome P450 family in insects.

The approach in comparative genomics is original and important results have been obtained that should allow to strengthen their leadership in the field during the next four years.

The team displays a solid and original expertise in *Bacillus* toxins, their mode of action and associated resistance mechanisms in insects.

The team has a unique expertise in complementary biochemical (catabolic/biosynthetic) pathways in insect/host-plant systems.

  - ### Weaknesses and threats

There are too many different research themes given the size of the team.

The integration between the two sub-groups in the overall project of the new team is weak.

The new ambitious projects are not yet supported by dedicated fundings.

  - ### Recommendations

The project should be more focused and the objectives prioritized not only according to scientific interest but also according to the financial and human resources available.

Collaborations should be established with other teams inside and outside ISA to implement more realistically the new project, especially as for the study of chronic effects of Bt toxin on non-target insect species.

To some extent financial resources and technical support within the team should be shared.

Close attention should be paid to the management and to the daily functioning of the team in order both to reach a high level of attractiveness and to encourage young researchers of the group to seek leadership in their own fields.

The involvement of the team members in teaching activities should be increased.

Title of the team: E5-“ Evolution et spécificité des Interactions multitrophiques” (ESIM)

Name of the team leader: Marylène POIRIE

- Staff members

	Past	Future
N1: Number of researchers with teaching duties (Form 2.1 of the application file)	1	2
N2: Number of full time researchers from research organizations (Form 2.3 of the application file)	0	3
N3: Number of other researchers including postdoctoral fellows (Form 2.2 and 2.4 of the application file)	2	1
N4: Number of engineers, technicians and administrative staff with a tenured position (Form 2.5 of the application file)	2	2,6
N5: Number of engineers, technicians and administrative staff without a tenured position (Form 2.6 of the application file)	0	
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	3

- Appreciation on the results

The team focuses on parasitoids and on the physiological interactions they establish with their insect hosts. The experimental approach used is very original and, by integrating both mechanistic and population genetic analyses, provides new fundamental information on molecular factors that play key-roles in successful parasitism and on their variability at the population level. Among these factors, special attention is paid to the role of venom in different groups of economically important parasitoids, through a unique comparative analysis, with emphasis on the functional role played by specific virulence factors triggering the suppression of the immune response. Worthy of mention is the work on *Lb*GAP, a virulence factor produced by the wasp *Leptopilina boulardi*, which enters the host haemocytes and causes cytoskeleton disruption by interacting with Rac1 and Rac2 *Drosophila* GTPases. This is one of the few well-characterized components of the venom in parasitic wasps; evolutionary convergence with bacterial virulence systems is another originality of these findings.

The team has published, in the time interval under consideration (2006-2010), 35 main papers, in very good international journals, often of interest to a broad audience, among which three PLoS Pathogens papers. This is complemented by a significant contribution to a large number (30) of papers reporting experimental work primarily developed by other groups, which places the team in a quite visible position in the field of comparative parasitology. Overall, the scientific productivity is of very good quality.

- Appreciation on the impact, the attractiveness of the team and of the quality of its links with international, national and local partners

The efforts devoted by team 5 (ESIM) to scientific communication is also remarkable, with 24 oral presentations to national and international meetings, four of which were invited. This is a good indicator of the considerable and growing appreciation in the international scientific community for the work done by this team, which has also attracted a good number of PhDs (3) and post-doc (3) trainees in the last 4 years. The team leader was awarded the AS Balachowsky Prize from the French National Academy of Sciences in 2008, for her important contribution to the study of integrative biology of insects.

These are all emblematic indicators of the significant impact of the team, which has been also very successful in recruiting active post-doc associates: one of them has been recently recruited by the University of Nice.

The satisfactory fund raising ability and the participation to national and international research/training networks further corroborates the quality of the links that the ESIM team has been able to establish and reinforce in a relatively short time.

- ## Appreciation on the scientific strategy and the project

The proposed research project represents the natural continuation of the current work of the team, with ambitious but realistic and well thought-out objectives, which seem to be achievable in the time frame ahead (2012-2015) and the new capacities of the group (5 scientists). The tools and the scientific models selected and the cutting-edge technologies proposed will allow addressing, at the best, very important questions in the field of host-regulation by parasitic *Hymenoptera*. This will have a significant impact both on basic knowledge and on the applications that can be derived from them, such as, for example, the discovery of novel bio-insecticides. The collaborative strategy on venomics is a good example of how positive returns on methodological investments are managed by the team. Moreover, this project will be partly developed in the framework of a very interesting national network already established, which includes very competitive groups on a national and European scale. This will enhance the overall impact of a program which looks already very promising.

- ## Conclusion

  - ### Summary

The group has made an original contribution towards the understanding of the molecular and functional bases of successful parasitism in insects. A wise research strategy is based on the choice of complementary biological models such as *Drosophila* and the pea aphid, shared by other scientists in the ISA unit.

  - ### Strengths and opportunities

The expected advancement of basic knowledge on parasitic wasps and on the virulence factors used will have a significant impact on the exploitation of bio-control agents, not only as organisms but also as a source of valuable molecules and genes for sustainable pest control.

The local context, grouping both a biological control unit devoted to the use of insect parasitoids and a dynamic group of population geneticists, defines a unique opportunity to strengthen the link between basic research objectives and improved management of biological control. This could happen through the development of diagnostic tools of parasitoid population variability on functional traits (venomics) associated to population structure analysis (through expertise from the BPI team).

The *Leptopilina* model should afford a good starting case for such studies.

  - ### Weaknesses and threats

The use of 3 different experimental model systems may prove uneasy to handle, even though the impressive expertise of team members in their respective field of study will certainly offset this potential problem. The strongly multidisciplinary approach presented (including comparative genomics and population genetics) is nevertheless a promising sign for the success of the strategy.

Even though the local context is quite favorable, diversification of new themes should be paced and adapted to the available resources.

  - ### Recommendations

The group size should be increased, although very good steps have been achieved recently to that end.

The group should intensify international applications for funds, through the interesting French and Euro-network already established.

The team should integrate and rely on existing networks for the use of additional model organisms, as functional tools strongly needed for the medium-throughput ambition of the group on venomics and other parasite virulence factors.

Title of the team: E6-"Génétique, Environnement et Plasticité" (GEP)

Name of the team leader: Alain ROBICHON

- Staff members

	Past	Future
N1: Number of researchers with teaching duties (Form 2.1 of the application file)	0	0
N2: Number of full time researchers from research organizations (Form 2.3 of the application file)	2	2
N3: Number of other researchers including postdoctoral fellows (Form 2.2 and 2.4 of the application file)	1	0
N4: Number of engineers, technicians and administrative staff with a tenured position (Form 2.5 of the application file)	1	0
N5: Number of engineers, technicians and administrative staff without a tenured position (Form 2.6 of the application file)	0	
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	1

- Appreciation on the results

The GEP team results from the splitting of the former ECM group, formerly led by two main scientists working on modeling and molecular aspects of insect behavior and adaptation, and the reasons for this new organization in the novel ISA unit were considered convincing.

The team leader has published, in the last 4 years, 7 main papers, that represent a good starting point for the proposed research project. The team conducted two main research projects on two insect models, one on *Drosophila* neurogenesis and one on aphid epigenetics, which is a new model for the team, with little cross-talks between these models (expression studies in aphid wings, investigation of *for* gene in aphids…). Considering the work force on the theme, the production was good with an average of one or two papers per year overall, in good journals ($2.7 \leq IF \leq 11.3$) and on the two subjects. The main scientific results include the demonstration of active neurogenesis in adult drosophila wings and the implication of these processes in adaptation to environmental niches, the first genome-scale description of epigenetic marks and the establishment of differential gene expression repertoires in clonal variants of the pea aphid, in response to severe temperature stresses. A post-doc and on-going PhD projects did contribute to this production, and the funding policy of the group was therefore adequate.

- Appreciation on the impact, the attractiveness of the team and of the quality of its links with international, national and local partners

The effort devoted by the GEP team leader to scientific communication is limited, with a single only invited presentation at an international meeting. Attractiveness toward students was also limited, although two post-doc and a few PhD students were recruited at an international level, but this can be partly due to the pioneering work considered, which, however, stimulates valid scientific collaborations, even with other teams in the unit. The fundraising capacity (through past ANR —Exsidum, coord— and other minor INRA and CNRS sources) seems to be adequate to support a team of limited size.

An international collaboration network exists on *Drosophila*, but comes mainly from previous work on the *for* gene. Care should be taken to maintain and expand this network in the field of epigenetics.

An emerging European network does exist on this topic and it should become fully integrated; the French networks on *Drosophila* epigenetics, working for example on transposable elements, could also be a starting point for insect epigenetics projects.

The team contributed with modest though original contributions to the aphid genome consortium with four papers produced through this cooperation.

- ## Appreciation on the scientific strategy and the project

The proposed research project on insect epigenetics represents an interesting new approach to the study of non-mendelian inheritance. The tools and the scientific models selected are appropriate to address the biological questions considered. The expected results will significantly contribute to the understanding of the molecular pathways controlling the adaptation, in insects, to fluctuating environmental conditions, a hot topic in the global warming context. The active collaborations at national and international level, and within the unit, will reinforce and expand the impact of a promising program.

The scientific strategy of mixing two complementary models is original, and although it did not result into a strong cross-fertilization during the reference period it was convincingly defended by the team leader in his perspectives. The potential of the aphid model for studying epigenetics, reinforced by the solid background of the first methylome analysis produced by the group, certainly deserves further research efforts. However, the size of the group is now at a minimal level, and attention needs to be paid to finding a competitive strategy in this constrained context. The future arrival of a researcher is therefore a critical step and special attention should be devoted to integrating both approaches and models in the resulting scientific project of the group

- ## Conclusion

  - ### Summary

The project is centered on the analysis of the stable epigenetic marks that may generate heritable phenotypes in insects in response to drastic environmental changes.

  - ### Strengths and opportunities

This study represents a valid contribution to a research field that has been considered only to a limited extent so far in insects. It has the potential to characterize original biological responses that are relevant for a better understanding of the set of insects' adaptive responses controlled by epigenetic mechanisms.

  - ### Weaknesses and threats

The project is a pioneer one, however a considerable amount of work will have to be invested for a complete achievement of the defined objectives.

The work force available in the team is critically limited.

The genetic determinants (and the overall genetic diversity explored up-to-now in the aphid model) have been underexplored, and could be questioned in collaboration with aphid geneticists.

  - ### Recommendations

Scientific and technical support are needed for the project, these will have to be acquired through contracting.

A mid-term assessment should be done, appropriately shortly after the arrival of an announced CNRS recruit, the director should then invite the group to assess and possibly (re-)define a few most promising objectives on which to focus for the rest of the project.

Title of the team: E7-"Biologie des Populations Introduites" (BPI)

Name of the team leader: Thomas GUILLEMAUD

- Staff members

	Past	Future
N1: Number of researchers with teaching duties (Form 2.1 of the application file)	0	0
N2: Number of full time researchers from research organizations (Form 2.3 of the application file)	4	5
N3: Number of other researchers including postdoctoral fellows (Form 2.2 and 2.4 of the application file)	1	0
N4: Number of engineers, technicians and administrative staff with a tenured position (Form 2.5 of the application file)	5	5
N5: Number of engineers, technicians and administrative staff without a tenured position (Form 2.6 of the application file)	0	
N6: Number of Ph.D. students (Form 2.7 of the application file)	2	
N7: Number of staff members with a HDR or a similar grade	1	3

- Appreciation on the results

During the present contract, research done in the BPI group mainly focused on the study of adaptive responses of introduced insect populations to fluctuating and transient agro-ecosystem environments. The team has an original place in the scientific landscape, especially considering its original positioning at the interface between theoretical population ecology and genetics and biological control applications. During the reference period, they produced very original results on adaptation of pests and demo-genetic processes associated to invasion phenomena. In particular, the work on invasive bridgehead effects has given new perspectives for the inference of invasion routes of introduced pests, as well as the reconsideration of Allee effect predictions for the dynamics of introduced populations. The BPI team occupies a central position in the IBSV unit at the crossroads between theoretical population genetics, ecology and biological control applications. Their research contributes significantly to the production of original generic results transferable to biological control applications.

The scientific production of the team is excellent, with 43 original papers (+ 14 from work done mainly elsewhere) published in high audience journals (1,8 ACL publications / ETP / year), and a regular participation to conferences (26 international conferences over the period). The group is very homogeneous regarding scientific output (7 to 15 publications per scientist over the period). The audience level of the targeted journals chosen for publishing the results has significantly increased over the period. The number of theses is good, considering the 2 HDR of the team, with 3 PhD theses defended during the period and 2 actually in progress.

- Appreciation on the impact, the attractiveness of the team and of the quality of its links with international, national and local partners

Members of the team have organized or co-organized 5 international conferences or meetings over the period. They were invited 5 times in international meetings. The group is highly attractive: five post-docs were recruited, and two CR2 INRA researchers were recently recruited.

Their ability to raise grants in competitive funding is excellent: out of 12 contracts, they coordinate one ANR "Biodiversité" and one ANR "Jeunes chercheurs", and they are partners of two European projects.

The group is very well inserted in a national and international network of collaboration (CBGP Montpellier, Universities of Georgia, Iowa, and Nebraska, …). Their originality concerning demo-genetic factors involved in invasion processes is well recognized and is demonstrated by co-publications with leaders from the field. They played a major role in the development and evaluation of the DIYABC software that estimates the probability of a particular invasion route. The use of that method is spreading into the community working on invasion processes. They have been at the origin of the Theidolb think tank group.

At the local level, their collaboration with the "Unité Expérimentale de Lutte Biologique" (UELB) coupling practical management in classical biological control operations and tests of hypotheses of invasion biology is very promising.

- Appreciation on the scientific strategy and the project

The proposed project is in the continuation of the current one, but it will be entirely focused on the biology of introduced populations and invasion biology in order to improve the visibility of the team and its specificity in the scientific landscape. The project appears clearly feasible according to the scientific competences of the team, with complementary approaches combining behavioral, genetic and demographic aspects. The main question for the next period is to decipher the genetic and demographic factors determining invasion success of introduced (insect) populations. The original positioning of the BPI group within the ISA unit but also within the national and international research network working on introduced populations, at the interface between theoretical ecology, population genetics and biological control applications looks very promising.

- Conclusion

  - Summary

The BPI group has produced excellent scientific research during the past 4 years with a high output of publications on the demo genetic processes associated to biological invasions, at the interface between theoretical ecology and genetics, and applied biological control. The proposed project is well focused, ambitious but feasible. The group occupies an original position in the scientific landscape, and will play an important role in the future ISA unit with their competences in the biology of invasive populations and biological control management.

  - Strengths and opportunities

The team develops cutting edge research on deciphering genetic and demographic factors determining invasion success of introduced (insect) populations.

The positioning is original, at the interface between theoretical ecology, population genetics approaches and classical biological control.

The use of biological control systems as models is promising.

The team has a pivotal role within the TGU, highly complementary to TEAPEA group for the demo genetic aspects.

  - Weaknesses and threats

There has been a recent increase in the number of scientists, which is important, but it has to be consolidated by replacing expected retirees.

The number of experimental models handled by the team is fairly high, and it could be reduced by choosing the most pertinent ones.

  - Recommendations

The team should continue to publish the most original results in wide audience journals.

The size of the group should be increased, in particular by replacing retirees.

They should enhance interactions with ESIM, TEAPEA and RDLB groups on the biology of invasive populations and biological control management.

Title of the team: E8-"Ecologie Théorique et appliquée aux Agrosystèmes Semi-Confinés" (TEAPEA)

Name of the team leaders: Eric WAJNBERG and Christine PONCET

- Staff members:

	Past	Future
N1: Number of researchers with teaching duties (Form 2.1 of the application file)	1	2
N2: Number of full time researchers from research organizations (Form 2.3 of the application file)	3	4
N3: Number of other researchers including postdoctoral fellows (Form 2.2 and 2.4 of the application file)	0	0
N4: Number of engineers, technicians and administrative staff with a tenured position (Form 2.5 of the application file)	34	32
N5: Number of engineers, technicians and administrative staff without a tenured position (Form 2.6 of the application file)	2	
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	1

- Appreciation on the results

The proposed new team TEAPEA results from the fusion of two researchers and one technician from the past team "Ecologie Comportementale et Moléculaire" (ECM) with the "Unité de Recherches Intégrées en Horticulture" (URIH). It is by far the biggest team (20% of the total ISA unit) considering the number of technicians and engineers, but is of medium size (11%) as regards researchers.

ECM was created in 2006 and the main objective of the subgroup joining TEAPEA was to better predict dynamics and attacks of parasitoids on insect hosts with obvious relevance regarding biological control. The 2 researchers of the subgroup mostly produced analytical and simulation tools in behavioral ecology of different parasitoids/hosts. They built or improved theoretical models by incorporating developmental and behavioral changes of the insects. They originally mixed a wealth of concepts from different fields like artificial intelligence, spatial ecology, agent-based models, game theory, genetic algorithms, and deterministic and stochastic models. The modeling approaches led to outstanding results in applied and fundamental sciences, for example to help optimize release of parasitoids or predict adaptive evolution of insect populations in complex, fluctuating environments. One recent arrival has developed a strong reputation in the BioControl and Behavioral Ecology communities based upon his high quality work.

Research conducted in URIH has been of strong relevance as regards optimization of greenhouse agrosystems to save fossil energy and reduce pesticide use. During the past 4 years, 2 young researchers were recruited and priorities clearly shifted from activities devoted to stakeholders and producers towards fundamental, more predictive research with a very positive impact on the quality of the results. URIH is now the only group in France gathering expertise in physics of transfer, dynamics of pests and diseases and modeling of complex systems. This enables the group to tackle questions directly connected to pest management and energy control in greenhouses with a high priority level. Participations to international conferences and funded projects attests that URIH reached a good international position in modeling microclimate distributions in greenhouse systems and, to a lesser extent, in controlling pests and diseases in such environments.

The 2 researchers from the ECM team who join TEAPEA have produced several scientific publications (25), many of them in the top journals of their field but rated medium impact overall (Evol Ecology, Ecol Modelling, BioControl). They have been invited to 4 major international congresses and gave seminars in Canada, Japan and Thailand.

Publications from URIH remarkably and consistently progressed both in quantity (60 in scientific journals, plus 12 on work done elsewhere) and quality (mean IF of 1.8). Consistent with the objectives of the group, most results were published in applied research journals with medium impact (J Econ Entomol, Plant disease, J Plant Pathol, Trans ASABE) but some publications were in high (Ecotox, Agric Forest Meteorol) to very high impact (Ann Rev Entomol) journals. This is remarkable for a team of only 2 researchers and 8 engineers on average during the past 4 year period. The TEAPEA group has a very high cumulative publication impact factor score (6.45: ΣIF5/4.5 yrs/#researcher).

A database has been developed to gather observations about long-term studies on pest management in greenhouses.

Overall, the theses number was relatively modest although this was compensated for by a large number of PhD co-supervisions and masters students supervision.

The ECM subgroup joining TEAPEA developed strong, useful relationships with mathematicians from the University of Nice Sophia, and the University of Palermo.

- Appreciation on the impact, the attractiveness of the team and of the quality of its links with international, national and local partners

The TEAPEA team has an excellent international and national recognition expressed by 17 international and 5 national symposium/congress invitations, 35 international (18 countries) and 19 research collaborations, which have resulted in a large number (34%) of joint publications. They also closely collaborate with other ISA units (IPO, BPI, RDLB). Members of the team have organized or co-organized 8 international conferences over the reference period, acted 4 times as session conveners, and disseminated their results via 130 scientific international and national congresses/symposia. Some members of the team act as Chief or associate editors for international refereed Journals (BioControl, *Entomologia Experimentalis et Applicata*, Applied Entomology and Zoology, Neotropical Entomology, Ecotoxicology, J. Pest Science. *Folia Geobotanica*, Ecotropica, Acta Amazonica, Revista Pesquisas Botanica, Revista de Ecologia Aplicada). Moreover, this group was invited to contribute to 17 book-chapter writings, and published 3 books, which constitutes an excellent indicator of the team recognition and impact at the international level. Their ability to recruit high level scientists and students is very good, with 7 postdoctoral fellows, 13 PhD and 30 Master students under the supervision or co-supervision of the team. The fusion of research members of ECM with URIH members will also be beneficial for the attractiveness of the whole TEAPEA team.

The TEAPEA's ability to raise grants in competitive and partnership funding is excellent. The team is involved in 41 national and international projects, and 11 contracts with private partners (e.g. ANR, CNRS, SPE-INRA, BEPAR-ESF, European INTERREG, WP-FP7-KBBE PURE, French-Korean, etc). In order to improve the environmental sustainability of the greenhouse system, members of the team collaborate actively with the industry regarding greenhouse engineering, biological control and breeding. This close relationship with the industry has resulted in two patents and two associated licenses as well as new knowledge and innovative technology. In collaboration with the industry and several other research centers, highly innovative technology (e.g. photovoltaic layers) will be developed and validated, resulting in a well-balanced scientific, industry and agriculture partnership. Finally, this group is very well inserted in a national and international network of collaboration. Their strong research collaborations and complementary expertise combining theoretical and experimental ecology will allow the development of new plant production and protection strategies within an environmental approach.

- Appreciation on the scientific strategy and the project

The TEAPEA research program for the next 4 years combining three main areas (I. Population and community ecology, II. Behavior and life history traits evolution, III. Ecology and environment) is ambitious but relevant and with well defined objectives. The multidisciplinary expertise offered by the different team members is unique. Their strong expertise and national and international collaborations with other research groups and industrial partnerships as well as the recruitment of complementary researchers (e.g. one new *maître de conférence* is joining the team) will ensure the achievement of their objectives within the proposed time frame schedule (2012-2015). Adaptation of Computer Fluid Dynamics to greenhouses is one original tool developed by 2 engineers in the team with 2 different goals: saving energy and optimizing pest management.

Maintenance of these activities critically depends on the anticipated departure and recruitment. The team offers a unique gathering of expertise to integrate plant response to abiotic conditions. Appropriate reinforcement in applied mathematics and numerical simulation are needed to optimize greenhouse management.

Conclusion

Summary

Expertise has been largely reinforced during the last 4 years in 1) modeling insect behavior as a function of host distribution, 2) simulating microclimate distributions in greenhouses at different scales and, 3) developing management strategies to control pest and diseases in greenhouses. The team project gives a large role for modeling in agreement with objectives and skills of the team.

In summary, this is a well structured research project at the crossroads of behavioral ecology and greenhouse management. The fusion of two research teams (ECM and URIH) will be highly beneficial for the whole ISA unit reinforcing an essential bridge between fundamental and applied research in collaboration with other research groups but also with the industry.

Strengths and opportunities

Use of ODE's is appropriate for heuristic models of continuously growing populations within greenhouse environments but it is not clear how technology transfer to growers will occur. Use of recursion models does remedy the problem of discrete occurrences but still the generic heuristic issue remains. This is important given the low rate at which advanced IPM tactics are currently used.

The project offers a fertile ground for teaching and training in mathematics applied to complex biological systems.

Development of databases is a good way to gather knowledge on complex systems in a sustainable way. They enable thorough analysis of system and populations dynamics by consortium of researchers.

Multidisciplinarity of the research team defines a specific strength of this group. A strong collaboration with national and international research groups is ongoing including collaboration with key industrial partners.

Weaknesses and threats

Two fields of expertise are central for the integrative dimension of the project, in physics and management of greenhouse agrosystems. Compared to expertise in pathogens, they may become as limiting for developing integrated pest management systems in partnership with stakeholders, private companies in biocontrol or even horticulturists.

The absence of HDRs in the past URIH group is a limitation for attracting PhD students and has resulted in a lot of PhD co-supervisions mainly with students from the South Mediterranean and not with local universities. The new TEAPEA team has only one HDR researcher.

Recommendations

The good balance between applied and fundamental researches should be maintained while sustaining efforts to publish in high impact journals.

Researches about energy saving in greenhouses should be kept to a level that will not handicap other activities on integrated pest management.

Training and supervision of PhD students should be developed with special emphasis on biomathematics as an original feature. Teaching activities should be further anchored to the University of Nice, and possibilities with INRIA should be explored.

It is desirable to Increase the number of HDRs as soon as possible.

Title of the team: E9-"Recherche et Developpement en Lutte Biologique" (RDLB)

Name of the team leader: Nicolas RIS

- Staff members

	Past	Future
N1: Number of researchers with teaching duties (Form 2.1 of the application file)	0	0
N2: Number of full time researchers from research organizations (Form 2.3 of the application file)	0	0
N3: Number of other researchers including postdoctoral fellows (Form 2.2 and 2.4 of the application file)	0	0
N4: Number of engineers, technicians and administrative staff with a tenured position (Form 2.5 of the application file)	14	8
N5: Number of engineers, technicians and administrative staff without a tenured position (Form 2.6 of the application file)	2	
N6: Number of Ph.D. students (Form 2.7 of the application file)	0	
N7: Number of staff members with a HDR or a similar grade	0	0

- Appreciation on the results

The Unité expérimentale de Lutte biologique (UELB) is an INRA experimental unit, not a research unit. Its activities fall into the R&D (Research and development) field, not in that of purely Academic research. It is composed solely of engineers and technicians. Consequently, it does not have the mission of publishing in high-impact-factor international journals and it is not possible to use the same criteria to evaluate it as those used for classical research teams.

Its main objectives are:

-To develop new methods of biological control in response to emerging agricultural pests.

-To improve current practices and procedures in research and development in biological control.

UELB is clearly fulfilling the objectives corresponding to an INRA Experimental unit. The three UELB working groups have developed high-level biological control surveys and experiments on a variety of pests and natural enemies, including: Diptera Tephritidae, scale insects, Lepidoptera and hymenopteran parasitoids. They are performing classic approaches of biological control but they also have been able to incorporate molecular tools as a method to better characterize pests and parasitoids (barcoding), and to study intraspecific variability. In addition they are now considering a background of population genetics as a major parameter that needs to be taken into account in biological control approaches in order to improve their efficiency.

They contributed to 11 peer reviewed publications (plus 1 done on work done elsewhere), and 22 international meetings with proceedings, trained 14 students and co-directed 2 PhD students. In agreement with their particular goals as an experimental unit, they released 17 publications in national journals dealing with plant protection or Entomology.

They have established strong partnerships with several research teams of the IBSV unit, with the URIH and with INRA units working on insect systematics. They have been a driving force into the Theidolb think tank to merge together traditional knowledge in biological control and recently developed population genetics concepts and tools.

They have also developed strong links with agronomic partners. Most of the UELB budget is coming from external sources.

The committee liked the UELB's idea of identifying causes of biological control success or failure but had difficulties to estimate the contribution of the UELB to this process. The committee would have appreciated to have more details about how new pests are chosen and about what contingencies are in place for rapidly responding to new, emerging pests. A question remains about the meaning of "new (biological control) methods".

- Appreciation on the impact, the attractiveness of the team and of the quality of its links with international, national and local partners

The UELB is likely the only actor in the biological control field at the national level and it has developed several international partnerships. Nevertheless the committee questioned the level of recognition of the UELB in the scientific community as a whole or in the BioControl community.

Since it is not a classical research unit, it is difficult to use common criteria to characterize its impact. One can underline the ability of the team to obtain funding from outside INRA, including its participation to the BioInv4I ANR project.

Results obtained by the UELB unit will be helpful for the agricultural community that is frequently requesting its help.

- Appreciation on the scientific strategy and the project

The project presented by the RDBL team is conceptually and methodologically in line with the previous research and development program they drove previously as a separate unit (UELB). They will add a few new pests, especially invasive ones, to those already studied, thereby defining a strong opportunity to work more closely with the BPI and TEAPEA research teams. They are aware of the emergence of new beneficial insects regulations at the national and international levels. Considering these points, they will likely perform as well as previously as a research and development team.

- Conclusion

  - Summary

UELB is an experimental unit that is clearly fulfilling INRA's technical and scientific missions for such a unit and that has been able to take into account concepts, knowledge and tools coming from population genetics and molecular systematics.

  - Strengths and opportunities

The team has a sound approach of modern biological control problems and strategies and will benefit from renewed interest into biological control exacerbated by new European regulation in the use of pesticides and by the accidental introduction of a growing number of alien pests. It can strongly benefit from collaborations with ISA teams that are studying more fundamental aspects of pest origin, genetics, ecology, pathogens and regulation.

  - Weaknesses and threats

The team is a very small one considering on one side its number of permanent position engineers and on the other side the amount of pests that potentially they may have to deal with.

They should fully demonstrate their capacity to use improved biological control methods to effectively regulate pests they are working on even if positive and encouraging results have already been reported (at that level).

  - Recommendations

Establishing the former UELB as a specific ISA team is a challenge clearly understandable in terms of promoting the research and development field into the ISA TGU and in terms of increasing visibility and recognition of the RDBL biological control group at the French and International levels. According to the committee, the success of that move will be strongly dependent on the ability displayed by the new RDLB team to establish strong and efficient research partnerships with BPI and TEAPEA research teams (and also the ESIM and possibly RISE teams) and at the same time the committee is expecting to see RDBL skills rapidly reinforced by new scientific capacities (engineers or researchers).

It is important that RDBL maintains its individual identity given its important service mandate.

Intitulé UR / équipe	C1	C2	C3	C4	Note globale
INSTITUT SOPHIA AGROBIOTECH	A	A	A+	A+	A
IPN: INTRACTIONS PLANTES-NÉMATODES [ABAD-ABAD]	A+	A+	Non noté	A+	A+
BPI: BIOLOGIE DES POPULATIONS INTRODUITES [ABAD-GUILLEMAUD]	A	A	Non noté	A	A
SYM: SYMBIOSE ET ÉTAT REDOX DE LA CELLULE [ABAD-HEROUART]	A	A	Non noté	A+	A
IPO: INTRACTIONS PLANTES-OOMYCÈTES [ABAD-PANNABIERES]	A	A	Non noté	A+	A
RISE: RÉSISTANCE DES INSECTES AUX STRESS ENVIRONNEMENTAUX [ABAD-PAURON]	B	B	Non noté	B	B
ESIM: EVOLUTION ET SPÉCIFICITÉ DES INTACTIONS MULTITROPHIQUES [ABAD-POIRIE]	A+	A	Non noté	A+	A+
RDLB: RECHERCHE ET DÉVLOPPEMENT EN LUTTE BIOLOGIQUE [ABAD-RIS]	Non noté	Non noté	Non noté	Non noté	Non noté
GEP: GÉNÉTIQUE, ENVIRONNEMENT ET PLASTICITÉ [ABAD-ROBICHON]	A	B	Non noté	A	A
TEAPEA: ECOLOGIE THÉORIQUE ET APPLIQUÉE AUX AGROSYSTÈMES SEMI-CONFINÉS [ABAD-WAJNBERG-PONCET]	A	A	Non noté	A+	A

C1 Qualité scientifique et production

C2 Rayonnement et attractivité, intégration dans l'environnement

C3 Gouvernance et vie du laboratoire

C4 Stratégie et projet scientifique

Statistiques de notes globales par domaines scientifiques

(État au 06/05/2011)

Sciences du Vivant et Environnement

Note globale	SVE1_LS1_LS2	SVE1_LS3	SVE1_LS4	SVE1_LS5	SVE1_LS6	SVE1_LS7	SVE2 _LS3 *	SVE2_LS8 *	SVE2_LS9 *	Total
A+	7	3	1	4	7	6		2		30
A	27	1	13	20	21	26	2	12	23	145
B	6	1	6	2	8	23	3	3	6	58
C	1					4				5
Non noté	1									1
Total	**42**	**5**	**20**	**26**	**36**	**59**	**5**	**17**	**29**	**239**
A+	16,7%	60,0%	5,0%	15,4%	19,4%	10,2%		11,8%		12,6%
A	64,3%	20,0%	65,0%	76,9%	58,3%	44,1%	40,0%	70,6%	79,3%	60,7%
B	14,3%	20,0%	30,0%	7,7%	22,2%	39,0%	60,0%	17,6%	20,7%	24,3%
C	2,4%					6,8%				2,1%
Non noté	2,4%									0,4%
Total	100,0%	100,0%	100,0%	100,0%	100,0%	100,0%	100,0%	100,0%	100,0%	100,0%

*** les résultats SVE2 ne sont pas définitifs au 06/05/2011.**

Intitulés des domaines scientifiques

Sciences du Vivant et Environnement

- **SVE1 Biologie, santé**
  - **SVE1_LS1 Biologie moléculaire, Biologie structurale, Biochimie**
  - **SVE1_LS2 Génétique, Génomique, Bioinformatique, Biologie des systèmes**
  - **SVE1_LS3 Biologie cellulaire, Biologie du développement animal**
  - **SVE1_LS4 Physiologie, Physiopathologie, Endocrinologie**
  - **SVE1_LS5 Neurosciences**
  - **SVE1_LS6 Immunologie, Infectiologie**
  - **SVE1_LS7 Recherche clinique, Santé publique**
- **SVE2 Ecologie, environnement**
  - **SVE2_LS8 Evolution, Ecologie, Biologie de l'environnement**
  - **SVE2_LS9 Sciences et technologies du vivant, Biotechnologie**
  - **SVE2_LS3 Biologie cellulaire, Biologie du développement végétal**

Institut National de la Recherche Agronomique

dépasser les frontières

Université Nice SOPHIA ANTIPOLIS

Centre de Recherche PACA

UMR INTERACTIONS BIOTIQUES ET SANTE VEGETALE
INRA 1301-UNSA-CNRS 6243

N/Réf. :
V/Réf :

Sophia Antipolis, 12/04/2011

OBSERVATIONS DE PORTEE GENERALE SUR LE RAPPORT D'EVALUATION DE L'AERES

We wish to acknowledge the AERES scientific committee for the time and the energy spent in evaluating the three unit reports and their project of fusion into a large UMR named 'Institut Sophia Agrobiotech' (ISA). We nevertheless regret the late reception of the report (April, 8th).

We appreciated that the committee has underlined much positive points, including:
- The development of a large array of research projects in the field of plant-microbe interactions and pest biology which are original, relevant and internationally competitive.
- The large number of scientific breakthroughs and high quality publications achieved during the past four-year period, and the strong scientific collaborations established at national, European and International levels including significant ones with private companies.
- The very good ability to recruit high-quality young research scientists and the massive investment in the training of young scientists.

We mainly agree with the comments and associated recommendations of the committee as summarized below, and we think that we are already in a position to face part of these challenges in the very next future:
- *The reinforcement of research in the field of Biological Control and the need to support the team in charge of this aspect.* This point will be one of the main scientific policies of ISA in the next contract period. Considering that the number of engineers holding a permanent position is too small to face present and future challenges of the team, we will make recruitment demands to INRA in this field of high priorities, with the aim of rapidly reinforcing skills by new scientific expertise capacities. In this respect, we have identified two engineer positions as key demands for the present INRA recruiting campaign. In parallel, we will strongly support joint projects between teams aiming to reinforce Biological Control as a transversal main objective of research in ISA.
- *The need to strengthen Bioinformatics*. Despite help from the INRA national bioinformatics network, the ISA Institute recurrently suffers from an insufficient critical mass in Bioinformatics that we try to overcome with temporary positions financed on grants. This is not a long-term satisfactory solution in the context of the current and future genomic challenges faced by several teams of ISA, and this deficit might preclude ISA competitiveness at the international level. We have kept the SPE INRA Department informed of this weakness, and we will continue to put bioinformatics expertise as a matter of high priority for ISA recruitments. In order to build a structured Bioinformatics service, we have proposed an "Assistant engineer" position in the present INRA recruiting campaign.

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- *The need to improve our strategy for sharing costs and common platforms and services*. We seriously take into account this observation with the aim of developing an accepted and stated platform strategy. ISA is the result of a long series of reorganisations on the Sophia Antipolis site that started in 2000, with important merges every four-year period. We have identified two councils (scientific and organizing research support) which are already operational and will work in 2011 on this specific organization of the common equipments and resources. In addition, a new INRA engineer previously in charge of the national Breeding Animal Genomics Platform (CRB, IBiSA) in Jouy en Josas, has been given the objective of contributing to the definition and deployment of a global platform management strategy. These operators will define common operating/access rules, develop a quality approach, and select the optimal levels of openness to provide an up-to-date technological level to the platforms while maintaining a high quality of service. We will also define rules for our participation to the functioning of the new local IBiSA NGS platform, which will be used to increase direct access to large genomic data with specific developments for health plant applications.

- The commission also noticed *the loss of technical staff over the reference period, which can significantly prevent the workforce from coping with the missions of the ISA unit in the future.* We have repeatedly alerted our supervisory research bodies, including our main provider, the INRA SPE Department, that the size of our technical staff should be at least maintained to achieve key scientific tasks of our project. Despite internal reorganization and optimization of technical staff involvement, including the sharing of resources, the situation tends to worsen. We hope that recommendations from AERES will be taken into account by the research bodies in the next future.
- In addition, the commission has expressed *concerns about the recent reorganization of the INRA administrative support services into a PACA regional Service Déconcentré d'Appui à la Recherche (SDAR), which results in decreased availability of logistic support staff for research teams of ISA.* We are aware that a solution is urgently needed to improve the efficiency of decision processes for the ISA research purposes. We are currently in a discussion phase with the SDAR of the PACA center in order to define new rules/structures aiming at fully support the future large UMR. A procedure of "Mise à Disposition" at ISA of the SDAR administrative staff directly working for the institute might be an appropriate problem-solving strategy.

Pierre Abad
INRA / CNRS / Université de Nice Sophia Antipolis