



Research evaluation

EVALUATION REPORT OF THE UNIT
PV - Pathologie Végétale

UNDER THE SUPERVISION OF THE
FOLLOWING ESTABLISHMENTS AND
ORGANISMS:

Institut national de recherche pour l'agriculture,
l'alimentation et l'environnement - INRAE

EVALUATION CAMPAIGN 2022-2023
GROUP C

Report published on June, 26 2023

High Council for evaluation of research and higher education



In the name of the expert committee¹ :

Lesley Torrance, Chairwoman of the committee

For the Hcéres² :

Thierry Coulhon, President

Under the decree n° 2021-1536 of 29th November 2021:

¹ The evaluation reports "are signed by the chairperson of the expert committee". (Article 11, paragraph 2);

² The president of the Hcéres "countersigns the evaluation reports established by the expert committee and signed by their chairperson." (Article 8, paragraph 5).

This report is the result of the unit's evaluation by the expert committee, the composition of which is specified below. The appreciations it contains are the expression of the independent and collegial deliberation of this committee. The numbers in this report are the certified exact data extracted from the deposited files by the supervising body on behalf of the unit.

MEMBERS OF THE EXPERT COMMITTEE

Chairperson: Ms Lesley Torrance, Emeritus Professor, University of St Andrews, United Kingdom

Experts: Mr Gilles Bena, IRD, Montpellier (representative of CSS INRAE)
Ms Christina Hazard, École centrale de Lyon (supporting personnel)
Mr Thierry Rouxel, INRAE, Thiverval-Grignon

HCÉRES REPRESENTATIVE

Mr Steven Ball

CHARACTERISATION OF THE UNIT

- Name: Pathologie Végétale
- Acronym: PV
- Label and number: UPR_A 0407
- Composition of the executive team: Mr Marc Bardin (2016-2020), Mr Benoît Moury (2021) and Ms Christel Leyronas (Deputy director 2016-2021)

SCIENTIFIC PANELS OF THE UNIT

SVE2 Productions végétales et animales (agronomie), biologie végétale et animale, biotechnologie et ingénierie des biosystèmes

SVE2_2 Biologie végétale fondamentale et appliquée et productions végétales

THEMES OF THE UNIT

The research objective of the PV unit is to contribute to the development of rational and efficient plant disease control methods that are compatible with a sustainable and high quality agricultural production. The unit focuses on bacterial, fungal, oomycete and viral diseases of fruits and vegetables produced in the Mediterranean Basin. It has the particularity to deal with the four main kinds of plant parasitic micro-organisms, as well as vector insects, and most possible disease control levers (disease etiology and diagnostics, biocontrol, plant genetic resistance, agricultural practices, landscape management), with a strong focus on biocontrol. The main specific scientific objectives are to:

- Assess the etiology of emerging diseases of crop plants and the importance of reservoirs of pathogens from outside of agriculture;
- Characterize the phenotypic and genetic diversity of plant pathogens and beneficial micro-organisms (phages and other biocontrol agents);
- Elucidate the epidemiology and evolutionary ecology of plant pathogens;
- Identify the genetic determinants of plant immunity;
- Study the impact of biotic and abiotic factors on the severity of plant diseases, and on the efficiency and durability of control methods;
- Identify the factors underlying the efficient and sustainable deployment of plant disease management strategies (based on biocontrol agents and/or resistant and tolerant plant varieties).

The unit also develops methodological and analytical tools (landscape genetic analyses; high-throughput sequencing strategies for diagnostics, epidemiology and population genetics; models of landscape strategies to manage diseases) and novel interdisciplinary approaches (aerobiology).

HISTORIC AND GEOGRAPHICAL LOCATION OF THE UNIT

PV was created in 1958 and is based at Saint Maurice near Avignon close to the Fruit and vegetable breeding unit (GAFL). It hosts the Molecular Biology Laboratory (LBM) and Microscopy platforms that are shared with other INRAE units and Avignon University. PV researches the epidemiology and ecology of plant diseases (bacterial, fungal and viral) devising control methods for integrated management strategies.

RESEARCH ENVIRONMENT OF THE UNIT

The PV Research Unit is exclusively attached to the Plant Health and Environment (SPE) Research Division ("Département") of INRAE. At the local scale, PV is one of the 16 research units of the INRAE-PACA (Provence Alpes Côte-d'Azur region) center. It is located in one of the major areas of production of fruits and vegetables in France. The strategic and operational priorities of the INRAE-PACA center are organized into 3 poles: Adaptation to Global Change (ACG), Integrated Horticulture (PHI) and Plant Health. PV is associated with the two poles of the Avignon site- ACG and PHI. The third pole (Plant Health) constitutes the ISA Research Unit of the Sophia-Antipolis site. The INRAE-PACA center includes 715 permanent staff and brings together various expertise and resources.

PV is included in the Federative Research Structure TERSYS "Development of natural plant products. Quality and Environment".

PV is part of the founders and executives of the IMPLANTEUS graduate school. IMPLANTEUS is an Interdisciplinary program on Mediterranean Plant Production and Processing, Environment, Human Health and Sustainability and received its first enrolments for the 2020/21 school year.

Since 2021, the research teams are attached to ED 536 "Sciences et agrosociétés" of University Avignon.

PV is member of the Competitiveness Cluster Innov'Alliance located in Avignon, dedicated to the development of a more sustainable, environmentally-safe, healthy and technology-based agriculture.

The PV unit has developed tight links with several plant breeding companies, biocontrol manufacturers and other stakeholders of the agricultural sector (Chambers of Agriculture, interprofessional technical centers...), many of which are located in the whole PACA region.

At an interregional level, PV is involved in the Labex Agro (2011-2024) that is supported by the Agropolis foundation.

UNIT WORKFORCE: in physical persons at 31/12/2021

Permanent personnel in active employment	
Professors and associate professors	0
Lecturer and associate lecturer	0
Senior scientist (Directeur de recherche, DR) and associate	3
Scientist (Chargé de recherche, CR) and associate	8
Other scientists (Chercheurs des EPIC et autres organismes, fondations ou entreprises privées)	0
Research supporting personnel (PAR)	29
Subtotal permanent personnel in active employment	40
Non-permanent teacher-researchers, researchers and associates	1
Non-permanent research supporting personnel (PAR)	3
Post-docs	2
PhD Students	13
Subtotal non-permanent personnel	19
Total	59

DISTRIBUTION OF THE UNIT'S PERMANENTS BY EMPLOYER: NON-TUTORSHIP EMPLOYERS ARE GROUPED UNDER THE HEADING "OTHERS".

Employer	EC	C	PAR
INRAE	0	11	29
Total	0	11	29

UNIT BUDGET

Recurrent budget excluding wage bill allocated by parent institutions (total over 6 years)	974
Own resources obtained from regional calls for projects (total over 6 years of sums obtained from AAP index, i-site, CPER, territorial authorities, etc.)	240
Own resources obtained from national calls for projects (total over 6 years of sums obtained on AAP ONR, PIA, ANR, FRM, INCa, etc.)	1 135

Own resources obtained from international call for projects (total over 6 years of sums obtained)	203
Own resources issued from the valorisation, transfer and industrial collaboration (total over 6 years of sums obtained through contracts, patents, service activities, services, etc.)	519
Total in euros (k€)	3 071

GLOBAL ASSESSMENT

The research objectives of the PV unit are to contribute to plant disease control methods to support sustainable agricultural production. The main focus is on diseases of fruit and vegetables produced in the Mediterranean Basin, particularly those caused by plant parasitic micro-organisms and their insect vectors. There is a strong focus on biocontrol.

The unit has the resources needed to pursue its research activities, it also hosts molecular biology and microscopy platforms that are shared with other Units and Avignon University. There is a critical mass of staff but 9 are expected to retire in the next 5 years and there are few research engineers and post docs. A strategic research plan is needed that clearly articulates the Unit's projects and requirements for staff with the necessary skills to deliver the programme. A strategic plan for replacement and upgrades of equipment is needed noting the requirement for further support for the microscopy platform. The Unit attracts substantial grant funding to support research activities and links to non-academic stakeholders is evident, but further efforts to attract postdocs and staff obtaining HDR qualifications would be beneficial. The resources of the unit were thus assessed as excellent.

The attractiveness of the unit is excellent, with strong scientific contributions and track record of obtaining EU (H2020 RIA, ERA-NET; including coordinating EU FEADER) and national funding (9 ANR). They have attracted 58 contracts over the period worth more than 2 million euros, representing c. 68% of the Units resources. This has translated into financing of technical staff, PhD students and postdocs, in addition to successful INRAE staff recruitment (2 researchers and one engineer) as well as strong and lasting industry collaborations.

The research was found to be of excellent international quality with original findings published in appropriate journals. The Unit published 167 articles, of these, 50% were co-authored with foreign scientists and 62% were rated excellent or exceptional. The unit scientists adhered to good scientific practice, with high standards of research ethics and integrity. There was some concern that the number of review papers with PhD students as senior or co-author were fewer than expected and should be strengthened.

The unit has many longstanding non-academic collaborations resulting in innovations on varietal resistance and disease control methods of direct relevance to industry partners, for example, biocontrol agents for Botrytis, and some that are likely to have future impact, such as phages to control pathogens. Hosting non-academic professionals and e.g. three PhD students supported by private companies as well as developing apps for citizen science are also noteworthy. Participating in National and International scientific committees is evidence of wider influence and recognition of the Unit Scientists. The contribution to society was rated excellent to outstanding.

DETAILED EVALUATION OF THE UNIT

A - CONSIDERATION OF THE RECOMMENDATIONS IN THE PREVIOUS REPORT

Eleven recommendations were made to the unit for the period.

Of these, five have been addressed satisfactorily and six partially, keeping in mind that loss of staff and recruitment to replace them is rarely in the hands of the research unit.

For the five recommendations properly addressed : 1- Interactions between biocontrol studies and the other research topics have been promoted and increased via diverse fundings, including partnership in the CapZeroPhyto PIA project, and recruitment of two permanent scientists (2018 and 2022) with topics in biocontrol (use of phages for the biocontrol of bacterial diseases, and ecological mechanisms involved in biocontrol efficacy; 2- A permanent scientist with experience in modelling has been hired in the Virology team as recommended; 3- The number of grants of small value has decreased with 18% grants > 100k€, as recommended; 4- The presence of students and postdocs has not changed compared to the previous evaluation, but their presence in collective decision structures of the unit are compliant with usual practices at INRAE; 5- The aging of growth facilities (identified as a main weakness) has been addressed via the building of two new phytotrons and, in the near future the renovation of greenhouses (incl. the enhancement of their safety level) and the building of C3 phytotrons, thanks to the CPER project Phytoscope. As recommended the facilities will be shared with the GAFL unit.

The six recommendations partly addressed (or in the process of being addressed are the following : 1- As recommended, collaboration between the two teams have been increased via recruitment of a scientist working at the interface between both, involvement in three research projects and co-supervision of two PhD theses, and development of shared tools. In contrast, there is no mention on how interactions between mycologists and bacteriologists have or have not increased; 2- Collaborations with GAFL have been increased (e.g. via co-supervision of seven PhD and three Master students, or participation to three common research projects) mainly on topics centered on plant pathogen interactions and durability of resistance. This is still work in progress, but with promising issues via the sharing of the future Phytoscope facilities and the building of profiles for recruitment of common scientists. 3- Contrasting with the recommendations, there has been no improvement in the publication metrics of the published papers with a stable scientific production compared to the previous period and 63% of papers being excellent or outstanding. However, it has to be noticed the involvement of the unit in the PCI initiative, and the obtainment of results of interest for the applied or scientific community which are valuable, but difficult to publish in leading multi-disciplinary journals; 4- The recommendation to increase the number of PhD, post-docs and HDR is uneven, with an increase of PhD, a decrease of post-docs and only one HDR to replace several senior scientists who retired. 5- The recommendation to be more involved in Editorial committees also met with limited success, with editorial activities in discipline specific journals (such as Tropical Plant Pathology, Phytopathologia Mediterranea, Phytopathology Research). However, as mentioned above, there is strong activity of three members of the unit in the PCI initiative (strongly supported by INRAE) 6- Last recommendation on attention on the management of the Microscopy platform is not fully in the hands of the unit, with involvement of the university in the management and unexpected loss of a technician with few opportunities for replacement.

B - EVALUATION AREAS

EVALUATION AREA 1: PROFILE, RESOURCES AND ORGANISATION OF THE UNIT

Assessment on the unit's resources

The unit has very good to excellent resources for the functioning of its research activities. This includes a critical but decreasing number of staff for accomplishing scientific objectives and management of the platforms. Recruitment of postdocs was minimal. The infrastructure and platforms of the unit are appropriate for the activities of the unit, however a strategic long-term financial plan for the maintenance, replacement and upgrade of equipment is desirable. Success in obtaining diverse grant funding for supporting research activities and non-permanent technical staff and students is rated excellent.

Assessment on the scientific objectives of the unit

The core activities of the unit are the protection of cultivated plants against diseases. These activities involve not only basic research but also very strong links to crucial societal issues. The dynamics of renewing approaches, such as the recent integration of the study of phages, also illustrate the risk-taking and the desire to always be positioned in the science front. All the activities form a group of remarkable scientific coherence with an exceptional transversal and integrative vision. The scientific objectives of the unit was overall excellent with outstanding developments including for instance the aerobiology of pathogen long-distance dispersal.

Assessment on the functioning of the unit

The unit is led by a director and a deputy director with the help of two secretary-managers. The teams are extremely autonomous to define their scientific strategy, and teamleaders play a central role in definition of these. However, there is no mention of direct interactions in a dedicated structure between the direction and teamleaders; rather the CS encompasses all scientists (including AI) and only meets three to four times a year. The decision-making strategy implies decisions at the team level, and additional interactions between team leaders and the direction. The decision making is qualified as collegial, but it remains unclear in terms of human resources, financial resources and mutualization or scientific strategy. The functioning of the unit was assessed as very good.

1/ The unit has resources that are suited to its activity profile and research environment.

Strengths and possibilities linked to the context

The number of staff is sufficient for the productive functioning of the unit. Staff numbers have been stable (except for loss of 1 technician and gain of 1 researcher). The unit has 38 permanent members of staff, all employed by INRAE (18 researchers/engineers; 20 technicians) (report p. 7). Staff is approximately evenly distributed between the two teams (MISTRAL: 6 DR/CR, 1 IR, 7 TR/AI; Virology: 7 DR/CR, 1 IR, 3 TR/AI; based on 'organigramme du personnel'). The functioning of the experimental infrastructure is lead by 6 technicians/engineers, and 9 technical staff are dedicated to specific research activities. The unit also hosted several non-permanent staff (27 PhD students, 3 postdocs, 5 visiting scientists, 12 contract staff, 74 students; report p. 7). Number of PhD students increased from that of the previous period (18 to 27; 40% foreign students) (report p. 12), and one HDR was attained with 3 more expected in the next period.

The global annual budget of the unit is healthy (511 k€ yearly average (excluding INRAE permanent salary charges); 162 k€ from INRAE, 350 k€ obtained funding; calculated from characterisation table 3). The contract funding accounted for on average 69% of the total budget (report p. 14). Of the 53 contracts obtained (excluding those for congress organisation, animations, PhD salary/traineeship fees, EUR for education), 15 from national/EU sources (6 EU = 778 k€, 6 ANR = 639 k€, 3 PIA = 637 k€; calculated from production table 9) accounted for 78% of the total budget of contracts (report p. 14). Five of these 15 contracts were coordinated by the unit (1 EU, 2 ANR, 2 PIA; production table 9). The number of larger funded contracts increased from that of the previous period (18% >100 k€, 51% > 20 k€) (report p. 12).

The unit has amply space; 4469 m² of technical surface (85 m² security microbiology lab; 70 m² platform; 30 m² clean lab; 4 284 m² other - offices, labs, greenhouse/chambers, workshop), and 40 m² of administrative space (characterisation table 4). Facilities include 1800 m² of glasshouses and 7000 m² of experimental fields. Plant growth facilities have improved through obtaining two large phytotrons and building of a C2 level biosafety containment. There has also been a recent national/regional planning agreement (project 'Phytoscope') for the renovation of two greenhouses, and upgrading of the C2 biosafety containment, and construction of phytotrons with C3 biosafety containment, and with planned mutualization with the Plant Breeding (GAFL) unit. A microscopy platform is hosted at the unit and supported by an AI and IR (20% of time) and recruitment of a permanent technician is intended in the midterm. Through mutualization with the INRAE-PACA center, the unit hosts a molecular biology platform (1 458 m²), and shares the geomatics (GeOpen4S) platform for the management and processing of spatial data. The unit also participates in computing platforms, cluster hosted at the BioSP unit (mathematics, modelling, statistics) and server shared with the GAFL unit (data storage, bioinformatics).

Weaknesses and risks linked to the context

Regarding staff, there is a low number of research engineers (1 per team), possibly limiting involvement in technical expertise and valorization, transfer and innovation. Similarly, there is a strong imbalance between junior scientists (CR: 10) and senior scientists (DR: 3). Technical support for the microscopy platform is still a work in progress. The number of postdocs was low (3 across the period), and in consideration of the increase in the number of PhD students, potentially a risk for resulting in less experienced researchers in the lab/field per student.

In the midterm (2022 – 2026), 9 retirements will take place (5 AT/TR/AI, 1 IE, 3 CR/DR), with 2 recruitments scheduled in 2023 (1 TR and CR). Therefore, a potential risk for loss in the unit's productivity is of concern.

While contract funding is substantial, and funds are pooled for collective research activities and innovative research, financing for maintenance and replacement of equipment and infrastructure remains a challenge.

2/ The unit has set itself scientific objectives, including the forward-looking aspect of its policy.

Strengths and possibilities linked to the context

The main activity of the unit is the development of methods for the control of plant diseases in a sustainable agricultural context (as opposed to the development of chemical phytosanitary compounds). These scientific objectives are in line with the priorities of the SPE scientific department, the unit's sole supervisor. From this point of view, the PV unit perfectly meets the expectations of its supervisory body.

The unit's activities are well articulated with other research units, whether on the site (Biosp, GAFL) or more broadly with other units present in the region. Relationships with the "Sciences et agrosociétés" doctoral school, in which the unit is strongly involved, with the labex Agro established in Montpellier at the regional level, and in a non-academic framework with numerous professional organisations, demonstrate the excellent integration of the unit in its scientific and economic ecosystem.

The scientific objectives are discussed at the team level, but also globally, since several people belong to both teams at the same time. The transversal positions also structure the exchanges between the teams. Scientific priorities, if they require financial, human or technical support, are validated by the Scientific Council, which includes representatives of all the unit's staff categories.

Because of the issues addressed in the unit, the activities are not only strongly implanted in the local professional activities, with networks of producers and technical institutes, but also with a very strong participation in local teaching activities (IMPLANTEUS). There is also a strong involvement of researchers in major advisory bodies, such as ANSES, the OECD or major national programmes such as Ecophyto II.

Beyond that, estimating the impact of the research conducted in the unit remains extremely complex.

Weaknesses and risks linked to the context

Potential risks are related to the pressure of demand from professional partners. The self-evaluation report highlights the implications for a wide range of crop species and emerging or atypical diseases. The unit needs to keep a balance so as not to increase the number of study models too much, which could exceed its human resources, especially in a context of staff downsizing. A weakness raised in the report by the unit itself concerns the evaluation of the impacts of activities. Because of its research activities, which are very strongly linked to societal issues, and although the committee recognises the complexity of their evaluation, the question of impact should be much more present in the unit's objectives.

3/ The functioning of the unit complies with the regulations on human resources management, safety, the environment and the protection of scientific assets.

Strengths and possibilities linked to the context

The PV unit addresses properly all or most of regulations on human resources management and prevention of risks to its scientific assets and information systems.

They have been pioneer in trying to reduce their carbon footprint by using very early low energy phytotrons and have intensified these efforts in favour of the environment and biodiversity to be currently one of 25 INRAE research units whose experimental facilities apply the INRAE environmental policy and are certified ISO14001.

They are strongly involved in gender balance and diversity issues and promote training for the staff and procedures to allow communication towards non-French speaking foreigners (e.g. slides in English during seminars).

They are attentive to the risks associated to the working conditions, with an important and innovative action on ergonomic of the working conditions; they also have a high ratio of one third of the staff that is "SST".

They also have set up efficient tools to promote training towards career development for its staff (assistance to the writing of applications, preparation of oral exams and training sessions). This seems to be very successful as illustrated by the high number of promotions for the staff (5 "promotions de corps et 10 "promotions de grade"). The unit seems also to have very efficiently managed the CoVid crisis and the lockdown troubles both at an individual (maintain the links) and collective levels. The actions taken, such as the "virtual Padlet", or the one-day photo session are exemplary to promote staff well-being and the unit esprit de corps. Similarly, the focus on convivial moments with a dedicated working group is important for the staff well-being. The well-being of the technical personal and their strong feeling of belonging to a team have been stressed during the visit by the staff.

Weaknesses and risks linked to the context

The principles of management of the unit are said to obey a series of ethical and humanist approaches including transparency of governance; traceability of decision-making; principle of financial, material (equipment) and human (staff) solidarity; and sharing of responsibilities. However, these ideal approaches to management are not properly detailed in the report, rendering their evaluation difficult, and there are few sharing of technical staff between the teams.

While most common regulations are addressed by the unit, psycho-social risks are increasing due to the multiplicity of solicitation of staff to perform transversal tasks, often outside of their field of expertise. The direction mention a very limited help to manage these problems, apart for the help of the human resource representative of the division. Also, it is mentioned that teamleaders and the direction are in charge of PSR, to discuss these matters with the staff, but it is unclear if a person outside of the directing bodies may also be available for staff who may be in conflict with their hierarchy.

The involvement of B and C categories in decision-making, or how they are informed of news of the unit is unclear and may be a source of frustration.

There is a large number of working groups in the unit. While this may be rewarding for the staff, this may also be time-consuming and frustrating and be part of the demotivation mentioned by part of the staff involved.

EVALUATION AREA 2: ATTRACTIVENESS

Assessment on the attractiveness of the unit

The attractiveness of the unit is excellent with respect to its size, through its strong scientific contribution at the national and international level, hosting of major platforms, and successful track record of national funding. This has translated into financing of technical staff, PhD students and postdocs, in addition to successful INRAE staff recruitment. Upkeep of platform quality and sufficient personnel may remain a potential weakness.

1/ The unit has an attractive scientific reputation and contributes to the construction of the European research area.

Strengths and possibilities linked to the context

The unit's reputation and contribution to the ERA are demonstrated by their invitations to speak at many International congresses and conferences, including Int. Congress of Biocontrol, Int Adv Plant virology, Int. plant epidemiology, APS meetings, contributing their expertise in biological control methods, host resistance durability, aerobiology and surveillance. During the review period, members have organised 4 international congresses and contributed to 8 international meetings. They have responsibilities in reviewing and editing papers for international journals. A particular strength is their contribution to the open access journal *Peer Community In*. Members have leadership roles in learned societies e.g. IOBC, and have won recognition through fellowship of APS, COMA, FSF. A notable strength is their contribution to the ERA is through knowledge of the control of plant disease to achieve lower pesticide inputs.

Weaknesses and risks linked to the context

Members of the unit including students have received prestigious prizes as indicated above but the unit does not actively seek such awards. While recognizing that research outputs are a collective effort, the outputs are generally not achieved without leadership and such awards raise the profile and recognition of the unit as a whole. By not actively seeking such nominations, opportunities might be missed. The unit has much involvement with research administration at International and national levels e.g. members of steering groups, evaluation panels, editorial work and the balance of these activities should be considered so as not to diminish research activities.

2/ The unit is attractive for the quality of its staff hosting policy.

Strengths and possibilities linked to the context

To provide a high-standard environment and supervision for PhD students and postdocs, staff and students are encouraged to participate in technical meetings and trainings offered by INRAE or others (e.g. doctoral school). Working groups have been created to help early career staff with HDR accreditation procedures, and others for e.g. safety and prevention ('PRAP') and professional training ('cellule concours'). PhD students benefit from training by usually 2 senior staff members (25 of 27 PhD students have 2 supervisors) and technical staff. Annual PhD committee meetings with supervisors and independent experts are upheld. PhD students have access to the unit's seminars and project meetings, and are encouraged to participate in PhD student days, and are supplied with office space, computers and library resources, and can join INRAE's ADAS for leisure activities.

The unit has been successful in the recruitment of candidates. Obtaining tenured positions with INRAE in the unit, either via an open targeted position, open competition, or unit transfer, has been successful, with 2 researchers and 1 engineer acquired during the period, allowing for reinforcement of a current research theme and establishment of a new research program. Established platforms and centralized infrastructure allows for low start-up costs required for new research staff. A working group ('Cellule concours') has been created to help prepare candidates for INRAE competitive advancement or positions.

The unit implements research integrity and open science, following knowledge updates through INRAE's DipSO program and attending national seminars on the topic. Forums for discussing and debating research is available through seminars, meetings, and workshops. Most publications are open access, available on HAL-INRAE or elsewhere (151 of 167 articles deposited; production table 1). Three referents of the unit participate in the data management initiative of the SPE department. The unit is involved in a consortium for the conservation and distribution of biological material (European EVAg project) and are working towards making their large collection of virus strains available to the scientific community. The unit also participates in the Peer Community In.

Weaknesses and risks linked to the context

While it is stated that the unit is committed to providing a high-quality work environment for postdocs, the evidence provided in the report is minimal. There is also minimal evidence of measures taken for the integration of international and non-french speaking students/postdocs.

The unit was unable to host renowned guest researchers for a significant period, however, this can be partly explained by the limitations due to the COVID pandemic.

It was stated that there is encouragement of PhD students to participate in annual SPE/INRAE conferences and to take advantage of funding opportunities for international conferences and collaborative activities. However, according to production table 3, there appears to be only 26 oral presentations and 19 posters co-authored by PhD students (out of a total of 176), this can be partly explained by only 3 conferences during 2020 due to COVID.

3/ The unit is attractive because of the recognition gained through its success in competitive calls for projects.

Strengths and possibilities linked to the context

The unit has an excellent record of success in responding to competitive calls for projects. Over the entire period, the unit has obtained more than 2 million euros in funding, representing 68% of the unit's resources over the five years, excluding the payroll (see evaluation area 1, section 1 for further details). It is remarkable that the unit has obtained funding from various calls for proposals, whether European (H2020 RIA, ERA-NET, mostly as partners,

with only one FEADER project as coordinator), national (ANR, CASDAR), from INRAE, or within the framework of the PIA (including two main PPR projects). Among these projects, the unit was the coordinator of a European project (EU FEADER, European funds for rural development), an ANR PPR project, an ANR France-reliance project and three ANR projects. It is also remarkable that out of these 58 projects, 15 different people are involved as leaders or corresponding person, out of a total of 18 researchers and engineers in the unit. These funds have also made it possible to finance technical staff (10), doctoral students (13) and two post-docs, contributing to the unit's dynamism.

Weaknesses and risks linked to the context

The unit will have to maintain this high level of self-financing, in particular to maintain the number of doctoral students, 50% of whom have been financed on projects over the last five years. Although many researchers and engineers are involved in these projects as the unit's leaders, it should be noted that out of the 27 projects in which the unit is responsible for the project, one third are led by a researcher who is very close to retirement. This dependence will therefore have to be anticipated.

4/ The unit is attractive for the quality of its major equipment and technological skills.

Strengths and possibilities linked to the context

The PV unit is responsible for two major equipments/platforms of importance for their research: 1-a main greenhouse/growth chambers with adequate confinement levels to deal with quarantine organisms or GMO (plus experimental fields), and 2-a microscopy platform. For the greenhouse/growth chambers facility, that includes 1800 m² of glasshouses, containment facilities (340 m² of S3 glasshouse and 27 m² of NS3 growth chamber), 13 growth chambers (amounting to a total of 68 m²), and 7000 m² of experimental fields (including 600 m² of plastic tunnels), the general approach of the unit is exemplary in all aspects of building, maintenance and quality. The unit regularly receive consistent fundings to renew the facilities or build new ones thanks to the CPER, share them with other units such as GAFL and opens them to external researchers, insist on the environmental quality of the facilities with a long-time use of low-energy phytotrons, obtained an ISO14001 quality management certificate in 2019, trained the staff to run all new equipment, and has the adequate in-home expertises for repair and maintenance. They also have all the manpower to run such large facilities (4 IE and TR for the greenhouse/growth chamber facility; 2 AI and TR for the maintenance). This large and up-to-date facility is clearly a factor of attractivity for PV. The microscopy platform, hosted in the PV building, is mutualised between INRAE-PACA units and the Avignon university, and managed by a research engineer (20%) and an AI. The equipment includes confocal, TEM, and a new scanning EM. This also is clearly a factor of attractivity that welcomes the staff of INRAE units and external persons for services but also offers training to make users autonomous and; this is a major facility for a unit working largely on plant viruses. The platform is financially managed by the SFR TERSYS.

PV also has on-site, a mutualized platform for molecular biology that is serving 6 units of the INRAE-PACA center. This platform hosts around 60 researchers and technicians (permanent and non-permanent). It includes labs fully equipped to implement molecular biology techniques. The financial management of this platform is under the responsibility of PV.

Weaknesses and risks linked to the context

The weaknesses linked to the major equipment are firstly due to the need to constantly update and maintain the infrastructures at their best. In view of the successes the unit had in the past in getting fundings to improve or equip the facilities, including common projects with GAFL, it makes no doubt that they will be as succesful in the future. However, we acknowledge that this is a time-consuming exhausting task for the managers to strive to maintain the facilities at their best.

One possible weakness is about the staff involved. In the case of the microscopy platform, only 20% IR are devoted to this platform and the economic model and sharing model has to be precised.

In the case of the greenhouse/growth chamber/maintenance staff, one important risk lies in the ageing of the staff with the responsible persons in charge of the two service likely to retire within the coming years (both being born in 1961).

EVALUATION AREA 3: SCIENTIFIC PRODUCTION

Assessment on the scientific production of the unit

The experts reviewed the originality of research based on the six topics provided in the SAD and the journal articles in the portfolio document. The research was found to be excellent and of international quality. There were many papers published in highly respected (62% of excellent and exceptional journals according to the NORIA standards) journals including *Peer community journal*, respecting INRAE policy for open access.

1/ The scientific production of the unit meets quality criteria.

Strengths and possibilities linked to the context

Based on the SAD and the examples provided, the experts conclude that the theoretical and methodological foundations conform to good standard practice in terms of statistical rigour, data management, regular instrument calibration, experimental planning and discussion of results within team meetings. The co-authors all play a part in writing papers and the unit complies with INRAE research ethics and integrity principles.

The experts reviewed the originality of research based on the six topics provided in the SAD and the journal articles in the portfolio document. The research was found to be of international quality and was published in appropriate journals including *Peer community journal*, respecting INRAE policy for open access. Original insights include the influence of air mass on long distance dispersal of pathogens, durability of host resistance and structure and evolution of host-parasite interactions. The work on pepper-pvy pathosystem to investigate selection pressures that influence resistance durability has revealed new insights into the role of genetic drift and the influence of the genetic background of the host plant and the development of a model to inform plant breeding. The work on phage for biocontrol is a promising area that should achieve new findings in future and the decision support systems based on pest biocontrol has provided a practical tool for users. The work on structure and analysis of host-parasite interactions (nestedness and modularity) raises important questions about the scale of deployment of crop diversity in regenerative agriculture systems to control the breakdown of quantitative plant resistance and highlights the need for more work in this respect.

The allocation of some of the unit budget for infrastructure improvement, training and exploring new areas of science supports the development and evolution of research into new areas.

Contribution to knowledge is évident in the publications e.g. the discovery of the importance of long distance dispersal of air-borne pathogens which should be considered in future disease prediction models.

The unit published 167 articles in the review period, with c. 50% co-published with foreign authors, demonstrating excellent international collaboration and relevance in the science community. Approx. 60% of the articles were in well regarded specialised journals such as *Mol Plant pathol*, *Phytopathol*, *J gen Virol*, *Appl and Env Micro* as well as in multi-disciplinary journals such as *Science*, *New Phytologist*, *Plant Journal* and *Global Change Biology* and prestigious annual reviews such as *AR Phytopathology and AR Ecology, Evolution and Systematics*. They have been cited many times by international authors. The SAD provides examples of several highly cited innovative articles by unit staff.

Weaknesses and risks linked to the context

The unit's budget management approach to allocate funds for mutual activities and supporting new areas of science is laudable but it was not clear what percent of the budget is allocated in this way and what processes are in place to decide how to use the funds. It is not clear how successful this policy is in terms of new ideas and proposals being developed or papers published.

2/ Scientific production is proportionate to the research potential of the unit and shared out between its personnel.

Strengths and possibilities linked to the context

While the unit requested to be evaluated as a single team, it is stressed that the two teams have a similar number of publications which is consistent with a comparable amount of scientists.

Except for three newly hired scientists, and one non-publishing scientist (one paper in the period) all scientists have a number of publications ranging from 6 to more than 36. Interestingly, and except for two, TR and AI also are regularly associated to publications as authors (from 3 to 13 publications in the period) and this again is similar between the two teams.

Weaknesses and risks linked to the context

Strength and weaknesses on this part are quite difficult to evaluate, with few information provided in the report or during the visit.

Twenty-seven PhD students have been hosted in the unit since 2016, but 21 are listed as authors of publications. In addition, of the 21 having published, three have no papers as first author, and five have only one publication as first author and no other. The average of 2.4 publications per PhD student seems unusually low. Of the 16 review papers produced by the unit, none associates a PhD student as author. Lastly, only 23% of the papers of the unit are co-authored by one (rarely two) PhD students. This indicates insufficient incentive to publish for PhD students, and a low weight of the research of PhD students in the unit.

3/ The scientific production of the unit complies with the principles of research integrity, ethics and open science.

Strengths and possibilities linked to the context

The unit has developed several axes to promote scientific production based on principles of ethics, integrity and open science. In addition to the desire stated in the document to implement an approach of fairness and rigour in the scientific process, it has put in place classic laboratory notebook procedures, a collective approach to promote reproducible and testable experimental plans, and the drafting of 121 Research Quality Assurance sheets covering different areas of laboratory activities. The unit has made efforts to promote open access publications and open data management, in particular through an engineer leading these issues within the unit. The willingness to support open access publications has resulted in 81% of articles being open access during the period 2016-2021. Several researchers are also involved in the PCI approach and two articles have been published.

Weaknesses and risks linked to the context

There is no reference to training in scientific integrity, especially for PhD students, although this should be mandatory and systematic. If the approach towards the PCI is important and supported by INRAE, the willingness to publish via this new system should be shared by more people in the unit to support this new journal. There is no mention of the General Data Protection Regulation (RGPD), although this has become a mandatory element in the projects.

EVALUATION AREA 4: CONTRIBUTION OF RESEARCH ACTIVITIES TO SOCIETY

Assessment on the inclusion of the unit's research in society

This is undoubtedly an area of strength and the Unit has many longstanding non-academic collaborations. In this evaluation period they participated in 15 projects involving research and technological innovations on varietal resistance and disease control methods of direct relevance to industry partners. Hosting non-academic professionals and apps for citizen science are also noteworthy. Participating in National and International scientific committees is evidence of wider influence and recognition of the Unit Scientists. These activities in aggregate merit an excellent to outstanding evaluation score.

1/ The unit stands out by the quality of its non-academic interactions.

Strengths and possibilities linked to the context

The PV staff have many links with a wide range of non-academic groups including farmers, growers and grower associations and private companies. Several of these links are longstanding and have led to funding (c17% of the unit's budget) to support research on topics of immediate practical interest to the groups such as detection and control of a new disease of garlic, deployment of resistant grape cultivar and decision support tools for

biocontrol on vegetable crops. Collaborative projects with industry were mostly focussed on plant breeding (e.g. resistance in pepper against TSWV) and biocontrol.

The unit provides excellent research support to non-academic partners in the diagnosis and control of economically important diseases, sometimes these interactions seem to be ad hoc. These partnerships and collaborations ensure that the outputs of the PV research projects are made available to industry and are implemented to produce many practical solutions.

The unit also provides support to non-academic professionals by making available facilities (such as microscopy platform) for training purposes and hosting technical seminars. Three PhD students supported by private companies were trained and farm advisors and technical staff from breeding companies and extension services have also been trained. These activities are important means of helping local industry as well as knowledge exchange of research findings.

The unit actively contributes to the ephytia website and the two apps Di@gnoview and Decicontrol are freely available for the general public to use and send in observations as well as to contribute to Citizen science projects.

Weaknesses and risks linked to the context

The partnership policy of the unit was not very clearly described in the SAD and some activities did not have formalised research contracts. Although outputs from all activities were very good, it would be useful to know what the policy aims and objectives were.

The activities clearly allow the research outputs of the Unit to be adopted and used by industry, but it was unclear whether there was any mechanism to obtain a return on investment (i.e. commercial income from its research products) back to support the Unit's research and facilities aside from the funding of original research contracts.

2/ The unit develops products for the socio-economic world.

Strengths and possibilities linked to the context

The links with the socio-economic world are undoubtedly one of the unit's assets of excellence. The unit has developed invention declarations for biocontrol agents against pathogens (e.g. *B. cinerea*) which are currently being commercially developed, in conjunction with a private company. This work is continuing to develop other products with a strong potential economic impact such as use of phages against pathogens. In addition, the unit has very strong links with professional organisations in the world of agriculture, be they chambers of agriculture, producers' associations or industrialists. This network of collaborations is exceptional and shows the major dynamism of the unit in this activity. This recognition at the level of professional actors also gives them the legitimacy to be directly involved in the definition of standards, procedures and recommendations, such as within ANSES where researchers are very present in the various expert committees. This involvement is also true at the international level with the OECD.

Weaknesses and risks linked to the context

There is very little weakness in this part. The unit has not taken the initiative to create or help the emergence of a start-up, although it has the means to do so in terms of activities and biological resources. It would be a way for the unit to concretise these activities and to have a legal and economic framework to develop them.

3/ The unit shares its knowledge with the general public and takes part in debates in society.

Strengths and possibilities linked to the context

PV develops a series of diversified actions to popularize and advertise their research topics, the importance of their research and ethical considerations towards non-scientists and young audience (ranging from twitter activity to MOOC, and including "artistic videos", game demo on Landsepi, development (in collaboration) of an educational game on crop pest control methods). They are strongly involved in the "Femmes et science" association to make the public aware of the inequalities between women and men in science, and to show the effect of stereotypes that can influence school orientation of young people and cause them to miss great opportunities (interviews, conferences, posters). They also organise a one week internship for > 24 3rd and 4th year college students involving 25 persons from the unit for supervision. Some hot topics (use of phage for biocontrol, emergence of new diseases) are highly relayed in print press, radio and TV, with interviews of the scientists in charge.

Weaknesses and risks linked to the context

While outreach activities are significant and diversified, events for the general public are scarce and very basic (fête de la science, salon de l'agriculture), without proper initiatives from the unit. The presence on media, except for the Tweeter account, is also difficult to evaluate due to the limited information provided in the Excel file "Tableau production".

C - RECOMMENDATIONS TO THE UNIT

Recommendations regarding the Evaluation Area 1: Profile, resources and organisation of the unit

Develop a strategic long-term scientific plan including the prioritization of staffing needs to support the new areas of science that have been initiated and how these relate to the funding body's roadmap.

Similarly the maintenance, replacement, and upgrade of equipment should be coordinated with other INRAE units present on site.

Continue to strive for increasing support for the microscopy platform.

Put in place a plan to reduce loss in expertise associated with future staff retirements especially in the MISTRAL team.

Consider increasing the number of postdocs, research engineers, and hosting of eminent scientists. Such efforts could include recruitment of international candidates for applications to e.g. Marie Skłodowska-Curie postdoctoral fellowships, Human Frontier Science Program, and Fulbright Scholar Program.

While the distribution of mutual funds for training and for exploratory projects is stated, it is suggested to clarify the policy for transparency of decision making.

Consider contacting again INRAE's regional or possibly national human resources services to assist with post-covid concerns dealing with personnel management issues.

Recommendations regarding the Evaluation Area 2: Attractiveness

Active nominations for prizes and recognition for lead scientists and students should be encouraged.

In order to attract PhD students, the unit should increase its ratio of HDRs, which is still too low.

The unit should further increase the number of post docs (3 over the period) which remains very low in relation to the reputation and activity of the unit.

This could be done by increasing the involvement of the unit as coordinators in large-scale European projects, such as a project involving countries from all over the Mediterranean sea.

Junior scientist mentoring should be perfected to reach a higher number of HDR scientists and promotion to the director of research status.

Training and mentoring should be expanded to non-permanent scientists hosted by the unit and not restricted to permanent staff.

Recommendations regarding Evaluation Area 3: Scientific Production

Continue the excellent effort of scientific publication.

Ensure that the PhD students are encouraged to write or be associated with the writing of literature reviews in which the unit excels.

Recommendations regarding Evaluation Area 4: Contribution of Research Activities to Society

Continue the excellent interaction with non-academic partners.

It is recommended that a strategy is developed for engagement with non-academic partners to explain their approach to prioritising partnerships, growing the number of interactions e.g. identifying new partners and sources of commercial income from the products of research.

The unit could intensify its openness to private companies in order to propose the development of, for e.g. a greater number of biocontrol agents, or even to create a start-up in this field of activity.

CONDUCT OF THE INTERVIEWS

Dates

Start: 24 October 2022 at 09:00

End: 25 October 2022 at 17:00

Interview conducted online

INTERVIEW SCHEDULE

October 24

- 8h45: Welcome and connection of the participants
- 9h00: Hcéres assessment process and role and presentation of the committee members (S. Ball)
- 9h15: General overview and achievements of the Pathologie Végétale unit
- 10h15: Questions by the Hcéres committee
- 10h45: coffee break
- 11h00: Hcéres committee debriefing (closed session)
- 12h00: lunch break

- 13h00: connection with engineer assistants and technicians*
- 13h10: Hcéres committee interactions with PV's engineer assistants and technicians
- 13h40: connection with PV's scientists*
- 13h50: Hcéres committee interactions with PV's scientists
- 14h20: connection with PV's PhD, post-docs and contractuels*
- 14h30: Hcéres committee interactions with PV's PhD and Post-docs
- 15h00: coffee break
- 15h15: connection with supervising institutions*
- 15h25: Hcéres committee interactions with the supervising institutions
- 15h55: connection with PV's direction and group leaders*
- 16h05: Hcéres committee interactions with PV's group leaders
- 16h35: Hcéres committee debriefing (closed session)

October 25

- 8h50: connection with PV's direction*
- 9h00: Hcéres committee interactions with PV's direction
- 9h30-12h30: Hcéres committee debriefing (closed session)
- 12h30-14h00: lunch
- 14h00-17h30: Hcéres report editing session

*: confidential sessions

GENERAL OBSERVATIONS OF THE SUPERVISORS

Benoît Moury

Director of INRAE Unit PV - UR0407

84140 Montfavet, France

Object : General Observations on the HCERES report for the PV Unit

Avignon, June 12, 2023

We first wish to thank the experts of the HCERES panel for their time and effort devoted to the evaluation of our research unit. Many suggestions are highly relevant and will be taken into account to improve the efficiency and quality of our activities.

We appreciate that the unit's resources, scientific objectives, functioning, attractiveness, scientific production and contribution to society were considered very good, excellent or outstanding and that the experts underlined our capacity to combine high-level scientific production with excellent interactions with the society and socio-economic world.

Since the writing of the self-assessment report, we have undertaken several actions that fit with the recommendations of the HCERES panel. As these actions are posterior to the evaluation period, most of them will not be detailed here. Notwithstanding, we would like to clarify several points raised by the HCERES panel.

Page 7 of the Evaluation Report: "In contrast, there is no mention on how interactions between mycologists and bacteriologists have or have not increased"

Comment : We have not emphasized this aspect, as mycologists and bacteriologists are now merged in the MISTRAL team. Joint projects and collaborations on biocontrol have increased, such as the LIPOCONTROL [Co25] and CERES [Co7] projects aimed at using Pseudomonas lipopeptides to control fungi, while joint projects on epidemiology and epidemiological surveillance continue (e.g. the BEYOND [Co54] project).

Page 9: "Regarding staff, there is a low number of research engineers (1 per team), possibly limiting involvement in technical expertise and valorization, transfer and innovation."

la science pour la vie, l'humain, la terre

Centre (+ nom du centre)

Adresse

Code postal + ville

Tél. : 00 00 00 00 00

Rejoignez-nous sur :



Site internet du centre

Comment : Three full-time study engineers (IE)) should be added to this list : one dedicated to expertise, valorization and transfer in etiology, another dedicated to scientific and technical information and finally the manager of the microscopy platform (promoted in 2022). Another IE position dedicated to the development and transfer of information systems and databases is also submitted for recruitment to the SPE INRAE Division.

Page 10: “psycho-social risks are increasing due to the multiplicity of solicitation of staff to perform transversal tasks, often outside of their field of expertise.” and “There is a large number of working groups in the unit. While this may be rewarding for the staff, this may also be time-consuming and frustrating and be part of the demotivation mentioned by part of the staff involved”

Comment : We are aware of the “psychological burden” on the staff and we work as much as possible on lightening the load of transversal tasks. Many of these tasks are essential for today's research activities and required by INRAE (prevention, research quality, social and environmental responsibilities, environmental management system, energy management plan, operational data...). They are part of the evolution of our professions. These tasks are described exhaustively in "mission letters" assigned to the staff of the unit concerned, and an explicit part of working time is allocated to these transversal tasks. These groups are set up on a voluntary basis.

As the panel rightly pointed out, these activities may be initially "outside the field of expertise" of the staff. They therefore require training, and group work is a way of increasing staff motivation and combining the expertise of several members of staff. Although time consuming, these transversal tasks are highly recognized during career promotion campaigns and recently exceptional investment can be rewarded by financial bonus.

Page 10: “it is unclear if a person outside of the directing bodies may also be available for staff who may be in conflict with their hierarchy”

Comment : In the event of conflict with the hierarchy, several members of the INRAE PACA Centre's support services can be contacted (Centre President, Human Resources Department), as well as the CHSCT (Comité d'Hygiène, de Sécurité et des Conditions de Travail) and the occupational physician. The Head of the SPE Research Division and the SPE Human Resources Department can also be contacted.

Page 10: “The involvement of B and C categories in decision-making, or how they are informed of news of the unit is unclear and may be a source of frustration.”

Comment : All unit staff are kept informed of news and decisions by e-mail, service councils and general assemblies, including their reports, and by the unit's internal newsletter. However, for reasons of confidentiality, certain information and decisions are not communicated.

la science pour la vie, l'humain, la terre

Centre (+ nom du centre)

Adresse

Code postal + ville

Tél. : 00 00 00 00 00

Rejoignez-nous sur :



Site internet du centre



Page 11: "Members of the unit including students have received prestigious prizes as indicated above but the unit does not actively seek such awards. While recognizing that research outputs are a collective effort, the outputs are generally not achieved without leadership and such awards raise the profile and recognition of the unit as a whole. By not actively seeking such nominations, opportunities might be missed."

Comment : We have not mentioned several initiatives by unit management to proactively obtain such rewards, as they were ultimately unsuccessful. Unit management nominated or supported staff members for the "Lauriers d'INRAE" and the "Prix du Collège de France pour les jeunes chercheuses et les jeunes chercheurs".

Page 14 : « Of the 16 review papers produced by the unit, none associates a PhD student as author. »

Comment : Two PhD students co-authored reviews in book chapters [references O11 and O16].

Page 14 : « There is no reference to training in scientific integrity, especially for PhD students, although this should be mandatory and systematic. »

Comment : This is an omission. All doctoral students receive training in scientific integrity as part of the compulsory training provided by the ED536 doctoral school. In addition, some also attend the EDEN (Ecole des Doctorants et de leurs Encadrants) training program run by INRAE, which also covers scientific integrity.

Page 14 : « There is no mention of the General Data Protection Regulation (RGPD), although this has become a mandatory element in the projects. »

Comment : Some elements are mentioned on page 52 of the self-assessment report:

« Human dignity also is respected through the care taken to ensure the confidentiality of personal data such as the contact information of producers that we gather during field sampling campaigns. Personal data are made confidential by limiting the access to corresponding data files, folders and tables in databases to the minimum necessary number of staff members. This question will further be discussed through the animations provided by the three recently nominated members of the RDO group about data management plans and associated regulations. »

Some elements of the RGPD are taken care of by INRAE as a whole (administrative tools linked to projects, data linked to the organization of seminars or congresses, best practices for the management of personal data linked to CSS (Specialized Scientific Commissions), recruitment juries or evaluation commissions...).

la science pour la vie, l'humain, la terre

Centre (+ nom du centre)
Adresse
Code postal + ville
Tél. : 00 00 00 00 00

Rejoignez-nous sur :



Site internet du centre



Personal data collected during projects is protected by our "PathoBase" information system and by servers with restricted, and secure access. Certain aspects still need to be improved, such as the anonymization or pseudo-anonymization of data (e.g. GPS data for which anonymization is not obvious) in PathoBase and in publications. We will also take advantage of the "RDO group" to help us comply with the RGPD in our future projects and activities.

Page 15 : « The partnership policy of the unit was not very clearly described in the SAD and some activities did not have formalized research contracts. Although outputs from all activities were very good, it would be useful to know what the policy aims and objectives were. The activities clearly allow the research outputs of the Unit to be adopted and used by industry, but it was unclear whether there was any mechanism to obtain a return on investment (i.e. commercial income from its research products) back to support the Unit's research and facilities aside from the funding of original research contracts. »

Comment : Since 2022, the unit embarked on a process of reflection aimed at improving the visibility and accessibility of some of our activities to our partners, particularly non-academic partners such as industry, through the creation of an INRAE-labeled platform. This platform will enhance the value of existing activities, equipment, premises and personnel. Activities will focus on two of the unit's scientific axes: disease etiology and evaluation of plant protection methods. This new organization, recognized by our institute, will improve our eligibility for more funding, notably for maintenance and development of our experimental facilities and microscopy platform.

B. Moury

Marie-Hélène OGLIASTRO
INRAE
Cheffe du Département Santé
des Plantes et Environnement

la science pour la vie, l'humain, la terre

Centre (+ nom du centre)

Adresse

Code postal + ville

Tél. : 00 00 00 00 00

Rejoignez-nous sur :



Site internet du centre



The Hcéres' evaluation reports are available online:
www.hceres.fr

Evaluation of Universities and Schools

Evaluation of research units

Evaluation of the academic formations

Evaluation of the national research organisms

Evaluation and International accreditation



2 rue Albert Einstein
75013 Paris, France
T. 33 (0)1 55 55 60 10

hceres.com

[@Hceres_](https://twitter.com/Hceres_)

[Hcéres](https://www.youtube.com/Hceres)

