

EVALUATION REPORT OF THE UNIT
ISA - Institut Sophia Agrobiotech

UNDER THE SUPERVISION OF THE
FOLLOWING ESTABLISHMENTS AND
ORGANISMS:

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

Université Côte d'Azur - UCA

Centre national de la recherche scientifique -
CNRS

EVALUATION CAMPAIGN 2022-2023
GROUP C

Report published on June, 19 2023



In the name of the expert committee¹ :

Christine Foyer, 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 Christine Foyer, University of Birmingham, United Kingdom

Ms Florence Arsene-Ploetze, Université de Strasbourg (representative of CoNRS)

Mr Denis Faure, CNRS, Gif-sur-Yvette (representative of CSS INRAE)

Mr Philippe Gallusci, Université de Bordeaux (representative of CNU)

Experts: Ms Christina Hazard, École centrale de Lyon (supporting personnel)

Mr Xavier Martini, University of Florida, United States

Mr Thierry Rouxel, INRAE, Thiverval-Grignon

Mr Bruno Touraine, Université de Montpellier

Mr Xavier Vekemans, Université de Lille

HCÉRES REPRESENTATIVE

Mr Christophe D'Hulst

CHARACTERISATION OF THE UNIT

- Name: Institut Sophia Agrobiotech
- Acronym: ISA
- Label and number: UMR 1355 INRAE / 7254 CNRS / Université Côte d'Azur
- Number of teams: 11
- Composition of the executive team: Mr Philippe Castagnone

SCIENTIFIC PANELS OF THE UNIT

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

THEMES OF THE UNIT

The research focus of ISA is on plant health. The themes of the unit include the biotic interactions that take place in cultivated plants, and the factors that determine success or failure of these interactions, resistance to pests and pathogens, particularly biocontrol, the evolutionary forces underpinning adaptation and the population and community ecology of ecosystems. Research in these areas is undertaken by eleven interdisciplinary teams with the collective aim of improving plant microbiome interactions and developing alternative methods of control of plant pests and pathogens.

HISTORIC AND GEOGRAPHICAL LOCATION OF THE UNIT

The current Institut Sophia Agrobiotech (ISA) has evolved through the merger of different research units devoted to Plant Health. The initial objective in 2006 was to create an INRAE strategic pole in the form of a "Plant Health" cluster that became a large research unit (TGU = very big joint research unit) at Sophia. The restructuring, in 2011, following the advice of the AERES, was the merging of three research units: "Interactions Biotiques et Santé Végétale" (IBSV) (INRA, University, CNRS), "Recherches Intégrées en Horticulture" (URIH) (INRA) and "Lutte Biologique" (UELB) (INRA). This merging followed the building of a common project with shared objectives between IBSV, UELB and URIH. The unit is administrated by INRAE, part of the INRAE research center PACA and its supervising bodies are INRAE (Crop Health and Environment division mostly), CNRS and university Côte d'Azur (UCA). ISA is located 400, route des Chappes at Sophia Antipolis, within a 6 ha area and the buildings are ca. 9170 m². It is located close to numerous research and teaching institutions such as Institut de Pharmacologie Moléculaire et Cellulaire, Inria UCA center, and the SophiaTech campus.

RESEARCH ENVIRONMENT OF THE UNIT

Research activities of ISA are in line with the strategic plan of INRAE departments Plant Health and Environment (contributing to the Major Scientific Objectives 1 – plant immunity, 2 – biological regulations, and 4 – risks) and Agroecosystems (contributing to the Major Scientific Objectives 2 – valorisation management and protection of biodiversity in agroecosystems, and 5 – evaluation design and management of agroecological systems).

With respect to CNRS, research activities of ISA, focusing on biological interactions are in line with the overall fundamental question tackled by the INSB, namely "How are living molecules, cells, organisms and populations organised, function and interact?". ISA hosts CNRS researchers affiliated to CoNRS sections 22 (Cellular biology, development, evolution-development), 23 (Integrative biology of photosynthetic organisms and associated microorganisms), 24 (Physiology, pathophysiology, biology of cancer) and 29 (Biodiversity, evolution and biological adaptations: from macromolecules to communities).

Within UCA, ISA belongs to the Life Sciences and Health community and is hosting teacher-researchers belonging to sections 64 (Biochemistry and cell biology), 66 (Physiology) and 67 (Population biology and ecology) of the National Council of Universities (CNU). Locally, ISA is an active member of the Idex UCA^{JEDI} with involvement in two Academies of Excellence programmes (3 – Spaces, environment, risks and resilience; 4 – complexity and diversity of living organisms), into the House of Modelling, simulation and Interactions initiative, and in the BOOST action (Plant Bioprotection and Biostimulation) within the framework of the structuring programme Environment, Health, Citizens. ISA is also strongly involved in the labex Signalife which has been renewed in 2020 under the direction of an ISA researcher. Within the labex, ISA is mainly contributing to axes 2 - Plasticity and signalling, and 3 – Signalling stress. In terms of education through research, ISA is participating to the "École Universitaire de Recherche" EUR LIFE (Life and health sciences) and is leading the international Master of Science programme "Biocontrol solutions for plant health" (MSc BOOST).

Under the CPER 2015-2020 and with contributions of ERDF funds, ISA has benefited from the construction of a start-up support structure focusing on biocontrol, the Ecobiotech platform, hosted on the ISA site and comprising a high-resolution mass spectrometer, climatic chambers and high-throughput insect behaviour phenotyping equipment (under construction).

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

| Permanent personnel in active employment | |
|--|------------|
| Professors and associate professors | 4 |
| Lecturer and associate lecturer | 11 |
| Senior scientist (Directeur de recherche, DR) and associate | 22 |
| Scientist (Chargé de recherche, CR) and associate | 16 |
| Other scientists (Chercheurs des EPIC et autres organismes, fondations ou entreprises privées) | 0 |
| Research supporting personnel (PAR) | 83 |
| Subtotal permanent personnel in active employment | 136 |
| Non-permanent teacher-researchers, researchers and associates | 1 |
| Non-permanent research supporting personnel (PAR) | 5 |
| Post-docs | 10 |
| PhD Students | 27 |
| Subtotal non-permanent personnel | 43 |
| Total | 179 |

DISTRIBUTION OF THE UNIT'S PERMANENTS BY EMPLOYER: Non-tutorship employers are grouped under the heading "others".

| Employer | EC | C | PAR |
|-------------------------------------|-----------|-----------|------------|
| INRAE | 0 | 33 | 78 |
| Université Côte d'Azur | 14 | 0 | 2 |
| CNRS | 0 | 4 | 2 |
| Université de Picardie Jules Vernes | 1 | 0 | 0 |
| Inserm | 0 | 1 | 0 |
| Others | 0 | 0 | 1 |
| Total | 15 | 38 | 83 |

UNIT BUDGET

| | |
|--|-------|
| Recurrent budget excluding wage bill allocated by parent institutions (total over 6 years) | 5 290 |
| Own resources obtained from regional calls for projects (total over 6 years of sums obtained from AAP idex, i-site, CPER, territorial authorities, etc.) | 1 191 |
| Own resources obtained from national calls for projects (total over 6 years of sums obtained on AAP ONR, PIA, ANR, FRM, INCa, etc.) | 5 215 |
| Own resources obtained from international call for projects (total over 6 years of sums obtained) | 1 748 |

| | |
|--|---------------|
| Own resources issued from the valorisation, transfer and industrial collaboration (total over 6 years of sums obtained through contracts, patents, service activities, services, etc.) | 1 513 |
| Total in euros (k€) | 14 957 |

GLOBAL ASSESSMENT

ISA is a well-resourced organization that has achieved commendable success over the reporting period, despite the restrictions of COVID etc. The unit has a sound team structure that is effective in terms of operation. The team structures are also continually evaluated and evolving to ensure a critical mass in each area of research, as well as the effective functional operation of each team. The themes of the unit and priority areas of research are compatible with national and local priorities, as well as addressing the priorities of the stakeholder organisations. The unit overall has achieved a high level of scientific production with a significant number of high-quality publications in leading international journals while being mindful of the needs of local and national agroindustry and wider society. The success of each of the teams in this regard was generally very good or excellent, with two teams rated as excellent to outstanding and only one team was evaluated as fair. The Unit was fully aware of forthcoming challenges that may constrain future success, particularly the age structure that encompasses a significant number of forthcoming retirements that may incur a loss of expertise if these posts cannot be replaced. However, the unit is fully aware that succession planning is urgent and that some team reorganization in the future may be required to address the problem. The Unit has an excellent number of national and international collaborations, many of which are supported by funded projects. The Unit continues to operate as a fully functional organisation despite the constraints of the poor infrastructure of the building and ongoing renovation. The committee recognises the negative effects that such constraints can have on the morale of the workforce and commend the direction on its effects to generate a vibrant research environment that fully supports the needs of the staff.

DETAILED EVALUATION OF THE UNIT

A - CONSIDERATION OF THE RECOMMENDATIONS IN THE PREVIOUS REPORT

Arguments have been made to meet all the recommendations:

- *"A scientific publication strategy that aims for quality rather than quantity should be implemented"*

The quality of publications has been improved: The number of publications in journals of the highest reputation in their field has doubled. The open science strategy is encouraged.

- *"ISA would benefit from having a scientific advisory board that meets regularly and gives strategic advice", "A large research unit like ISA should have an international scientific advisory board to help outline scientific policy and strategy" "The unit should install a scientific advisory board."*

The unit did not wish to set up an international scientific committee as recommended, as it follows the policy of INRAE, and the diversity of disciplines would complicate the setting up of such a committee. Nevertheless, the management is still willing to consider this possibility.

- *"The attractiveness of ISA for foreign postdoctoral researchers is relatively low (9 foreign postdocs out of 53 hosted during the period)", "Attractiveness to foreign postdocs can be improved, for example by more frequent participation in and organisation of international events"*

The unit has tried to improve its attractiveness. Members of the unit participated in the organization of an international nematology congress. The unit is involved in international and bilateral international mobility programs and has initiated a project to create a LIA. 2/3 of the unit's A-rank publications are co-authored with foreign laboratories. The unit participates in training courses with foreign universities which could attract foreign students. Within the framework of the labex, it is planned to recruit new team leaders, including a chair of excellence. It is mentioned that the low salaries and budgets available in France make it difficult to recruit foreign researchers.

- *"The collaboration between individual teams should be improved", "The interdisciplinary interaction between research teams should be strengthened" "Inter-group collaborative projects should receive more encouragement (through significant part of common budget?)"*

The ISA is a multidisciplinary unit that proposes to combine various approaches, at various scales, to develop the use of biocontrol agents and optimize strategies for improving plant resistance. Interactions between the teams are necessary to achieve these goals and are evidenced by 62 co-authored publications and 21 funded projects involving members of several teams. These collaborations are nevertheless heterogeneous between teams. One person (CRCN, INRAE) was recruited for a project built at the intersection of the themes of three teams. There is still room to improve this aspect.

- *"If the IE is to be structured in the future as a collective scientific facility ("Installation Scientifique Collective ISC") specialized staff will need to be dedicated to the structure. This could be a problem for the research groups, as technical staff is being increasingly reduced. The unit will therefore have to implement this type of change with special care"*

The Experimental Facility (IE) benefits from the resources of the PlantBIOs Collective Scientific Facility (CSF), which includes 11 full-time and 15 part-time staff. Their activity is shared and benefits the unit's research teams. The support team (EQA) enables the pooling of administrative and IT services. The unit should also benefit from a regional digital resource (equipex+ 4D-Omics).

- *"For some teams (2, 4), the periodicity of team meetings should be shortened. There is also space to organize more inter-teams meetings that would be helpful for small teams, by exposing them to a larger scientific environment."*

Unit seminars are organized on a weekly basis, and less formal meetings are held regularly between some of the teams.

- *"Thesis committees should be generalized for all PhD students to ensure a good follow-up" "The PhD student community at ISA should be given the means to develop its sense of community beyond the University of Nice. Students should have local thesis committees as well as scientific meetings and a monthly public talk session."*

Thesis committees are now generalized to all students. "Journal club" type meetings are organized, and students also present their work during unit seminars. Social activities are organized with a budget allocated by the unit. Individual meetings between thesis students and the management ensure that the thesis is carried out in good conditions.

- *"The committee recommends to provide spatial and logistical unity to the teams that are split."*

The regrouping of the teams is underway and should allow for better interactions between the teams.

B – EVALUATION AREAS

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

Assessment on the unit's resources

ISA has a strong international profile and is well known for its research outputs and contributions at the interface of agriculture and the environment. A number of unit researchers are internationally recognised in topics such as plant-microbe and plant-pathogen interactions and their dynamics in time and space. The unit has achieved a high profile in terms of the skills and expertise in molecular physiology, comparative, evolutionary and functional genomics, and community ecology and agronomy, and a strong competence in translational biology, public engagement and science advocacy.

The unit is generally very well resourced with a critical mass of permanent and non-permanent researchers and technicians. There is a mix of staff employed by INRAE, Université Côte d'Azur, CNRS and Inserm, as well as on fully funded projects. The unit has a considerable number of material and financial resources such as contracts (72% to 82% of the global budget). It has a policy of mutualization that allows the efficient functioning of all of the teams.

The unit has a functional team structure that fully supports the research activities of the organisation in effective functional groups. The structure of these teams is dynamic and is designed to maximise critical mass on selected topics of major interest and is assessed as excellent.

Assessment on the scientific objectives of the unit

The scientific objectives are evaluated as excellent. They are well defined and address important and current issues in agriculture. They are in adequation with objectives of the scientific authorities. These objectives are organized in five priorities that mobilize all the teams. The scientific goal of the unit is to produce basic and applied knowledge on interactions between plants, pathogens, symbionts, and natural enemies, by integrating data from genes to agrosystems. These objectives are supported by expertise in genomics, plant biology, entomology, ecology and mathematical modelling.

Assessment on the functioning of the unit

The functioning of ISA is very good. There is a significant amount of investment in staff training, and the management of health and safety procedures through several trainings and assigned referents, although there is no on-site professional. The unit is aware of the imbalance between women and men at the DR level. Recent investment in environmental initiatives through awareness and technological means is evident, and the protection of scientific assets is well strategized. The unit suffers from various frustrations related in part to the building infrastructure issues and remote and central administration not able to address simple HR requests of the unit. Another issue is that each team seems to function independently without sufficient coordination at the level of the institute.

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

Strengths and possibilities linked to the context

The unit is currently well funded (850 k€ of recurrent allocations per year, 1500 to 1800 k€ of grants or contracts) that has benefited the organisation, ensured its continued functioning and drove the integration of activities between the teams. There has been a very good level of national cooperation with a significant number of international collaborations (involvement in 14 European projects). ISA currently has the required critical mass to undertake its activities, although a wave of retirements is forecast.

Weaknesses and risks linked to the context

The amount of international grants and international collaborations decreased over time, in particular EU projects. The retirement of several key members of the staff will represent a challenging issue because they will be difficult to replace in the context of funding opportunities. The administration structure constrains the activity of the researchers. The transportation of teachers and PhD students limits the effectiveness of the organization. There are still issues with some of the buildings and current infrastructure problems are not solved.

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

Strengths and possibilities linked to the context

The strength of the unit is supported by the complementary expertise of the scientific members (118 permanent positions) whose activities are supported by the administrative staff (15 permanent positions). The research of the unit goes from genes to agrosystems, with a focus on three main research topics: (1) Molecular mechanisms of interactions at different trophic levels; (2) Evolutionary processes underlying biological adaptations; (3) Population and community ecology in agro-ecosystems. These topics are supported by a wide range of technical skills and expertise (bioinformatics, modelling, genomics, cell biology, genetics, insect behavior, plant biology, nematology...). Another noticeable point is a strong involvement of the unit in the organization of agronomic research (and beyond Life Sciences) at the local level: in particular, Idex UCA JEDI, labex Signallife, EUR LIFE, Maison de la Modélisation, simulation and interactions (MSI), Equipex 4D-Omics (supported by UCA and AMU). The unit is also active in the transfer of expertise to economic players (UMT FioriMed, start-up MYCOPHYTO, Ecobiotech platform with the support of CPER 2015-2020, Biocontrol consortium, Carnot Institute Plant2Pro). Finally, the unit contributes to and coordinates several national and international networks, including 6 genome annotation consortiums.

Weaknesses and risks linked to the context

ISA is facing retirement of permanents, with risks of losing expertise and technical skills in some research topics, constrained career of technical permanents, and increasing time that is dedicated to administrative tasks. ISA approach mixing academic and applied objectives does not appear in all team projects, with some teams mostly focused on academic fundamental work. With the CNRS (INSB) that will become a secondary supervisor (tutelle secondaire), there is a risk of losing expertise, human resources and investments in fundamental research. Strategy for publication, scientific orientation and interactions with stakeholders are all delegated at team level without overall direction from the head of the unit. ISA did not set up a scientific advisory board to get advice on their scientific strategy and organization. Since a long period, ISA did not organize ISA scientific day to discuss about scientific orientation and unit organization.

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

Staff training was highly utilized by permanent (127) and non-permanent (122) members of staff, with 16,364 hours of training completed from 1,337 training sessions on a diversity of topics, with the majority (62%) of the topics on data processing (21%), prevention (18%), mathematics/statistics/modelling/bioinformatics (13%) and languages (10%). Staff careers are supported through training offered by INRAE, CNRS and UCA. There were 8 HDRs defended, 48% of ITAs promoted to a higher grade/body, and 14 researchers/teacher-researchers were promoted during the period. A formal internal mobility procedure was put in place for remobilising skills of permanent staff and for staff opportunities to develop their skill sets and for the needs of the unit, of which 4 staff members utilized.

The unit conscientiously manages for the prevention of health and safety risks of staff through the unit's and PACA centre prevention department that consists of 4 prevention assistants, 13 risk assessment referents, 34 occupational first aiders, and 36 evacuation officers, and a manager of common equipment, equipment inspections, GMO files, and 4 officers are responsible for chemical waste. Recurring (e.g. new arrival induction, annual assessment of risks, training and accreditation) and new technical and organisational actions (e.g. chemical disposal organisation, prevention workshops, lone workers alert system) have been put in place. Many actions are also taken for the prevention of psychosocial risks at the unit level and they have access to social workers, career counselors and prevention doctors through INRAE PACA Center.

Protection of scientific assets is organised. Biological resources, such as living collections and quarantine organisms, are subject to control procedures for risk prevention consisting of authorised access, traceability of samples, and backup of materials. Storage of scientific data on computers/servers is protected from intrusion through tools of the Information Systems Department (DSI) of INRAE. The SIIR-CAS ISD unit of the PACA centre is responsible for security of the central IT system.

The unit is in line with INRAE's Societal and Environmental Responsibility Strategy, demonstrated through initiatives of the unit's 'sustainable development liaison' (e.g. awareness-raising on waste management, "mobility challenges" for reducing use of personal vehicles, bicycle promotion actions), photovoltaic installation project for energy needs (covering 20% of electrical consumption), and adoption of an 'Environmental Management System' approach in 2021 that aims to reduce the environmental impact.

The unit has a Business Continuity Plan, which was updated in 2020, and describes activities that can't be interrupted and includes a list of volunteer staff that can be mobilized.

Weaknesses and risks linked to the context

In the unit women are underrepresented at the DR level (3 women vs. 18 men), although there are more women CR (11 to 16) and several expected retirements of male DRs in the short term. There is no on-site professional prevention advisor since 2015, and the unit struggles with switching over to the new version of the prevention management tool at INRAE, putting at risk the psycho-social well-being of staff, students and postdocs. There are also very limited opportunities for career development for ITAs and teacher-researchers, which risks the motivation and well-being of staff. Furthermore, the time consuming and long waits for the completion of administrative procedures is a risk for the productivity and smooth functioning of the unit. In particular, the teacher-researchers spend long commuting hours between the ISA and UCA campus. While training opportunities are highly utilized, difficulties arise for PhDs in that there is a limited selection of relevant scientific training (more medical courses at university and lack of career development training) and there is fewer training offered on the ISA campus.

EVALUATION AREA 2: ATTRACTIVENESS

Assessment on the attractiveness of the unit

The unit is attractive through its scientific themes (agroecology, biological control, etc.), its scientific production, and its success to competitive calls. In contrast, it suffers a series of short-term or structural issues that reduce the attractiveness to newcomers. These include current major problems in the research building that should be fixed within the next two/three years, but that will continue to impact the experiments and well-being of the staff for this period. Another impairment to attractiveness is linked to the location of the Institute in a region where the cost of life is very high, housing is sparse (mainly for short-time non-permanent persons or low budget permanent staff such as junior technicians), and public transportation is insufficient. Administrative burdens are also problematic to host newcomers, and mostly foreigners with few documents available in English, at the University and unit levels. It should be stressed that there is a worrying decrease of international grants obtained during the period and an insufficient focus on European grants. In conclusion, the attractiveness of the unit is considered as good but should improve to very good once building issues are fixed.

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 has a very good level of scientific production, and in certain teams it is excellent. ISA agents have been invited to give more than 90 lectures in international conferences, as well as about 10 seminars in foreign laboratories. They were involved in the organization of about 30 international colloquia or conferences, including 2 with 150 and 350 participants. They participate in national and international expert committees and evaluations.

There is very good interdisciplinary research and the researchers have a high level of national and international collaboration. The unit participates in undergraduate and postgraduate training, with a sound plan to produce the next generation of researchers and it has strong interactions with industries and other stakeholders. The researchers contribute to Open Science with very good innovation and socio-economic partnerships that have allowed wide dissemination of research to society.

ISA agents are involved in science dissemination: 1 founder of 1 journal, chief editors of 2 journals, associate editors of 23 journals, 5 special issues as guest editors. Several persons are members of the UCA and ED boards, 2 members CNU and INRAE. Four members have responsibilities in 9 learned societies. All these points contribute to the international visibility of the units which increase its attractiveness too.

As a consequence, some members received national awards (2 Chevaliers de l'Ordre du Mérite, Jeune chercheur FRB, 1 UCA award, 1 thesis award), 1 person at 4 x HCR (Highly Cited Researcher), 2 conference awards, 2 international awards ("LIBER Award for Library Innovation", the "ISHS Medal").

Weaknesses and risks linked to the context

The unit had only few international grants since the last 3 years. There is a worrying decrease of international grants starting from 542 k€ in 2016 until 274 k€ in 2020 and only 94 k€ in 2021). There is too little focus on European grants (particularly ERC).

The age distribution of the permanent staff is a potential weakness because it is difficult to replace those persons and their competence could be lost.

The unit was involved in the organization of only 2 large conferences, and did not invite a sufficient number of international speakers for giving seminars.

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

Strengths and possibilities linked to the context

The ISA unit is distributing a welcome guide that provides to newcomers with all the necessary information for their proper integration, including practical life, safety information, prevention, rules of collective life. Newcomers have also prevention sessions to facilitate their arrival. A special policy has been set up to follow PhD students, mainly focusing on the progress and supervision of the thesis, as a complement to the follow-up organized by the Graduate School. This is performed without the supervisors and is aimed at identifying and solving potential problems.

During the 5 years of the contract, 35 foreigner scientists, out of a total of about 50 visiting scientists, have been hosted by ISA, for a short stay, which illustrates the attractiveness of the unit worldwide. Among them, 14 postdocs were hosted (9 from France, 5 from abroad).

In addition, ISA is attractive for junior scientists that would like to apply to new positions. This is illustrated by the arrival of one DR2 (INRAE), holder of an Idex UCAJEDI chair of excellence, and a total of 3 CRCN (including one holder of an ATIP-Avenir funding), 1 IR, as well as several other INRAE and CNRS researchers, and University assistant professors, through individual mobility.

Weaknesses and risks linked to the context

The number of postdocs remains low (14) of which only 5 are foreigners, indicating a limited attractiveness of the unit for young scientists from abroad.

Administrative information is difficult to obtain in English for non-French-speaking PhD students and postdocs. Also, training courses for PhD students are almost exclusively in French.

PhD students from ISA feel thematically isolated within the Doctoral School.

There was no specific organisation during the evaluated period for young non-permanent scientists (PhDs and postdocs) that would allow them to meet on a regular basis and have their own research meetings independent of those organized at the unit level.

The cost of housing in the area of the Institute may represent a limitation for the attractiveness of ISA for young researchers and PhD students.

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 is pretty successful in funding via competitive calls, at all possible scales, from local to EU (14 projects) and other international calls (10 projects). Their ratio of coordinated projects is also very good (12 out of 33 ANR projects or eight out of 14 EU-funded projects by example). During the evaluation period, the average of funds secured from research project was 2.120 M€ (minimum 906 k€ in 2018 and maximum 3.381 M€ in 2021). The unit also received additional funding for high-tech equipment or infrastructure for 6 M€ (funded by the ERDF, the PACA Region, INRAE and UCA), a Chair of Excellence (282 K€), and doctoral contracts for 1 M€.

Weaknesses and risks linked to the context

There are some important disparities between the teams in their success to calls, which seems to be unrelated to the size of the team. One team is much more successful than the others in getting international (4) and EU-funded (6) projects, while others, have difficulties to obtain such funding. These teams rely mainly or exclusively on locally or nationally funded projects. The anticipated departure of senior scientists in the coming four years is likely a threat to the important number of projects of the unit.

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

Strengths and possibilities linked to the context

Since 2019 the unit's experimental facilities (insect breeding house, greenhouses, climate chambers), analytical platforms (biochemistry, microscopy, bioinformatics) and biological resources (nematodes, trichograms) were structured into an INRAE designated Collective Scientific Infrastructure (CSI) called 'PlantBIO', and is aiming for ISO 9001 and ISO 14001 certification by the end of 2023. Parts of PlantBIO also currently benefit from labels, such as the microscopy component being a part of the Microscopy Côte d'Azur (MICA) platform with "Infrastructures en Biologie Santé et Agronomie" (IBISA) certification.

Projects were carried out to enhance the quality of facilities, such as rehabilitation of greenhouses in 2016 and the SABLES project (2015-2020 Contrat de plan État-Région (CPER)) that resulted in the PheHome building for hosting high-throughput phenotyping platform and climatic chambers for insects. The unit has a strategic 5-year investment plan that is updated annually for prioritizing self-financing investments of existing and new equipment, and use a software package (Capilog) to monitor and keep track of equipment maintenance.

The unit is developing policies such that public and private partners can also utilize PlantBIO, by defining access procedures, an economic model, and communication. For example, start-ups Mycophyto and Mane Company have access to PlantBIO through hosting agreements. A team composed of 11 staff members is fully dedicated to running PlantBIO, and with another 15 staff members, which are part of a research team, dedicating part of their time (20-50%) to the functioning, for an overall total of 15.75 full-time equivalents.

Weaknesses and risks linked to the context

The new building has serious problems with the heating/cooling system and requires full replacement that will take place across two/three years and leaving some facilities (e.g., environmental controlled rooms) inoperable, and potentially closing the building or parts of the building during this time. This risks in decreasing the research productivity for the users of the affected facilities and the unit overall, and could negatively contribute to the well-being of staff, PhDs and postdocs. The institute's development of a substantial multicomponent platform without the involvement of more collective platforms shared with the health and/or chemistry community in Nice may be a risk.

EVALUATION AREA 3: SCIENTIFIC PRODUCTION

Assessment on the scientific production of the unit

The scientific output of the unit is excellent. Production is quantitatively important for the unit but highly variable between teams. The unit publishes regularly in journals that are relevant in plant and insect science. Scientific production is distributed among 205 journals, reflecting the diversity of topics of the unit. Scientific production reflects a balanced involvement between leading and partnerships. Scientific production reflects the international collaborative successes of the unit. Scientific production highlights a relatively low level of interaction between teams.

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

Strengths and possibilities linked to the context

The strong expertise of the unit and its integrative expertise from gene to ecosystems are recognised internationally. 55% of ISA papers are published as lead author (1st, last or corresponding authors). 544 publications (92% of all papers) were published in journals with are registered in "Web of Science". Among them, 44 articles (7.4% of the total) were in journals with a high visibility, such as *Molecular Biology and Evolution* (1), *Nature Communications* (1), *Annual Reviews* (4), *Current Biology* (1), *Microbiome* (1) and *New Phytologist* (10) with ISA as a lead author. Overall, 42% of the papers are published in journals leaders in disciplinary topics. The journals where ISA published the most are: *Journal of Pest Science* (38), *Entomologia Generalis* (34), both

leaders in entomology, *Frontiers in Plant sciences* (27), *Scientific Reports* (21) and *New Phytologist* (17), the latter is a leader in plant sciences.

Weaknesses and risks linked to the context

While the overall quality of papers is ranked high in the scientific fields of the unit, there were no outstanding papers in generalist journals with a large readership. Overall, about 11% of publications and 4% of the book chapters were co-authored by members of at least two teams, although with high heterogeneity in the level of co-publication among teams (ranging from 4% to 50% of co-publication, with a median of 22%).

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

During the period, the ISA members have published 591 publications in peer-reviewed journals, which amounts to, taking into account dates of the arrival and the departure of the 60 permanent researchers or teacher-researchers, 1.92 publications per year per scientist (or 2.25 if taking into account only 50% research time for teacher-researchers), which can be considered quantitatively as a very good production level. The rate of articles as first or last author is very good (51% of publications). The proportion of publications with PhD students as co-authors is 22%.

Weaknesses and risks linked to the context

The number of publications per team is highly heterogenous, ranging from 22 to 181, with a median of 31 publications, which amounts to a rate of publication per team ranging from 0.69 to 13.4 publications per year per scientist (0.75 to 18.5 after correction for teacher-researchers) with a median per team of 1.61 publications per year per scientist (1.91 after correction for teacher-researchers).

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 set up a data management plan for the PlantBIOs ISC, as well as a certification of scientific procedures, and offers an IT platform for secure data storage. The ISA provides support to its staff and can turn to the INRAE-CIRAD-Ifremer-IRD Joint Advisory Committee in case of questions. The unit published in journals associated with academic institutions (*The ISME Journal*, *New Phytologist*, *Plant Journal*, *PNAS*, *Journal of Experimental Botany*, *Current Biology*, etc.), and mentions the absence of conflicts of interest. Several ISA members have cofounded or are members of the "Peer Community in" initiative. ISA participates in the deployment of INRAE's open science policy through 2 repositories. ISA applies the FAIR principles and makes data available to the scientific community in digital repositories, for example Data INRAE (<https://data.INRAE.fr/>).

Weaknesses and risks linked to the context

There seems to be no specific charter of the unit describing the unit's policy on scientific integrity (avoidance of predatory journals, vigilance advice...), nor an open scientific policy document specific to the unit (public URL of the document).

The unit does not provide the percentage of the unit's publications posted on HAL or other equivalent portals. The percentage of publications in open journals or in journals associated with academic institutions could be increased (25% of articles and 59% of books are not published in open science).

The strategy for a fair data management including open access to generated data is lacking.

EVALUATION AREA 4: CONTRIBUTION OF RESEARCH ACTIVITIES TO SOCIETY

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

ISA has developed excellent interactions with the society and economic world, both with local startups, national and international companies. The research unit has a clear strategy to contribute to the social and economic world by depositing patents and declarations of invention, contracting R&D programmes with industrial partners, launching innovative products, and also disseminating their results towards professionals of the agriculture sector and the general public. This strategy is shared among all ISA teams, with differences in the involvement level between teams consistent with the research theme of each team.

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

Strengths and possibilities linked to the context

During the evaluated period, 7 ISA teams delivered 2 patents, 15 declarations of invention and 3 softwares (including one open-source software). These innovations concern biocontrol agents or delivered compounds (e.g., compounds of Ascomycete culture supernatant to treat oomycete infections, *Anthracozytis flocculosa* strain to control fungal diseases, use of microorganisms in biocontrol, parasitoids as biocontrol agents, hydroxyphomone a new oomycide molecule), or products and services promoting plant health (*Rhizobium leguminosarum* for legume inoculation, plants with improved nematode resistance, method of mycorrhization of tomato seedlings, inactivation of the plant spliceosome protein SMD1 to increased resistance to nematodes). Most ISA teams (8) also engaged in numerous collaborations with private partners, including research contracts with the companies SYNGENTA, OLMIX and MYCOPHYTO and funding of 6 doctoral grants by the Cifre mechanism (BAYER, LIDEA and BIOLINE AGROSCIENCES).

It is worth mentioning that ISA supported the emergence of the MYCOPHYTO startup funded in 2017 by a former ISA PhD and an ISA engineer, which offers mycorrhizal fungi-based solutions to the agriculture. The FloriMed Joint Technology Unit (UMT), that was accredited in 2015 and renewed in 2020 under the joint coordination of INRAE and ASTREDHOR (plant professionals institute), develops applied research programs to design pesticide-saving crop schemes, innovative techniques to control epidemics and methodologies/tools (test area, startups, workshops) for co-innovation. Also, members of the BPI team coordinate a large private-public research-innovation network on biocontrol that groups more than 50 members.

ISA has disseminated its results via 64 publications in journals dedicated to the professionals of the agriculture sector over the evaluated period.

Ten members of ISA are experts for state agencies, including the Ecophyto plan and the National Biocontrol Deployment plan at the Ministry of Agriculture, the ANSES Specialized Committees "Biological risks for plant health" and "Plant protection substances and products, biocontrol", the ANSES "Macro-organisms useful to plants" working groups, and the National Council for the Protection of Nature (CNPN).

Finally, all the ISA teams contributed to the dissemination of scientific culture to the general public through several actions, such as the participation to local events ("La fête de la science", "La nuit des chercheurs", "Le salon de l'agriculture", "Fascination of plants day"), the development of a collaborative game where the players must apply agroecology principles in a context of limited resources ("Stal Invasions"), the facilitation of a press trip on biocontrol at ISA for a delegation of national media journalists in 2018, and the participation in the MEDITES investment program developed by the Nice University (UCA) for secondary school pupils in 2016-2018.

Weaknesses and risks linked to the context

The interactions with industrial partners are variable among teams, due to differences in their investment in basic research and applicability of the results obtained. This is logical but the development of fundamental research culture vs applied research driven by industrial or societal demands may be a risk for the research unique cohesion. A weakness in the ISA strategy toward the delivery of products to the socio-economic world is the large spreading of the team's involvement over a large number, maybe excessive, of small R&D contracts.

Another risk lies in a high level of dispersion in too many activities in interaction with the society and the economic world at the detriment of the scientific activity of the teams.

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

Strengths and possibilities linked to the context

The performance of the unit is evaluated as very good to excellent for this criterion. The unit publishes articles to professionals in letters and reviews produced by INRAE (*Le Cahier des Techniques de l'INRA*, *lettre aux entreprises de l'INRA...*) but mostly in nationally recognized professional journals edited outside (*Phytoma*). The unit produced or organized 75 publications and events for the public which give a ratio of 1.47 per scientist for 6 years. Some teams are highly productive with 16 professional publications. Events for the public include booths at science festivals, talks to conferences ("La nuit des chercheurs"), field days at INRA. Those events were impacted by the COVID-19 epidemic which dramatically decreased in events organized for the general public. This was compensated by the production of e-learning supports that started in 2020 and increased significantly, for a total of 11 during the 6-year evaluation period. One teaching book was published by a team. The unit produced 6 videos for outreach. A startup Mycophyto has been created in 2017 by a former PhD student from the unit and offer products to professionals to increase mycorrhiza symbionts, two other startups are in the process of creation. The unit valorized its research by 20 patents, inventions or licenses. The unit have extension activities toward growers. Notably they are increasing the skills of growers by teaching how to improve management of natural enemies in greenhouses and other closed structures. The unit reported significant behavioral changes with a decrease by 80% of insecticide spray by some growers reached by the extension program.

Weaknesses and risks linked to the context

The unit only produced in 6 years 67 publications for professional magazines, which gives a ratio of 1.31 per scientist/ 6 years for the whole evaluation period. In addition, the production of outreach, educational and extension documents is highly variable between teams: while one team produced 16 professional publications, some teams had none during the past 6 years. All the videos produced for outreach were all created by the same team and the same technician, and this unique skill is not shared with the whole unit.

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

Strengths and possibilities linked to the context

The unit has regular dissemination activities toward the general public. It includes the participation to national and local events on a regular basis ("Fêtes de la science", "La nuit des chercheurs", Fascination of plants today), the development of collaborative games aiming at putting players in the context of Agroecology, the interaction with journalists (2018), and the involvement in the Medites a programme coordinated by the University of Sophia Antipolis for secondary schools in priority areas. The latter is focused on two main areas, "Biodiversity of insects" and "Plant observation at different scales".

Weaknesses and risks linked to the context

The unit has limited activities toward young publics, with the exception of the MEDITES program. This could be extended to all types of high schools, and additional activities could be organized directly by the unit. This could include laboratory visits, pedagogic project targeting specifically secondary schools. The research themes of the unit are central to the present challenges of agriculture. Scientific mediation should be emphasized, such as webinars, seminars for the general public or public meetings.

C – RECOMMENDATIONS TO THE UNIT

Recommendations regarding the Evaluation Area 1: Profile, Resources and Organisation of the Unit

The panel recommends that the replacement of retiring staff should be a key focus, in order to keep essential skills and ensure continued scientific competence and international visibility. The unit should prepare a strategic plan for securing more international grants and increasing international collaborations. The unit should continue to increase the quality, as well as the number, of publications. We fully support the unit in its reorganisation of the teams and recommend that this process continue in order to increase the efficiency of the teams and the quality of research. We recommend that the unit also focuses on increasing interactions between the teams. Ways to encourage greater participation of all members in decision-making should be investigated. Communication may be improved for example by forwarding the Unit Council meeting agenda in advance to

all unit members and rapidly reporting the minutes of the meetings. Management may consider debating important issues such as the mechanisms of attributing systematic contributions of contract funds for collective purposes, with the wider community. Mechanisms to increase staff motivation and inclusivity should be considered. For example, by making information on promotion and the CIA prime information more accessible. Motivation of the technical staff is a key issue, particularly with regard to the organization of the forthcoming renovation of the building.

We recommend that a unit strategy is developed with regard to publication, choice of journals, co-author policies, open access data management and accessibility to generated data, etc. The unit should formalise all internal rules and recommendations in a document (code of conduct, "règlement intérieur"). All documents should be available in French and English. The unit should support researchers in applying for ERC funded projects and similar grants. A strong succession plan is required to replace both research and technical staff to ensure the future functioning of the organisation particularly the technical platforms.

Recommendations regarding the Evaluation Area 2: Attractiveness

Most issues in attractiveness are not in the hands of the unit (administrative issues, building issues, cost of life, etc.), and no recommendations can be done to the unit to improve it. Actions that can be taken by the unit include strategizing with researchers for the preparation of applications to ERC calls, and attract younger scientists from abroad through canvassing for candidates via international networks for applications to e.g., Marie-Curie fellowships to better maximize EU and international funding opportunities in general and across all teams, and to increase the number of postdocs in the unit. Also, the unit should develop a strategic plan for coping with the inoperable facilities during the renovation of the building infrastructure, and communicate this to all unit members. Furthermore, the committee recommends organising a regular forum for non-permanent staff, including PhDs and postdocs, to meet and discuss their research together independent of meetings organized at the unit level. Actions to help non-French-speaking PhD students and postdocs for obtaining administrative support and hosting documents in English are recommended. We encourage the unit to further pursue unit-wide and other group-level activities for increasing the moral of the unit and which could feed back into increasing the attractiveness of the unit. Activities could include unit away days, professionally organized team building activities, and informal social gatherings.

Recommendations regarding Evaluation Area 3: Scientific Production

ISA head should stimulate scientific cooperation between teams through the publications of papers, reviews, special issues and book chapters.

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

The interaction of ISA with non-academic partners appears as the sum of multiple actions conducted by researchers through rather individual actions without general policy at the institute level. It is recommended to focus interactions in order to favor a limited number of strong partnerships, aiming at developing big contracts instead of spreading over a large number of relatively small contracts with private partners. In this aim to structure its partnership with the economic world, ISA could envisage using the LabCom framework.

Overall, the production of articles toward the professional world and the general public should be increased in some team. Each team should be able to have at least one outreach article per year toward the professional world.

The TR that is responsible for all promotional videos in one team, a unique skill in the unit, could be in a position of support with the role of providing video resources for the whole unit.

It is possible that the limited number of publications to the professional world and to the general public is a consequence of the limited number of venues to publish outreach articles. To address this issue, the unit should consider producing a blog or a more stakeholder-friendly website for dissemination of knowledge for the general public and the professionals.

The unit should consider being more active on social media (Twitter, Facebook, etc.).

TEAM-BY-TEAM ASSESSMENT

Team 1: Bioinsecticides, Environnement et Santé (BES)
 Name of the supervisor: Mr Armel Gallet

THEMES OF THE TEAM

Team 1 (Bioinsecticides, Environment et Santé, BES) is studying the response of non-target organisms (*Drosophila melanogaster* as a main model) to acute and chronic exposure to biopesticides (spores of *Bacillus cereus*/*Bacillus thuringiensis*). Team 1 combines expertise in insect biology and genetics as well as cellular and molecular biology. Team 1 produces academic knowledge in the field of host-microbe interactions. In addition, Team 1 develops a rare expertise for public institutions such as ANSES.

CONSIDERATION OF THE RECOMMENDATIONS OF THE PREVIOUS REPORT

The trajectory of the team has positively evolved since the previous evaluation. According to recommendations, the team recruited PhDs (6 over the period including 2 PhD defences), increased its scientific production (15 papers including some in journals with a high visibility) and developed collaborations at regional (Centre Méditerranéen de Médecine Moléculaire, Laboratoire de Microbiologie Clinique Nice, Institut de Biologie du Développement de Marseille), national (ANSES) and international (Université Libanaise) levels.

WORKFORCE OF THE TEAM

| | |
|--|-----------|
| Permanent personnel in active employment | |
| Professors and associate professors | 0 |
| Lecturer and associate lecturer | 1 |
| Senior scientist (Directeur de recherche, DR) and associate | 1 |
| Scientist (Chargé de recherche, CR) and associate | 2 |
| Other scientists (Chercheurs des EPIC et autres organismes, fondations ou entreprises privées) | 0 |
| Research supporting personnel (PAR) | 3 |
| Subtotal permanent personnel in active employment | 7 |
| Non-permanent teacher-researchers, researchers and associates | 0 |
| Non-permanent research supporting personnel (PAR) | 1 |
| Post-docs | 0 |
| PhD Students | 4 |
| Subtotal non-permanent personnel | 5 |
| Total | 12 |

EVALUATION

Overall assessment of the team

According to the trajectory of the team since the previous HCERES evaluation, the scientific activity and production, as well as collaborative networks, are evaluated as very good. The involvement in ANSES scientific panels contributes to the visibility and recognition of the team.

Strengths and possibilities linked to the context

The team was attractive for students, especially PhDs (6 along the period). The team (5-6 permanent positions) developed a solid expertise in genetics and physiology of insects, and molecular and cellular biology which has been valorized by publications in leading journals in the considered scientific field (15 publications including some in *Development*, *PLoS pathogens*, *PLoS Genetics*, *Cell reports*). The team contributes to public health policies (ruled by ANSES) for evaluating the hazard associated with the use of biopesticides.

Weaknesses and risks linked to the context

The number of publications, specifically those led by the team's members, remains low with regards to the size of the team.

RECOMMENDATIONS TO THE TEAM

A main recommendation is to continue the effort to develop and consolidate partnerships for the study of the response of non-target organisms to biopesticides. External funding should be used as an opportunity to hire postdocs. The number of publications with a team's member in leading position should be increased. In addition, journals with a higher visibility should be prioritised. Increasing HDR holders should be an opportunity to better share PhD supervision in the team.

Team 2: Biologie des Populations Introduites (BPI)

Name of the supervisor: Ms Élodie Vercken

THEMES OF THE TEAM

The BPI team addresses fundamental and applied questions in relation to biological invasions, with insects as model organisms, using a wide combination of approaches such as individual-centred modelling, approximate Bayesian computation inferences, population genomics, molecular barcoding identification, mesocosms experiments, and phenotypic analyses. Fundamental questions tackled by the team include the exploration of the role of stochastic processes in population expansion models, and whether purging of deleterious mutations is an important property of invading populations. Applied questions are associated with specific invasive insect populations, and comprise the search for their origin and invasive routes, as well as means of developing biological control against them.

CONSIDERATION OF THE RECOMMENDATIONS OF THE PREVIOUS REPORT

The BPI team has contributed positively to the follow-up of some of the general recommendations of the previous committee, i.e., improving attractiveness to foreign postdocs and fostering interdisciplinary collaborations between teams. In particular, the team has shown exemplary attractiveness to foreign postdocs, with four (50%) postdocs/visitors hosted in the team during the period coming from foreign countries. Also, the team has been very actively collaborating with other teams during the period, in particular with teams 10 and 11, with e.g., 16 (30%) publications in common with either or both teams and 9 national projects developed in common. Although the proportion of publications with international colleagues has been improved (accounting for 51% of the publications), the involvement in international research projects remains limited.

WORKFORCE OF THE TEAM

| | |
|--|-----------|
| 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 | 0 |
| Other scientists (Chercheurs des EPIC et autres organismes, fondations ou entreprises privées) | 0 |
| Research supporting personnel (PAR) | 8 |
| Subtotal permanent personnel in active employment | 11 |
| Non-permanent teacher-researchers, researchers and associates | 0 |
| Non-permanent research supporting personnel (PAR) | 0 |
| Post-docs | 0 |
| PhD Students | 2 |
| Subtotal non-permanent personnel | 2 |
| Total | 13 |

EVALUATION

Overall assessment of the team

The BPI team has produced a very good to excellent scientific activity, with original results on the biology of invasions obtained using cutting-edge approaches in population genomics and demographic modelling. The indicators of scientific production are very good (2.0 articles/researcher/year, 55 articles in very good to excellent specialized journals of the field, 66.5% led by the team). The team has shown an excellent capacity to obtain competitive research funds (e.g., 2 ANR young researcher projects funded), although mostly at the national/regional level, and to attract PhD students (7 students hosted during the period). The outreaching activities are excellent with several projects and PhD theses developed in collaboration with private companies involved in pest biocontrol and with an important scientific mediation activity.

Strengths and possibilities linked to the context

The BPI team is using cutting-edge approaches in population genomics and Bayesian statistical inference to address fundamental and applied questions on a key component of global change affecting biodiversity, the process of biological invasions. The large majority of the publications are involving collaborations at the international (e.g., with the USA, Chile, Spain) or national level.

The BPI team has a very good publication record with 55 peer-reviewed articles (2.0 per year per researcher, including one "Ingénieur de Recherche") on the period, published in specialized journals of the entomology, ecology and biodiversity conservation domains, with very good statistics of citations (38 citations on average for the ten most cited publications). The proportion of publications leads by the team (first and/or last author) is high (65%). The team has also developed two biocontrol products, protected by exploitation licenses.

The team shows an excellent capacity to obtain funding in competitive calls such as ANR (2 ANR JCJC funded in the period) and PIA (2 projects from IDEX UCA^{Jedi} coordinated by the team), mostly national, although two EU-funded FP7 projects coordinated by the team were completed during the period. The team also obtained contracts with private companies involved in pest biocontrol in the field of plant protection (e.g., Bioline Agrosience, biobest), including a Cifre-funded thesis project.

The team provides excellent hosting conditions and training for non-permanent members. Indeed, the team hosted 7 PhD students and 8 postdocs/visitors during the period, which all contributed to the scientific production of the team (they are associated with 51% of the team's publications). All PhD students, except two ongoing theses, published at least one paper as a first author, and 30% of the publications of the team have a former PhD student as the first author. Half of the postdocs/visitors were from foreign countries, which underlines the international attractiveness of the team.

The team has strong interactions with the socio-economic world, through its involvement in developing studies and tools for pest biocontrol. The team is also coordinating intersectoral actions and projects at the national (launching a national consortium on biocontrol) and international (previous EU FP7 projects) on research and innovation in this field.

Remarkably, the team is collectively highly involved in initiatives to promote open science and scientific integrity. The team has shown strong involvement in the development of the "Peer Community In" initiative, with a deliberate choice of avoiding targeting journals with high and unjustified cost of publication. The team has also produced publications or other types of communications on ethical issues, such as the problem of conflicts of interest in research conducted on GMO plants, or on economic issues, such as the underestimation of the cost of pesticides use in crop production.

Weaknesses and risks linked to the context

Although the proportion of publications with international colleagues is relatively high (51%), the involvement in international research projects is limited. Also, the strategy to select virtuous publication vectors in terms of economic model and transparency may be at risk in terms of visibility, especially for PhD students and young researchers.

RECOMMENDATIONS TO THE TEAM

The team should seek opportunities to foster international contacts and to lead or participate to international projects. The team should consider adapting its strategy of choice of publication vectors for PhD students and young researchers in order to increase their international visibility.

Team 3: Écologie des Communautés dans les Agrosystèmes (CEA)

Name of the supervisor: Mr Nicolas Desneux

THEMES OF THE TEAM

The CEA team's overarching theme is plant protection in agroecosystems, which breakdowns into 4 main axes of research: i) Formalization of biotic interactions in model agroecosystems and identification of multitrophic complexes important in integrated pest management; ii) Plant-mediated bottom-up trophic interactions and impact on pests and natural enemies; iii) Biopesticides of natural origin and off-target effects; iv) Biocontrol services, particularly of service plants for use in the support of natural enemies.

CONSIDERATION OF THE RECOMMENDATIONS OF THE PREVIOUS REPORT

"Interactions between all axes (including Biocontrol services), as well as interactions with other teams should be reinforced."

The team has joint funding of projects (5 listed) and papers co-authored with other teams (7 papers).

"The team should yet improve its reputation at the national and international level through participation/organization to conferences. This could improve its attractiveness to postdocs."

The team has participated at international conferences (74 in total), received a total of 14 invitation, and participated in organization of colloquiums.

"Development of interactions with the socio-economic environment (criterion 3) could be a way to become more involved in continued education programmes."

There is no evidence provided that this recommendation was specifically addressed.

"There is missing expertise in mathematical and computational biology and ecology as well as in molecular biology. All efforts should be made in order to bring the expertise required for the new plan to the team as soon as possible. In the meantime, this expertise could be sought through collaborations."

There is no evidence provided that this recommendation was specifically addressed. However this does not seem to be an issue.

WORKFORCE OF THE TEAM

| | |
|--|----------|
| Permanent personnel in active employment | |
| Professors and associate professors | 0 |
| Lecturer and associate lecturer | 1 |
| Senior scientist (Directeur de recherche, DR) and associate | 1 |
| Scientist (Chargé de recherche, CR) and associate | 0 |
| Other scientists (Chercheurs des EPIC et autres organismes, fondations ou entreprises privées) | 0 |
| Research supporting personnel (PAR) | 2 |
| Subtotal permanent personnel in active employment | 4 |
| Non-permanent teacher-researchers, researchers and associates | 0 |
| Non-permanent research supporting personnel (PAR) | 0 |
| Post-docs | 0 |
| PhD Students | 2 |
| Subtotal non-permanent personnel | 2 |
| Total | 6 |

EVALUATION

Overall assessment of the team

Overall, the team is excellent to outstanding in regard to their outstanding level of production through scientific publications, excellent success with competitive grant funding, and excellent project participation at the international level through an established network of collaborators. Despite the small size of the team, they have been highly successful, though it is a major weakness for the long-term stability of the team. The anticipated merger with the ESIM team is promising.

Strengths and possibilities linked to the context

The outstanding production and high-quality level of the team are demonstrated by the publication of 185 articles in international A-ranked journals with 54% and 28% in exceptional and excellent journals, respectively (based on INRAE 2020 reference system, NORIA), and in consideration of the small size of the team (1 MCF and 1 DR since 2021). Publications include research and review articles, and 22.4 citations on average per article (535 citations per year). A member of the team was a highly cited researcher across four years of the period. A total of 69 papers were first/last authored by the team, and 29 included PhD students as co-authors (more than 71 including MS, PhD and postdocs according to the report), and notably there was 1 co-author paper in PNAS and 2 (1 last author and 1 co-author) in *Sci Total Environ* (based on excel table). The team also published three book chapters and submitted 7 PhD theses. The average number of publications by PhDs and postdocs was 5.5 and 9, respectively, during the period. The team also produced 3 patents.

The team is significantly involved at the international level. They have participated at international conferences (75 in total), and received a total of 14 invitation (e.g., ICBC 2018, Beijing; BES-SFE joint meeting, Liverpool, UK; ICE2016, USA), and also serve on journal editorial boards (e.g., *Journal of Pest Science, Scientific Reports*), and participate in organization of colloquiums (e.g., ICBC 2018, EAB 2021). The team has a successful network of foreign collaborators, such as current projects with collaborators from CAAS China, Imperial College UK, University of Calabria Italy, and University of Lavras Brazil. Most published articles (97%) including foreign collaborators as co-authors.

The team has a notable number of projects funded by local (Université Côte d'Azur, INRAE), national (CASDAR, ANR) and international (FP7, H2020, USAID) bodies, resulting in a total of 1358 k€ of funding (national, 494K euro; international, 811 k€; industrial, 53 k€). Of the 12 funded contracts (1 international, 5 EU and 6 National), the team is coordinator of 3 EU and 1 national grant (based on excel table). The team also collaborates with other teams within the unit, demonstrated by joint funding of projects (5 listed) and papers co-authored with other teams (7 papers).

CEA has good access to MS and PhD students through the link by the team member whom is an MCF and co-directs the BOOST MS degree at UCA. PhD students completed their degrees on average in 3.6 years with the exception of one student out of 8. The team significantly engages with the general public through written press, film ("Silence ça pousse" at the Villa Thuret on plant defenses), school and other visits (e.g., Botanical visit of the Valrose park), and a member is the current president of Société française d'Écologie.

Weaknesses and risks linked to the context

As the size of the team is currently small (1 DR, 1 MCF, 1 IE, 1 TR) and that 3 permanent members of staff are due to retire within the next 8 years, this could jeopardise the long-term stability and productivity of the team. In addition, most of the contract funding is from 1 researcher in the team. Another issue is that the number of open access papers is only 37% (64 papers), which could decrease the potential of research dissemination. Furthermore, as the team is located at two different sites, this could lead to difficulties with organization and functioning. There is also an overall lack of funding directly from the industry, and which may limit maximum funding potential.

RECOMMENDATIONS TO THE TEAM

The team needs to put in place a long-term strategy to cope with future retirements. Consideration of canvassing for excellent candidates (from national and international networks) to apply for open DR and CR INRAE competitions is recommended. In order to increase the number of open access papers, the team could consider increasing grant budgets for covering related fees and could consider publishing in Peer Community In. The team should also consider pursuing direct industrial funding by the approaching of industrial partners from previous and current projects.

Team 5: Évolution et Spécificité des Interactions Multitrophiques (ESIM)
 Name of the supervisor: Ms Marylène Poirié

THEMES OF THE TEAM

The ESIM team research focuses on the specificity of multitrophic interactions that involves insects, their bacterial symbionts and their parasitoid wasps. Main research interests are (1) to understand how bacterial symbionts may influence the insect immune response, (2) to study hosts/parasitoids coevolution (3) to investigate the evolution of parasitoid venoms as a function of environment and host species, (4) to investigate the information exchange between host and parasitoid. The work is performed using two different models: a pea Aphid and *Drosophila* species and their wasps endoparasitoids.

CONSIDERATION OF THE RECOMMENDATIONS OF THE PREVIOUS REPORT

The team which had a very rich and diverse research activity is currently focusing on the study of venoms and parasitoids as recommended.

The team has participated in the organization of conferences.

Interactions with the non-academic world are mentioned but have not been developed. The team specifies that its research remains very fundamental for the time being.

WORKFORCE OF THE TEAM

| | |
|--|----------|
| Permanent personnel in active employment | |
| Professors and associate professors | 1 |
| Lecturer and associate lecturer | 0 |
| Senior scientist (Directeur de recherche, DR) and associate | 1 |
| Scientist (Chargé de recherche, CR) and associate | 1 |
| Other scientists (Chercheurs des EPIC et autres organismes, fondations ou entreprises privées) | 0 |
| Research supporting personnel (PAR) | 4 |
| Subtotal permanent personnel in active employment | 7 |
| Non-permanent teacher-researchers, researchers and associates | 0 |
| Non-permanent research supporting personnel (PAR) | 0 |
| Post-docs | 0 |
| PhD Students | 0 |
| Subtotal non-permanent personnel | 0 |
| Total | 7 |

EVALUATION

Overall assessment of the team

The team output is considered very good to excellent in terms of publications and good in terms of contributions to the society. The team has published 26 ACLs (20 in leading positions) and has acquired an international recognition in the study of the multitrophic interactions between insects and their parasitoids. Most notably, the team has developed innovative research to understand the evolution of parasitoid venom. The team has also hosted 5 PhD students. However, the team had recently limited success in obtaining funding in competitive calls and in integrating young scientists. The team is very good in fundamental research but has not implemented significant contribution to the society resulting from their results.

Strengths and possibilities linked to the context

The ESIM team has developed original and diverse approaches that use biochemistry, cellular and molecular biology, as well as various types of omics data to evaluate the multitrophic interactions between insects and their parasitoids. They develop integrative approaches in order to understand the complex interspecific interactions with an evolutive perspective. Consequently, the team has acquired a very good international recognition in the field of insect immunity and of the evolutionary biology of parasitoids.

The ESIM team has a very good publication record with 26 articles (in average 6 ACL/ permanent researcher during the period), published mainly in specialized journals of the research domain, but also in more general ones such as scientific reports or BMC genomics. The articles were in average cited 12 times during the period (43 times for the most cited one), with a large variance between articles. Also all PhD students and postdocs have participated in the articles (16 articles for PhD and 2 for postdocs out of 26). The team has hosted 5 PhD students during the period which are first authors in 11 ACL.

The ESIM team also had a very good capacity to get funded in competitive calls (454k€ during the period, 1 ANR Blanc and 1 KBBE project, 1 PIA). Five projects are developed in collaboration with at least one other team of ISA.

The team has developed interactions with economic partners on parasitoids in the frame of the DROPSA (FP7 project) and with a local company (nixe) to evaluate the potential role of biostimulant on the legumes/ aphid interactions. The team has therefore developed some non-academic interactions and prospects in terms of possible applications, but research is clearly very much upstream of product development for the socio-economic world.

The team participates to different communication events such as science festival, researchers' nights, and is involved in the interactions with students of secondary schools.

The team makes genome sequencing and transcriptomics data available for the scientific community.

Weaknesses and risks linked to the context

The team production relies essentially on two scientists and is therefore not well balanced between the 4 different researcher/ teachers of the team.

The team used to obtain ANR and European projects, but these were obtained during 2014 and 2017. The team has not obtained new funding on selective calls (Europe, ANR) since 2017. There is no foreign postdoc recruited during the last suggesting a low international attractiveness. Integration of young researchers seems challenging (departure of the chair of excellence and publication records of young permanent scientists of the team).

Given the research themes developed, parasitoid of insects, that could lead to important applications, the interaction with the industry is not sufficiently developed. The team mentions that this could be an outcome of the FP7 project DOPBA, but there is no indication of time for releasing potential applications. The team contribution is mainly devoted to the understanding of the mechanisms that may drive the success of the strategies developed by partners. There is no specific strategy to develop interaction with socio-economical partners.

RECOMMENDATIONS TO THE TEAM

The permanent researchers and EC are over 55 years old, it is necessary to anticipate how the projects will be continued after researcher retirement, even though the merging with the CEA team may help to secure the projects. However, CEA and ESIM expertise are complementary. The ESIM team should identify ways to maintain the scientific expertise necessary for its project.

The team should work to better integrate young scientists and to attract international postdocs.

The team should develop interactions with growers and companies for a better valorisation of its research results.

Team 6: Multi-performance des cultures horticoles protégées (FIORIMED)
 Name of the supervisor: Ms Christine Poncet

THEMES OF THE TEAM

The focus of the team is on applied interdisciplinary research aimed at the development of and innovation transfer to agricultural systems.

CONSIDERATION OF THE RECOMMENDATIONS OF THE PREVIOUS REPORT

This team was not assessed in the previous evaluation period as it was established in 2021, and previously part of the M2P2 team.

WORKFORCE OF THE TEAM

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

EVALUATION

Overall assessment of the team

The overall assessment of this team is fair, considering that there is very little reported in terms of research productivity, funding and outreach since the actual creation of this team in 2021. This team will likely be disbanded in the next period due to further staff departures or restructuring.

Strengths and possibilities linked to the context

During this evaluation period, members that compose this new small team created in 2021 (based on personnel table in the excel file and table 2 in the report), produced 16 publications in international peer-reviewed journals (1 publication in 2021), which all include co-authors of international collaborators. This translates to 2.67 articles per researcher (1 IR) per year. Also, members of the team were involved in the production of 16 articles (1 in 2021) in professional or technical journals, a synthesis book for professionals in collaboration with 2 other teams

and 6 videos/tutorials produced on the information system developed. Members were also involved in various animations (e.g., interviews (1 in 2021), written press, interactions with society), and a member participated in colloquium organization (Chile-France Academic Forum 2021). There was also collaboration with the companies MANE (2015-2020) and URBASOLAR (2020-2021), and a member of the team is a co-founder and scientific advisor of MYCOPHYTO, which was founded in 2017.

Weaknesses and risks linked to the context

This team has limited resources, in terms of staffing (1 IR, 4 TR) and funding (112 k€; source/use and if obtained since 2021 is unknown) since its creation in 2021. Team members were historically involved in the FioriMed UMT (Mixed Technological Unit), which was created in 2015 and renewed in 2020 for another 5 years. However, this UMT has since been discontinued. The research theme of the team is disjoint with that of the other teams in the unit.

RECOMMENDATIONS TO THE TEAM

It is recommended that team members continue to seek out opportunities for repositioning.

Team 7: Défense des Insectes (ID)

Name of the supervisor: Ms Christine Coustau

THEMES OF THE TEAM

The overall research interest of the team is the study of the genomic of insecticide resistance and detoxification mechanisms in aphids and fall armyworms. The team is also studying insect physiological responses to parasitoids and to plant defenses. The main biological system of the team is the fall armyworm *Spodoptera frugiperda*. However, the team also published different papers on other pests including mollusk or *Drosophila*.

CONSIDERATION OF THE RECOMMENDATIONS OF THE PREVIOUS REPORT

There was no specific recommendation from the previous evaluation in the document provided.

WORKFORCE OF THE TEAM

| | |
|--|-----------|
| Permanent personnel in active employment | |
| Professors and associate professors | 1 |
| Lecturer and associate lecturer | 0 |
| Senior scientist (Directeur de recherche, DR) and associate | 2 |
| Scientist (Chargé de recherche, CR) and associate | 1 |
| Other scientists (Chercheurs des EPIC et autres organismes, fondations ou entreprises privées) | 0 |
| Research supporting personnel (PAR) | 5 |
| Subtotal permanent personnel in active employment | 9 |
| Non-permanent teacher-researchers, researchers and associates | 1 |
| Non-permanent research supporting personnel (PAR) | 0 |
| Post-docs | 1 |
| PhD Students | 1 |
| Subtotal non-permanent personnel | 3 |
| Total | 12 |

EVALUATION

Overall assessment of the team

The overall assessment of the team is very good. The scientific production is very good with some articles in well respected journals (1 in *Biotechnology Advances*, 1 in *Trend in Parasitology*). They have a very good international recognition as shown by the regular invitations to international congresses, and participation to books and reviews. They also contribute significantly to the genome annotation consortium and are recognized for their expertise in the P450 cytochromes. They had a limited number of PhD students and postdoctoral researchers. Despite the fact that the team chooses to mainly focus on fundamental research, their interaction with the non-academic world is very good.

Strengths and possibilities linked to the context

The team is well staffed with 5 technicians and engineers for 2, and 3 since 2020, researchers. Recently an IR obtained her HDR. The team has several collaborations with international teams: the team is involved in 6 genome annotation consortiums; the team participated to a population genetics study for the fall armyworm that has been published in *Nature, Ecology and Evolution*. The team has obtained a research funding for a PhD student in collaboration with Bayer (Cifre funding). The team publishes in journals adapted to their research field, with some article as primary author in very high-ranked journals (1 in *Biotechnology Advances*, 1 in *Trend in Parasitology*). The team produced 4 book chapters in the last 6 years which is excellent. The team has a good visibility: the articles published as lead authors have in average 12.30 citations/ year. While the teams had a little number of PhD students (3); they all graduated in 3 years, and the two that graduated have found a permanent position in the private sector. Similarly, the sole postdoc that had an appointment over a year for the last 6 years co-authored 8 papers, which is outstanding. The team is doing a good effort in having the articles that they lead in open access (60%). The reviews published by the team are highly cited, with 44 citations for a review article published in 2021 in *Pesticide Biochemistry and Physiology* and 116 citations for a review article published in 2020 in *Biotechnology Advances*. The team was on 11 successful research grants that altogether totalized 766 k€ (547 k€ for the project where a member of ID was the leader within the unit). The team maintains collaborations with professional world through talks at the "Journées d'échanges sur les résistances aux produits de protection des plantes", 4 articles in professional magazine (3 in the *journal Phytoma*, and 1 in the *Revue Grain*) and expertise on insecticide resistance management throughout the country.

Weaknesses and risks linked to the context

Although the team has a very good publication record (31 over 6 years), the members of the team are in leading positions (first, last or corresponding author) on less than half of these publications (48%). This situation impacts the productivity of the PhD students: among the 3 PhD of the previous contract, only one published 2 articles during his thesis, while for the two others, one didn't publish a single article, and the other one only one as first author (2 in total). Also, the team has only trained 3 PhD students, and one postdoc more than one year. Among the 11 projects (that only amount to 766 k€) to which the team is participating, team members are Principal Investigator in only 2 research grants for a total of 148 k€. Additionally, the team is not really engaged in outreach activities with no production for the public or educational products. Also given the team expertise, they could implement more industrial partnerships (only one on the last period) and implement an insecticide resistance monitoring program nationwide or at least in the region.

RECOMMENDATIONS TO THE TEAM

The team should develop strategies to increase the number of PhDs and postdocs for example by applying specifically to funding for PhD students (region; INRAE) or by including PhD students' money in ANR or European calls. The team should lead more research projects. This would, furthermore, help to increase the number of PhDs and postdocs. The team should increase its outreach activity through a higher number of publications in professional magazines or educational products.

Team 8: Interactions Plantes-Nématodes (IPN)

Name of the supervisor: Mr Pierre Abad

THEMES OF THE TEAM

The IPN team, likely the biggest of all teams at ISA, develops innovative transdisciplinary (molecular genetics, -omics, cell biology, genetics and ecology) and multi-scale (from the gene to the field) research on plant-nematode interactions, so that to understand the mechanisms underlying these interactions and derive new sustainable control strategies. One of the particularities of the team is to develop research on both the pathogen and the host. There are three main axes of research: 1. Plant responses in the course of compatible interactions (i.e., when nematodes can colonise the tissues), 2. Evolutionary and adaptative aspects of parasitic nematodes, and 3. Plant resistance durability and agroecological levers to enhance the durability of resistance. The team is one of the few in France addressing these important pathogens.

CONSIDERATION OF THE RECOMMENDATIONS OF THE PREVIOUS REPORT

None specifically addressed to the team.

WORKFORCE OF THE TEAM

| | |
|--|-----------|
| Permanent personnel in active employment | |
| Professors and associate professors | 0 |
| Lecturer and associate lecturer | 4 |
| Senior scientist (Directeur de recherche, DR) and associate | 5 |
| Scientist (Chargé de recherche, CR) and associate | 2 |
| Other scientists (Chercheurs des EPIC et autres organismes, fondations ou entreprises privées) | 0 |
| Research supporting personnel (PAR) | 5 |
| Subtotal permanent personnel in active employment | 16 |
| Non-permanent teacher-researchers, researchers and associates | 0 |
| Non-permanent research supporting personnel (PAR) | 0 |
| Post-docs | 1 |
| PhD Students | 4 |
| Subtotal non-permanent personnel | 5 |
| Total | 21 |

EVALUATION

Overall assessment of the team

The ISA team is globally excellent, with outstanding level of recognition at the international scale and long-lasting collaborations with national and international partners, outstanding publication record, and high success rate to competitive calls at all scales, from region to international. Despite its focus on basic research, the team has an excellent interaction with the socio-economic world. The loss of technical staff and anticipated loss of four researchers is a major issue for the team.

Strengths and possibilities linked to the context

The team is one of the few in France addressing these important pathogens, which are nematodes. In a globally small community at the international scale, it has a high reputation due to its track records and its success in competitive calls. Its numerous (141) articles appear in excellent to outstanding journals (*New Phytologist*, *Molecular Ecology*, *Nature Genetics*, *Nature communications*, *PloS Genetics*, *PLoS Pathogens*, *Annual Review Phytopathology*, and 75% of them were co-published with foreign colleagues. The team develops both basic and applied research and it has been pretty successful in getting funded via competitive grants.

Weaknesses and risks linked to the context

While claiming to have an important focus on applied research, the team only had two CASDAR-funded projects, five applied research contracts (3 at the European level: GONEM, INTERLUDE and SYSTEMIC; and 2 SuMCROP metaprogram projects: MultiServ and CREA), and two Cifre PhDs. The average number of publications per scientist is high, and it has to be noticed that more papers are signed by numerous researchers of the team, substantiating the scientific interpersonal interactions within the team. One EC who joined the team in Feb. 2020 appears to have no publication since its integration in the team. The team currently only has only three persons in charge of technical support and lost four of these last years. In the next period, four scientists will be leaving (and one additional has been nominated in the directory board of the Plant Health INRAE division). This loss of expertise and human strengths is a major threat for the team.

RECOMMENDATIONS TO THE TEAM

The committee recommends pursuing the research effort developed in the evaluated period and to maintain the balance between basic and applied research. The team should take care of the impact of future retirements, and reorganization linked to the creation of GAME emerging team.

Team 9 : Interactions Plantes-Oomycètes (IPO)

Name of the supervisor: Mr Franck Panabières

THEMES OF THE TEAM

IPO team research activity aims to decipher the mechanisms underlying interactions between plants and oomycetes. It develops genetic, molecular, biochemical and cellular studies on both partners of the interaction using the model plant *Arabidopsis* and *Solanaceae* of agronomic interest, and telluric or aerial oomycetes. Specific skills are brought together for integrated studies of oomycete pathogenicity and plant responses. Team IPO has also developed interdisciplinary approaches in collaboration with physicists and chemists to study the movement of zoospores in the rhizosphere. In addition, the team contributes to structuring the scientific community in INRAE and on the Sophia Antipolis Campus through multidisciplinary actions.

CONSIDERATION OF THE RECOMMENDATIONS OF THE PREVIOUS REPORT

The two main recommendations made to the team in the previous evaluation report were to focus on a restricted number of key research topics and to publish in higher reputation journals to reach the outstanding level. None of these recommendations have been addressed. In addition, it was recommended to make an effort to increase the number of HDRs, but this was not implemented during the evaluated period.

WORKFORCE OF THE TEAM

| | |
|--|-----------|
| Permanent personnel in active employment | |
| Professors and associate professors | 0 |
| Lecturer and associate lecturer | 0 |
| Senior scientist (Directeur de recherche, DR) and associate | 4 |
| Scientist (Chargé de recherche, CR) and associate | 2 |
| Other scientists (Chercheurs des EPIC et autres organismes, fondations ou entreprises privées) | 0 |
| Research supporting personnel (PAR) | 6 |
| Subtotal permanent personnel in active employment | 12 |
| Non-permanent teacher-researchers, researchers and associates | 0 |
| Non-permanent research supporting personnel (PAR) | 0 |
| Post-docs | 2 |
| PhD Students | 2 |
| Subtotal non-permanent personnel | 4 |
| Total | 16 |

EVALUATION

Overall assessment of the team

The IPO team is mainly engaged in basic research. Its scientific productivity is very good. The academic reputation of the team is excellent and its national and international recognition is a clear strength that allowed it to maintain fruitful collaborations. The team has a good production towards the socio-economic world.

Strengths and possibilities linked to the context

The team valorized its research activity by 22 publications in excellent journals of Microbiology, Plant Science and Biochemistry and Molecular Biology (e.g., *Microbiome*, *Cell Host & Microbe*, *Frontiers in Microbiology*, *PLoS Pathogens*, *New Phytologist*, *FEBS Journal*), of which 17 publications as first or last author. It is worth mentioning that, among these 22 publications, 10 were published with members of other ISA teams (mainly teams ID and IPN), 5 with other research units on the Nice Campus, and 13 with French and foreign researchers.

The team clearly benefits from national and international recognition as illustrated by its participation to several national and international consortia (OMGN, international genome sequencing consortium; PHARE; INDRES; Franco-Chinese International Associated Laboratory on Agroecology and Green Agriculture Development).

The team has been very successful in the acquisition of local funding, including the two large projects SOLSTICE (structural project for the competitiveness) and the Idex UCAIEDI "Chaire d'Excellence", and national INRAE programs (5 during the period). In addition, a member of the team is responsible for ISA participation at two ANR projects (Plant epidermis responses to invading cells, 2014-2018, STRESS-PEPT, 2021-2024, work-package coordinator).

In the last contract period, the attractiveness of the team led to host a researcher from Yunnan University for 1 year, 5 postdoctoral fellows and 5 PhDs, among which 1 foreigner and 2 from other French Universities.

The team has shown its potential to interact with the socio-economic world. It participates to the great SOLSTICE project funded by the French PIA (Programme d'Investissements d'Avenir) together with another team of the unit, other research institutes and private partners. The patent published during the previous contract period has been valorized through Bpifrance (Banque Publique d'Investissement) funding. The team valorizes the collection of several hundred *Phytophthora* spp. strains, unique in Europe, in collaborative projects with institutional and private partners, in France and abroad.

The team has significantly participated in outreach activities towards a large public (presentation of ISA activities through posters, videos, games; notes within the INRAE department communication tools; interactions with school pupils within the MEDITES project led by UCA).

Weaknesses and risks linked to the context

Given the number of permanent researchers (6) and technical staff (6) more publications and/or of a higher reputation should have been produced. On the 6-year period evaluated, the production corresponds to 0.6 paper/year/full time equivalent scientist, and no publication has appeared in a generalist journal or an outstanding specialized one. Despite its international recognition based on its publications, the team does not develop a significant activity at the international level: only 2 editorial boards (1 in an *MDPI journal* and 1 in *Scientific Reports*, Springer), no involvement in scientific societies, only 3 participations at workshop organization (2 labex meetings and 1 French scientific "root days"), and no invitation in a foreign laboratory. Despite real partnerships developed over the years with private companies, the team had only one three-year contract to develop a product of interest for the socio-economic world during the evaluation period (characterization and evaluation of the efficiency of new biocontrol and biostimulation agents, NIXE company, 35k€). The team has seemingly very low or null involvement in teaching at the university, which cannot be justified by the fact that no assistant professor or professor is a member of the team. This lack of investment towards higher education may be a risk with regards to good student attractiveness.

RECOMMENDATIONS TO THE TEAM

The team should focus its research activity in order to strengthen its basic research activity in a limited number of key topics. In the highly competitive field of oomycetes-plants interactions, the team should build on their original skills and interdisciplinary approaches. They should increase the quality level of their best publications up to the specialized journals of the highest reputation in their domain and generalist journals. With regards to its applied research activity, the team is encouraged to reinforce its industrial partnerships with the aim that products arising from their results can be more actively developed.

Team 10: Modèles et Méthodes pour la Protection des Plantes (M2P2)

Name of the supervisor: Mr Ludovic Mailleret

THEMES OF THE TEAM

The M2P2 team addresses fundamental and applied questions in relation to crop protection using essentially theoretical approaches such as modelling or development of statistical methods for data analysis. The team also uses experimental approaches on arthropods and develops tools for automation of analyses of experimental data. The team brings together expertise on applied mathematics, plant physiology, community ecology, evolutionary biology and epidemiology. The questions raised by their work are related to a better understanding of the dynamics and evolution of crop pest populations in order to develop innovative and environmentally friendly plant protection methods.

CONSIDERATION OF THE RECOMMENDATIONS OF THE PREVIOUS REPORT

The M2P2 team has contributed positively to the follow-up of some of the recommendations of the previous committee. In particular, the team has shown very good attractiveness to foreign postdocs or visiting scientists, with three (75%) postdocs/visitors hosted in the team during the period coming from foreign countries. Also, two (25%) PhD students were foreigners. The team has been very actively collaborating with other teams during the period, in particular with teams 2 and 8, with 12 (21%) publications in common with other teams and 12 national projects developed in common.

WORKFORCE OF THE TEAM

| | |
|--|-----------|
| Permanent personnel in active employment | |
| Professors and associate professors | 0 |
| Lecturer and associate lecturer | 0 |
| Senior scientist (Directeur de recherche, DR) and associate | 2 |
| Scientist (Chargé de recherche, CR) and associate | 3 |
| Other scientists (Chercheurs des EPIC et autres organismes, fondations ou entreprises privées) | 0 |
| Research supporting personnel (PAR) | 5 |
| Subtotal permanent personnel in active employment | 10 |
| Non-permanent teacher-researchers, researchers and associates | 0 |
| Non-permanent research supporting personnel (PAR) | 0 |
| Post-docs | 1 |
| PhD Students | 4 |
| Subtotal non-permanent personnel | 5 |
| Total | 15 |

EVALUATION

Overall assessment of the team

The M2P2 team has a very good to excellent overall research activity well equilibrated between the production of original fundamental results, contributions to training of PhD students, and involvement in interactions with the socio-economic world and science mediation to the general public.

Strengths and possibilities linked to the context

The M2P2 team is using up-to-date mathematical and computation biology approaches, as well as innovative experimental approaches on arthropods to produce original results of fundamental and applied interest. A large majority of the publications are involving collaborations with other laboratories, mostly at the national level. The team is strongly involved in a joint project team (Biocore) on crop protection, sponsored by Inria, with other national laboratories with expertise in applied mathematics and computer science.

The M2P2 team has a very good to excellent publication record with 57 peer-reviewed articles (1.9 per year per researcher) on the period, mostly published in specialized journals of the mathematics and computation biology, applied mathematics, ecology, and plant science domains, although two papers were published in general journals (*Nature Communications* and *Plos One*). The team shows a high rate of publication porting, with a member of the team as first and/or last author of 71% of their publications.

The team has also developed an experimental device protected by exploitation license, a double spiral arena, to characterize arthropod dispersal behaviour. It has also delivered software for data analysis.

The team is co-leading an Inria international associate team with several universities of Cameroon on epidemiological modelling for tropical agricultural pests control. It is also leading an ANR project involving partners of the Chinese Academy of Agricultural Sciences. At the national level, the team shows a very good capacity to obtain funding from several sources (ANR, two projects coordinated by the team; several PIA Idex UCA projects coordinated; INRAE Department SPE; Ecophyto). It also obtained a contract with a private company involved in pest biocontrol in the field of plant protection (Bioline Agrosience).

The team provides excellent hosting conditions for PhD students, with 8 theses hosted during the period (three are still ongoing). All PhD students, except two ongoing theses and one thesis defended, published at least one paper as a first author, and 25% of the publications of the team have a former PhD student as the first author. Two PhD students (25%) were foreigners. The team also hosted two postdocs.

The team has very good interactions with the socio-economic world, through its involvement in projects dedicated to evaluating strategies for pest biocontrol. In particular the team is participating to projects supported by the Ecophyto plans and to the national consortium on biocontrol which both involve agricultural interprofessional agencies as well as biocontrol and seed companies. The team has also produced technical notes in the professional press.

The team has an excellent activity of mediation towards the general public through participation to several science fairs (in particular with strong involvement of PhD students), to school animation, as well as to press conferences on biocontrol.

The team is collectively involved in initiatives to promote open science and scientific integrity, with involvement in the development of the "Peer Community In" initiative.

Weaknesses and risks linked to the context

The committee did not identify obvious weaknesses. Although the team has strong expertise in relation to hot topics in the context of sustainable development, which is well recognized at the national level, the international collaborations and co-publications (20% of all publications) are somewhat still limited. Also, the team has hosted only a few postdocs (two during the period).

RECOMMENDATIONS TO THE TEAM

Although the publication record is very good to excellent, the team should continue to focus on higher reputation publications in order to gain a stronger international reputation. This would increase the attractiveness of the team for foreign PhD students, visiting scientists and postdocs, which also could contribute to increasing opportunities to participate in international collaborative projects.

Team 11: Recherche et Développement en Lutte Biologique (RDLB)

Name of the supervisor: Mr Nicolas Ris

THEMES OF THE TEAM

The team topics are organized around 3 main axes: the team aims to decipher the link between biological control and population biology, in close collaboration with the BPI team; the second axis concerns the taxonomic characterization of pests and/or beneficials; the third axis concerns the phenotyping of biological control agents. As mentioned in the portfolio, the team progressively built up the Egg Parasitoids Collection BRC, certified ISO9001:2015 for the characterization, conservation and dissemination of resources. The EP-Coll BRC is also well established in the national system with a driving role within the "Environment" pillar of the RARe national infrastructure (<https://www.agrobrc-rare.org/>) and the accreditation of the GIS IBI SA (<https://www.ibisa.net/>). The RDLB team has a particular positioning within the Sophia Agrobiotech Institute: its activities spread over a wide range of Technology Readiness Level (TRLs) between 3 and 6).

CONSIDERATION OF THE RECOMMENDATIONS OF THE PREVIOUS REPORT

The RDLB team addressed the recommendations made in the previous evaluation:

"Well thought reinforcement of the internationalization of the activities of the team and thus of its reputation should help with its visibility and attractiveness."

The team has a good publication activity (around 30 articles in international peer-reviewed journals) but does not intend to internationalize its activities.

"The interaction of the team with the socio-economic environment is very good."

It is still the case.

"The team might create joint specialization programmes for ongoing education, with other teams of the unit that are also lacking in this area."

The team has co-supervised 3 PhD students with other teams and two other PhD supervision began during the period.

"Efforts to plan replacement for the leaving staff should be a priority. The committee recommends to try to hire new permanent staff and attract more non-permanent staff (PhD and postdoctorate students, temporary technical support), increase funding, develop a plan to renew infrastructure and increase the surface. Reinforced sharing of essential tasks among technical staff at the unit level should be considered to ensure the sustainability of the Ep-Coll center."

The team has recruited 1 scientist, but he will retire in 10 years. They should continue to try to recruit young scientists. The team has increased its funding over the last two years. However, the high activity of the team staff remains a reality.

WORKFORCE OF THE TEAM

| Permanent personnel in active employment | |
|--|-----------|
| Professors and associate professors | 0 |
| Lecturer and associate lecturer | 0 |
| Senior scientist (Directeur de recherche, DR) and associate | 1 |
| Scientist (Chargé de recherche, CR) and associate | 0 |
| Other scientists (Chercheurs des EPIC et autres organismes, fondations ou entreprises privées) | 0 |
| Research supporting personnel (PAR) | 10 |
| Subtotal permanent personnel in active employment | 11 |
| Non-permanent teacher-researchers, researchers and associates | 0 |

| | |
|---|-----------|
| Non-permanent research supporting personnel (PAR) | 2 |
| Post-docs | 2 |
| PhD Students | 1 |
| Subtotal non-permanent personnel | 5 |
| Total | 16 |

EVALUATION

Overall assessment of the team

The overall assessment of the team is very good tending to excellent. The scientific production is very good to excellent (28 scientific papers, 3 books, 2 scientific and technological resources, 1 instrumental and methodological development) regarding the team composition (11 permanents, but only one DR who arrived in 2019, one IR and 9 "PAR"). The team has excellent production towards the socio-economic world (24 products for the professional world and 5 products for the general public). The financial support is very good to excellent and stable over the period evaluated (200 to 350 k€/year).

Strengths and possibilities linked to the context

The team has a very good scientific production (28 articles and 3 books, 2 scientific and technological resources, 1 instrumental and methodological development) and has developed several collaborations within ISA with co-supervision of PhD students, but also with non-academic actors. It has developed inventions that can be economically valued (6 patents). This includes the genetic optimization of the parasitoid *Trichogramma brassicae* and identification molecular kit for thrips identification. The work of the team includes the releases of the parasitoid *Torymus sinensis* that allowed an increase of chestnut production. The team has obtained funding through 16 successful calls for projects, with an increase in the last two years (around 200 k€/year for 2016-2019, and around 350 k€/year for the last two years). The team has a strong activity in disseminating results to the agronomic world and the general public (24 products for the professional world and 5 products for the general public). The team has hosted or co-supervised 5 PhD students and 2 Postdocs. In addition, the team promotes current technicians and engineers by offering them the possibility to pursue a PhD. They collaborate with 5 other teams within ISA that allowed to be included in 9 different research projects. The team works directly with growers and stakeholders, as well as with 4 experimental stations (AREFLEC, CREAM, La Tapy, La Morinière), 2 organisms for territory protection (FREDON et FDGDON), and 3 private companies (BIOLINE Agrosociences, BIOBEST et KOPPERT). This work with stakeholders is supported by 24 articles destined to the professionals, most of them (11) published in the professional review Phytoma. Their research is developed in different sites across the French territory, highlighting the national recognition of the team.

Weaknesses and risks linked to the context

The team has little involvement in teaching (as for example Licence, Master, DUT, BTS or Engineer schools). The team is mainly composed of "PAR" staff (only 1 senior scientist (DR, 55 years old) + 1 IR) and has no MCF or Professor to support teaching activities. The team has little number of collaborations with international teams and is only on one European research project. The technical staff has been reduced by 50% in the last two years.

RECOMMENDATIONS TO THE TEAM

The team should strive to recruit an additional researcher (MCF or CR), this would be beneficial, as he or she will be able to host additional postdocs and PhDs. An MCF would have the advantage to disseminate technical competences through teaching at the UCA. Given the excellent national recognition and the specific technical skills (egg parasitoid collections, thrips taxonomy and barcoding tools), the team should open more to international collaborations, in particular being included in more European and/or international research projects.

Team 12: Symbiose et état redox de la cellule (SYMBIOSE)

Name of the supervisor: Mr Pierre Frendo

THEMES OF THE TEAM

Research in the symbiosis team focusses on atmospheric nitrogen-fixing symbiosis between legumes and soil Rhizobia. In particular, this team investigates the role of cellular redox state, in determining the efficiency of symbiosis, studying the redox regulation systems in both symbiotic partners. A key aim is to determine the mechanisms associated with nodule senescence. A variety of complementary interdisciplinary methods are used for these studies. A recent focus is the tripartite interaction between *Medicago truncatula*, *Synorhizobium melliloti* and aphids.

CONSIDERATION OF THE RECOMMENDATIONS OF THE PREVIOUS REPORT

The recommendations from the previous report have been taken into consideration.

WORKFORCE OF THE TEAM

| | |
|--|-----------|
| Permanent personnel in active employment | |
| Professors and associate professors | 2 |
| Lecturer and associate lecturer | 5 |
| Senior scientist (Directeur de recherche, DR) and associate | 2 |
| Scientist (Chargé de recherche, CR) and associate | 2 |
| Other scientists (Chercheurs des EPIC et autres organismes, fondations ou entreprises privées) | 0 |
| Research supporting personnel (PAR) | 2 |
| Subtotal permanent personnel in active employment | 13 |
| Non-permanent teacher-researchers, researchers and associates | 0 |
| Non-permanent research supporting personnel (PAR) | 0 |
| Post-docs | 1 |
| PhD Students | 7 |
| Subtotal non-permanent personnel | 8 |
| Total | 21 |

EVALUATION

Overall assessment of the team

The Symbiose team has very good to excellent publication record with 40 papers and 8 book chapters during the reporting period. This team has a very good to excellent international reputation and its contribution to our current understanding of the "redox regulation of symbiosis" is widely accepted. The team has also provided key information related to the regulatory mechanisms associated with nodule senescence. Scientists from this team are invited to present their results in national and international conferences and have therefore a very good to excellent international visibility.

Strengths and possibilities linked to the context

The team has a strong international reputation and shows strong leadership within the field. Leaders and innovators in these themes at the world level in their biological model. The work in phase with strong societal expectations, interaction with actors of the non-academic world which is strengthened with a Plant2Pro project and an exploitation license.

The team has varied and complementary methodologies and scientific rigor. The team budget is well organised. The Symbiosis team has strong scientific skills in the field of plant physiology and microbiology. Team members have strong involvement in the initial training of the Université Côte d'Azur with heavy responsibilities of the team members within the UCA.

Weaknesses and risks linked to the context

The scientific production is very good but limited because of the high time consuming teaching. There are only few postdocs and PhD students. The capacity to attract postdoctoral students is not sufficiently important. The team is composed of 11 scientists but only 2 technicians. There is apparently no resources from international sources. The age pyramid within the team will be a crucial issue in the coming years.

RECOMMENDATIONS TO THE TEAM

The team should continue to focus on high-quality publications and increase its international visibility. The team should strive to attract more PhD students and postdoctoral scientists. The team should make a plan for the replacement of retirement staff. The team should try to obtain international funding.

CONDUCT OF THE INTERVIEWS

Dates

Start: 11th January 2023 at 8:00 a.m.

End: 13th January 2023 at 6:00 p.m.

Interview conducted: on-site

INTERVIEW SCHEDULE

| Start | Duration | End | Status |
|-------|----------|-----|--------|
|-------|----------|-----|--------|

Day 1: January 11, 2023

Part 1: Scientific presentations

| | | | |
|-------|-------|-------|--|
| 08h30 | 00:15 | 08h45 | Introduction (Hcéres Scientific Advisor) Open |
| 08h45 | 00:30 | 09h15 | General presentation of the Research Unit: organization and scientific policy (Philippe Castagnone) Open |
| 09h15 | 00:15 | 09h30 | Discussion with the committee Open |
| 09h30 | 00:20 | 09h50 | Team 1 Bioinsecticides, Environnement et Santé (Armel Gallet) Open |
| 09h50 | 00:10 | 10h00 | Discussion with the committee Open |
| 10h00 | 00:20 | 10h20 | Team 2 Biologie des Populations Introduites (Elodie Vercken) Open |
| 10h20 | 00:10 | 10h30 | Discussion with the committee Open |
| 10h30 | 00:20 | 10h50 | Break |
| 10h50 | 00:20 | 11h10 | Team 12 Symbiose et état redox de la cellule (Pierre Frendo) |
| 11h10 | 00:10 | 11h20 | Discussion with the committee Open |
| 11h20 | 00:20 | 11h40 | Team 5 Évolution et Spécificité des Interactions Multitrophiques (Jean-Luc Gatti) Open |
| 11h40 | 00:10 | 11h50 | Discussion with the committee Open |
| 11h50 | 00:40 | 12h30 | First closed Hcéres committee meeting Closed |
| 12h30 | 01:00 | 13h30 | Lunch break |
| 13h30 | 00:20 | 13h50 | Team 6 Multi-performance des cultures horticoles protégées (Christine Poncet) Open |
| 13h50 | 00:10 | 14h00 | Discussion with the committee Open |
| 14h00 | 00:20 | 14h20 | Team 7 Défense des Insectes (Christine Coustau) Open |
| 14h20 | 00:10 | 14h30 | Discussion with the committee Open |
| 14h30 | 00:20 | 14h50 | Team 8 Interactions Plantes-Nématodes (Pierre Abad) Open |
| 14h50 | 00:10 | 15h00 | Discussion with the committee Open |
| 15h00 | 00:20 | 15h20 | Team 10 Modèles et Méthodes pour la Protection des Plantes (Ludovic Mailleret) Open |
| 15h20 | 00:10 | 15h30 | Discussion with the committee Open |
| 15h30 | 00:15 | 15h45 | Break |
| 15h45 | 02:00 | 17h45 | Second closed Hcéres committee meeting Closed |

Day 2: January 12, 2023

| | |
|-------------------|---|
| 09h00 00:20 09h20 | Team 9 Interactions Plantes-Oomycètes (Eric Galiana) Open |
| 09h20 00:10 09h30 | Discussion with the committee Open |
| 09h30 00:20 09h50 | Team 11 Recherche et Développement en Lutte Biologique (Nicolas Ris) Open |
| 09h50 00:10 10h00 | Discussion with the committee Open |
| 10h00 00:20 10h20 | Team 3 Écologie des Communautés dans les Agrosystèmes (Nicolas Desneux) Open |
| 10h20 00:10 10h30 | Discussion with the committee Open |
| 10h30 00:30 11h00 | Break |
| 11h00 01:30 12h30 | Third closed Hcéres committee meeting Closed |
| 12h30 01:00 13h30 | Lunch break |

Part 2: Meetings with lab members

| | |
|-------------------|--|
| 13h30 00:45 14h15 | Meeting of the committee with (Associate) Professors and Researchers (DR, CR, IR, IE) (except direction) Closed |
| 14h15 00:45 15h00 | Meeting of the committee with the technical (AI, TR, AT) & administrative staff (in French) Closed |
| 15h00 00:45 15h45 | Meeting of the committee with PhD students & Post-docs Closed |
| 15h45 00:15 16h00 | Break |

Part 3: Meetings with Funding bodies representatives and Unit Head

| | |
|-------------------|--|
| 16h00 00:30 16h30 | Meeting of the committee with the CNRS, INRAE and UCA representatives (CNRS: Cécile Bousquet-Antonelli; INRAE: Marie-Hélène Ogliastro and Thomas Nesme; UCA: Noël Dimarcq) Closed |
| 16h30 00:30 17h00 | Meeting of the committee with the Research Unit Director and members of the Codir (Philippe Castagnone, Pierre Frenedo, Christine Coustau, Thibaut Malausa, Catherine Auguet-Chadaj) Closed |
| 17h00 01:00 18h00 | Fourth closed Hcéres committee meeting Closed |

Day 3: January 13, 2023

Part 4: Committee final debriefing

| | |
|-------------------|--|
| 09h00 03:30 12h30 | Final Hcéres committee meeting Closed |
| 12h30 01:00 13h30 | Lunch break |
| 15h00 | Departure |

GENERAL OBSERVATIONS OF THE SUPERVISORS

Hcéres

**Evaluation campagne 2022-2023
(group C)**

Objet : C2023-EV-0755361V-DER-PUR230023193-RT

Sophia Antipolis, 12 June 2023

General comments on the Institut Sophia Agrobiotech (ISA) evaluation report

I have received the ISA evaluation report covering the period 2016-2021, drawn up by an expert committee under the aegis of Hcéres, and based on an analysis of the self-evaluation report and several interviews with ISA members. This outside view provides us with a rich and valuable basis that will help us reinforce the strategic orientations of the unit for the next 2024-2028 contract. The Codir of ISA would like to thank the evaluation committee, the Hcéres staff and all ISA colleagues who worked hard for this evaluation.

We have appreciated the positive points highlighted by the committee, including:

- the scientific objectives of ISA evaluated as excellent;
- the recognition of the strong international profile of the unit and its high level of scientific production at the interface of agriculture and the environment;
- the functional and dynamic team structure assessed as excellent;
- the quality of our interactions with the society and economic world rated as excellent.

These strategic and organizational policy elements reinforce the Codir in the direction given to the project for the next five-year contract.

We generally agree with most of the comments and recommendations made by the committee, which will provide useful input in the frame of our collective reflection on both the future scientific orientations and functional organization of the unit. We believe that we are already able to face some of these challenges in the immediate future, summarized below:

- *“a worrying decrease at international grants obtained during the period and an insufficient focus on European grants”*

We readily acknowledge a decline in our participation in European projects over the period under review. This point has been noted internally, and the teams have made significant efforts to improve access to such funding. This trend can be illustrated by several large projects that

have been positively evaluated and funded by the EU very recently, for which we got the results after the committee's visit:

- NEM-EMERGE (Research and Innovation Action): "An integration set of novel approaches to counter the emergence and proliferation of invasive and virulent soil-borne nematodes";
- ROOT-BENEFIT (COST Action): "Beneficial root-associated microorganisms for sustainable agriculture";
- ACROPICS (Staff Exchanges - Marie Skłodowska-Curie Action): "Agroecological crop protection: towards international co-innovation and evidence of sustainability".

- *"the Institute's development of a substantial multicomponent platform without the involvement of more collective platforms shared with the health and/or chemistry community in Nice"*

Because of the specificity of our research activities in plant sciences, it is true that some of our facilities are difficult to integrate into the local health and chemistry platforms (e.g., the experimental greenhouses or the EpiColl Biological Resource Center). However, PlantBIOs has been aiming for many years to join the dynamics of the Nice platforms, especially when technological approaches and tools were shared. Indeed, this integration is today well established for some of the PlantBIOs components, e.g.:

- the microscopy component belongs to the MICA (Microscopy Côte d'Azur) platform, which is IBiSA labelled;
- the biochemistry component is involved in the CAPABIO initiative to pool together metabolic and proteomic forces in the PACA-Est region;
- our strong involvement in the coordination of the EquipEx 4D-Omics project, a high-performance computing and omics data storage infrastructure for the PACA region.

This integration implies coordination and complementarity with the health and chemistry communities in terms of investment choices, cross-access to all our facilities, and sharing and upgrading the skills of our staff. In addition, we are continuing in this direction with (i) an ongoing reflection on more advanced integration of our biochemistry skills and devices, in particular with the Institut de Chimie de Nice (ICN); (ii) the integration of PlantBIOs quality approach towards ISO 9001 certification with the same approach taken by MICA, and the hosting of MICA's Capilog database on PlantBIOs servers; and (iii) our involvement in the ongoing reflection on the structuring of bioinformatics strengths within the Université Côte d'Azur (UCA) perimeter.

As highlighted by the committee, we also have collectively identified two risks that could have a significant impact onto the unit's future:

- *"the age structure that encompasses a significant number of forthcoming retirements that may incur a loss of expertise"*

We are well aware that a loss of expertise will occur in the short term, particularly in the area of scientific skills around the functional study of interactions. In addition to the requests for new permanent positions addressed to our supervisory bodies, we are exploring all possibilities that could enable us to welcome new skills at ISA. For example, among the most promising options, we can already mention an INRAE Junior Professor Chair (CPJ) (the results of the competition


have just been published: Dr. Silvia Bottini has been awarded and will join ISA next September or a Labex Signalife Excellence Chair as part of the UCA^{Jedi} IDEX. However, to this respect, the recent positioning of CNRS as a secondary supervising body of ISA also raises questions (and concerns).

- *“the constraints of the poor infrastructure of the building and the ongoing renovation”*

We are fully aware of the current and future problems associated with the building's malfunctioning and the major work required to remedy them (expected duration 18 months). These dysfunctions affect both the quality of our scientific activities and the quality of working life for all the unit's staff. In this respect, the resilience of the staff is to be acknowledged. Given the scale of the renovation work, the final decisions rest with INRAE's General Management. However, in close coordination with the PACA Centre Support Services, the unit is making every effort to find temporary solutions that will enable us to wait for the end of the renovation work in degraded but acceptable conditions (e.g., redeployment of some activities, installation of temporary Algeco offices, additional air-conditioning of some sensitive premises). Particular attention will be paid to experiments linked to non-permanent staff projects (PhD students and post-doctoral researchers).

Finally, as an UMR under the joint supervision of UCA, we regret that the "teaching" aspect of our activities was not addressed as such, either in the self-evaluation document or during the committee's visit, even though it represents a significant part of the scientific activities of most ISA teams.

Philippe Castagnone, on behalf of ISA Codir



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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



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