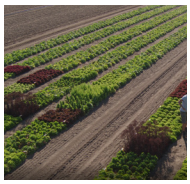









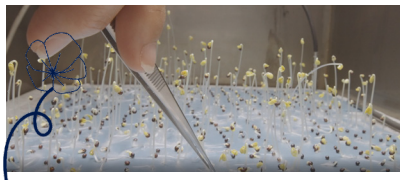



ANNUAL REPORT 2021

GEVES
Expertise & Performance

FOREWORD

Responding sustainably to economic, environmental, food security and health issues are major objectives of the transition to agroecological agriculture.

Plant breeding and crop diversification are important levers to facilitate the transformation and transition to healthier and more sustainable systems.

The new version of the “Seeds and Plants for Sustainable Agriculture” plan published by the French Ministry of Agriculture and Food in November 2021, as well as the INRAE 2030 and GEVES Ambition 2030 strategic plans provide a cohesive framework of analysis and work priorities for the future.

In particular, 2021, the fiftieth anniversary of GEVES, is the first year of deployment of the GEVES Ambition 2030 strategy, which confirms GEVES’ commitment to contribute ever more effectively to the excellence of the seeds sector in support of the agroecological transition, at national, European and international levels.

Preparing for the future means contributing to discussions and analysis in support of public policies, with a view to a renewed European law and implementing the “Farm to Fork” strategy in the area of seeds and plants.

Preparing for the future means increasing investments in research and development, modernisation, safety and adaptation of working means, whether it be equipment, facilities or IT tools.

Preparing for the future means continuing the deployment of national reference laboratories and the development of methods and international standards, and playing a major, recognised role in guaranteeing the quality of seeds used in France or exported abroad.

GEVES, the French national examination office, has carried out its missions in a delicate context due to the continued COVID-19 pandemic.

We owe this very positive 2021 report to the investment of GEVES's staff. Despite the difficult context, numerous actions, innovations and tests were carried out in support of the seed and plant sectors. We thank the GEVES staff most sincerely for their efforts.

I would also like to express my sincere thanks to Christian Huyghe, for his 11 years as Chairman of the GEVES Board of Directors from 2010 to 2021, during which time he has been been integral to GEVES's trajectory.

We hope you enjoy reading this annual report.

Patrick FLAMMARION
Chairman

Alain TRIDON
CEO

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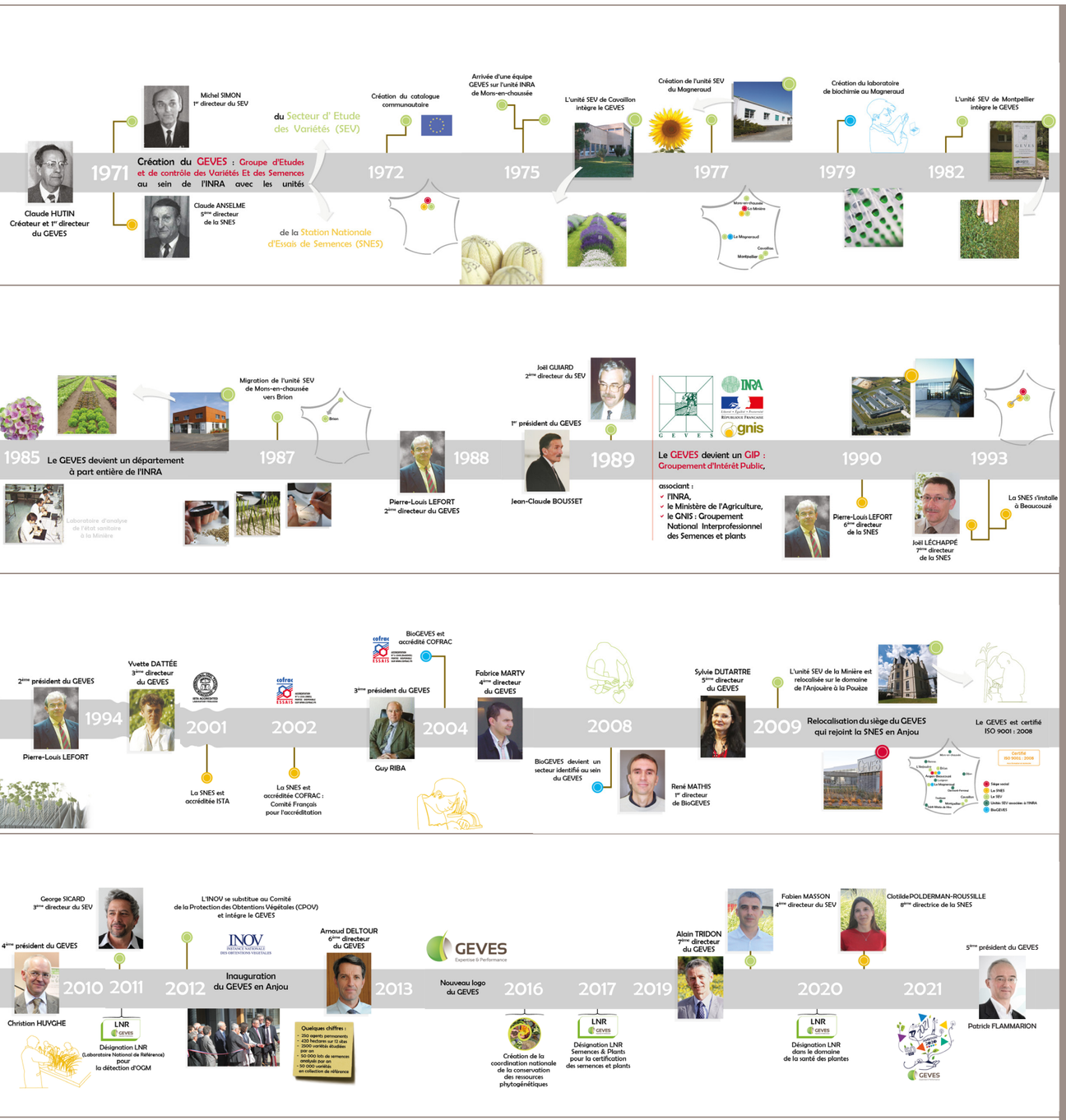
50 years of GEVES



Contributions from former GEVES CEOs

Claude Hutin (1929-2005)
(1st CEO of GEVES 1971-1994)

Extract of comments collected by D. Poupardin in Versailles, 13 March 1996

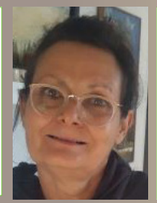
At the end of the 1960s, international negotiations took place on plant variety rights, in which I participated. This was mainly the field of Mr. Bustarret, Mr. Mayer and Mr. Laclavière who was head of the INRA general affairs department at the time and was in charge of the legal aspects...

Fabrice Marty
(CEO of GEVES 2004-2008)

I was appointed Director of GEVES in July 2004 and finished my mandate on 31 August 2008. When I took office, GEVES had been very stable for more than a decade. I had been informed of the internal organisational difficulties and of the scientific dynamics promoted by my predecessor Yvette Dattée...

Pierre-Louis Lefort
(CEO of GEVES 1988-1994)

Having left GEVES 17 years ago, my account of this 50th anniversary will be more historical than prospective [...] Assessing genetic progress (VCU), verifying the reality and novelty of plant varieties proposed for national listing (DUS), controlling the quality of commercial seed (SNES)...



Sylvie Dutartre
(CEO of GEVES 2008-2013)

The beginning of the 2009-2013 period was marked by the relocation to the Anjou region, moving the Head Office from Paris and creating a new experimental station [...] Between 2009 and 2013, GEVES proposed to extend VCU to VCUS, and to develop, test and implement new protocols, which were often more complex than those for more traditional trials to evaluate the agronomic and technological value of varieties...

Yvette Dattée
CEO of GEVES 1994-2004

I arrived at GEVES in 1991, as scientific director, at the suggestion of Jean Marrou and Pierre Louis Lefort, who was director at the time. I was then appointed CEO in 1994. I was at GEVES for three mandates at La Minière until 2004...

Arnaud Deltour
(CEO of GEVES 2012-2019)

GEVES has learned to communicate and share its expertise! Arnaud DELTOUR was CEO of GEVES from 2012 to 2019 and, on the occasion of GEVES' 50th anniversary, looks back on his experience and his vision of GEVES in the past and in the future...

National, EU & international partners

Paul Vialle
(CEO of INRA 1996-2000, President of the CTPS 2000-2014)

GEVES is celebrating its 50th anniversary this year! In 1981, when I arrived at INRA as Deputy CEO, GEVES was 10 years old and still in its infancy, whereas the institute already had a 35-year history...

Martin Ekvad
(President of the CPVO 2011-2021)

Martin Ekvad is the President of the Community Plant Variety Office (CPVO), the Euro-pean Union agency responsible for administering the community plant variety rights system. He has held this position at the CPVO since 2011. Before becoming President, he was Head of the Legal Unit of the CPVO from 2003...

Peter Button
(Vice Secretary-General of UPOV)

More than 300,000 titles of protection have been granted to new plant varieties around the world. This diversity of plant breeding and large number of varieties means that cooperation in the examination of the Distinctness, Uniformity and Stability ("DUS") is crucial for an efficient, international system that is accessible and affordable for all types of breeders...

Steve Jones - President of ISTA
(International Seed Testing Association)

Steve Jones spoke to GEVES about his past and future work with GEVES. With over 20 years of experience at ISTA and collaboration with many of GEVES's colleagues over the years, Steve Jones shared his thoughts on the highlights of the past 50 years, and the challenges of tomorrow...

Read the complete articles at the link below:

GEVES 50th Anniversary

Preparing for the future

With today's rapidly evolving agricultural and ecological landscape, defining a strategy for the next ten years was an important step to strengthen the coherence and efficiency of GEVES's activities, to help prioritise them, and to adapt them to the realities of tomorrow. This strategy is the result of a collective reflection based on numerous internal contributions, external interviews conducted with multiple public and private partners, and exchanges with the GEVES Board of Directors, which approved it on 8 July 2020.

GEVES Ambition 2030 expresses GEVES's commitment to contribute to the excellence of the plant and seeds sector in the support of the agricultural and ecological transition at national, EU and international levels

Read the Ambition 2030 strategy (French version only)

A strategy for the next 10 years

GEVES AMBITION 2030

Our strategic goals

1. Innovate in plant variety and seed testing for the agricultural and ecological transition
2. Consolidate our independant and reliable expertise
3. Promote variety registration, seed quality testing, plant variety protection and the conservation of plant genetic resources
4. The people at the heart of GEVES
5. Strengthen efficiency, sustainability and exemplarity at GEVES

Our ambition

To be the European leader in plant variety and seed testing for the agricultural and ecological transition.

To be efficient, sustainable and exemplary in the performance of our missions.

To develop innovative and reliable testing methods and promote them at national and international level.

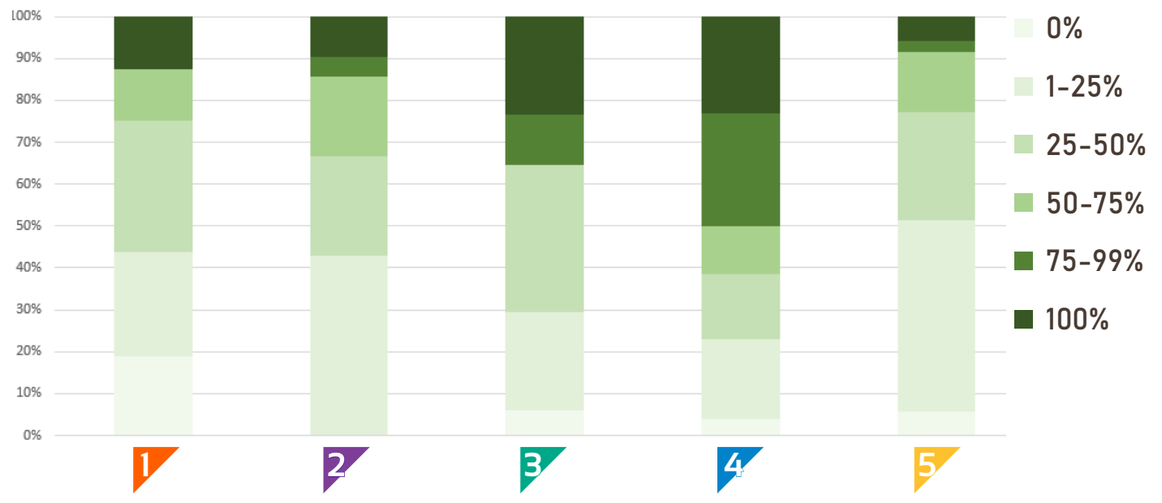
To offer quality expertise in support of public policies and stakeholders in the agricultural and food sectors, through the scientific and technical skills of our agents.

2021-2023 Action Plans for the GEVES Ambition 2030 strategy

Examples of actions that have been completed:

- Draft the GEVES rules of procedure and update the GIP general regulations
- Set up a scientific coordination unit
- Develop, validate and formalise the testing methods for the NRL seed mandate
- Promoting the GEVES Ambition 2030 strategy note: publication of the video
- Consolidate the monthly publication of a newsletter
- Renew the teleworking agreement and support its implementation
- Assess greenhouse gas emissions
- Assess waste generated

Implementation of 2021-2023 action plans



Key figures in 2021

VARIETY TESTING

SEED QUALITY TESTING

FIELD TESTING

3423 lots
Variety checks
for certification

3455 cycles
of DUS studies
for all species

1261 cycles
of VCUS studies
pfor agricultural species

Plant Variety Protection (PVP)

PVP & National Listing

National Listing

Other examination offices

Plant variety rights delivered by CPVO & INOV

669 new vaieties listed in the French Catalogue in 2021

66 215
variétés en collections

Vegetable **29 586**
Ornamental **3 052**
Agricultural **33 577**

160 host/pest combinations for variety resistance testing

Biomolecular and biochemical tests

13000
for listing & PVP

Variety resistance tests

3475
for listing & protection

4314 for private clients

Inoculum production: 1925

58 research projects

LABORATORY TESTING

89 280 tests

32 634
Germination quality

27 120
Physical quality

21 737
Seed health

6 565
Pest detection using molecular biology

31 training sessions
183 tainees

23 Laboratory proficiency tests
536 participants
3 500 samples prepared

14 Laboratories audited
7 remote audits

PHENOTIC SEMENCES & PLANTES
59 000 images and **630 000** seeds analysed
using 2D/3D x-ray & automatised germination curves

€30.6m budget
- R&D 10%

360 staff members

250 host/pest combinations for seed health

462 hectares of experimental fields

16 371 m² of greenhouses & tunnels

2725 m² laboratories

More than **900** visitors welcomed

24 oral presentations

22 publications

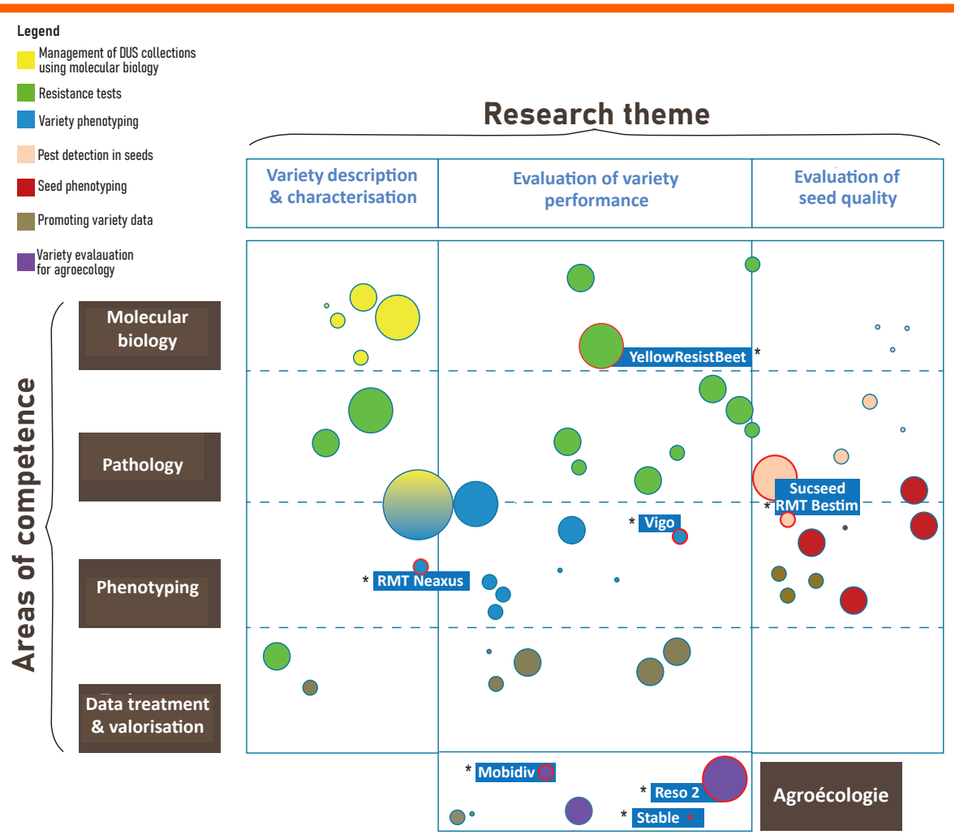
11 Newsletters

Social media

Enhancing knowledge on seed & variety evaluation

GEVES, thanks to its expertise and R&D capacities, is stepping up its investments to adapt its variety and seed evaluation methods in order to contribute to the essential challenges of the agricultural and food sector, and the necessary agricultural transition, and benefit from the possibilities offered by new technologies. It devotes 11% of its resources to these R&D projects, most of which are conducted in partnership with other French or European stakeholders.

58 GEVES research projects/actions in 2021 including 8 new projects*



A network to develop the use of digital technologies in farming: NAEXUS

The goal of the 'NAEXUS' Mixed Technology Network, which was set up on 1 January 2021, is to create an ecosystem of research, development and training partners to structure the monitoring of digital solutions It aims to develop methods and platforms for evaluating these tools by supporting their expertise in the field, in order to prepare the future professions in agriculture for the current digital revolution. GEVES is co-leading a task with Arvalis on methods for evaluating digital solutions in experimental networks. In 2021, a first seminar on evaluation methods and needs in terms of technology evaluation highlighted the difficulty of imagining, even for relatively simple cases, the evaluation of a digital solution. This led and led to a new seminar in February 2022 on the subject of "Evaluation, a lever for adopting digital technologies?" At the same time, it was decided to co-draft a methodological guide for evaluating the benefits and potential of using a digital tool; drafting is currently underway.

RMT NAEXUS

Avec la contribution financière du compte d'affectation spéciale développement agricole et rural CASDAR

MINISTÈRE DE L'AGRICULTURE ET DE L'ALIMENTATION
Liberté
Égalité
Fraternité

Find out more:

Characterising the genetic diversity of Mediterranean Brassica species for sustainable production: BRASEXPLOR project

BRASEXPLOR, a project supported by European funding, brings together 12 partners from 7 countries, for three years from 1 September 2020.

Led by INRAE - IGEPP in Rennes (https://www6.inrae.fr/brasexplor), it aims to research the genetic determinants of adaptation to climate change by exploring the genetic diversity of cabbage and turnip. These two species, originating from the Mediterranean basin, are present in the form of wild and farmed populations over a climate gradient from northern France to the sub-Saharan zone. The crossing of these species, nearly 7,500 years ago, gave rise to rapeseed, the world's third largest oilseed. *Brassica rapa* and *Brassica oleracea* are species with varied plant morphotypes, either leaf or root, at the heart of a rich and diversified human diet (Fig.2). The consortium plans to collect and propagate wild populations from the North Atlantic coast to the southern Algerian desert and local varieties from the contributing countries in order to characterise the genetic diversity available over a large climatic gradient. GEVES will contribute to the phenotyping of the hundred or so accessions per species. They will be collected by the partners and multiplied under the same conditions by the UMR IGEPP, focusing on the germination and early growth stages under favourable conditions or hydro-thermal stress in order to quantify the adaptation of populations to climate change.

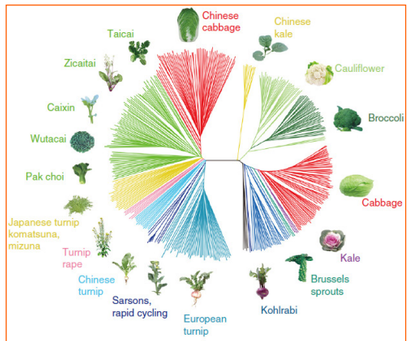
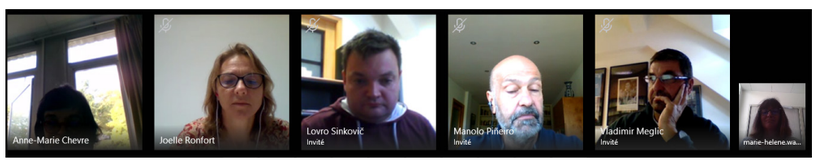


Fig. 2: Phylogenetic tree of *Brassica rapa* (left) and *Brassica oleracea* (right)



Kick-off meeting online on 9-10/09.

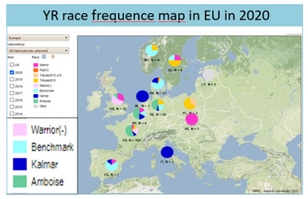
Improving variety testing methods and information available on variety performance: INVITE project (INnovations in plant Varlety Testing in Europe)

More than 100 participants met in November 2021 for the second meeting of the European INVITE project, in order to discuss the progress of this project in the development of phenotyping tools, molecular markers and innovative variety testing methods. Within the framework of this project, GEVES participated in two VCU-type trial networks in 2021: maize at the Magneraud station and soft wheat at the Anjouère station. Phenotyping tools (drones, connected stakes and poles, earboxes) were tested to assess plant vigour and size, as well as cob characteristics for maize, and fusarium symptoms for wheat. These trials will be repeated in 2022 to confirm the interest of these envirotyping and phenotyping tools. GEVES has provided historical variety data, which is analysed with the aim of identifying agro-pedo-climatic zones on a European scale, and to improve the prediction of variety behaviour in a range of environments and growing conditions. GEVES has also led a group of users and suppliers of variety data, in order to propose ways to work on the exchange of this data.




VCUS trials to study epidemiology of cereal rusts: Rustwatch project

For the past three years, GEVES has participated in the EU H2020 project Rustwatch, led by the University of Aarrhus in Denmark, the objective of which is to develop an early warning system for cereal rusts in Europe. GEVES is leading a task contributing to the identification of new virulences of yellow rust races present in variety trials conducted in 18 countries across about 80 locations: symptom ratings with a common rating scale, and collection of rust isolates on a harmonised differential host range for laboratory identification of races by the Global Rust Reference Center or INRAE. GEVES presented the progress of this work to the European VCU group and to the EUCARPIA Cereal Biotechnology and Breeding Conference. In 2021, RUSTWATCH has in particular allowed the identification of new races of yellow rust and a better knowledge of the development of black rust. A European survey on the evaluation of varietal resistance to black rust has been launched by GEVES among the registration offices. This information will be useful for calibrating the variety testing system in relation to rusts. The data acquired by GEVES on variety resistance to wheat rusts has been used in a database, Diverciland, developed by INRAE, which allows the conversion of national scales into a standard scale, allowing the comparison of resistance scores between each country. Rustwatch has thus made it possible to begin harmonising evaluation protocols and to make progress in terms of sharing variety data at EU level.



Find out more:

Researching bio-inspired solutions for seed protection and stimulation: SUCSEED project

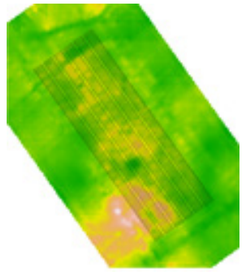
Launched in January 2021 for 6 years, SUCSEED aims to develop innovative and bio-inspired solutions for the protection and stimulation of oilseed rape, tomato, bean and wheat seeds by proposing 3 actions:

1. Induction of seed defences,
2. Steering the seed microbiota,
3. Modulation of the microenvironment of germinating seeds.

This covers methodological development, regulatory support and the study of the perception of these innovations by the industry and society. The project is coordinated by the IRHS research unit and funded under the "Cultivating and Protecting Differently" priority research programme. It brings together a consortium of 20 public-private partners and service providers, including GEVES. GEVES will be particularly involved in methodological development in relation to the pathosystems worked on in the project and the evaluation of germination under different conditions. The year 2021 was marked by the official launch of the project, through a first meeting to present the project and its objectives, which brought together more than 70 people, and the start of the research and associated methodological development work. The progress of the project will be presented to all the partners and associated service providers each year at an annual meeting to present the results.

Experimenting in more heterogeneous environments: OPTIRES project

Funded by the CASDAR Seeds and Plant Breeding programme, the OPTIRES project involves GEVES, Arvalis, INRAE, ITB and Terres Inovia. It has made it possible to evaluate and propose new methods for statistical processing of data from variety testing networks. Its aim is to increase the number of trials retained in the syntheses and thus contribute to a better evaluation of the performance of varieties. This makes it possible to make better use of existing experimental systems, to improve the power of variety comparison, and to develop the implementation of trials in situations that are generally unconducive to the success of experiments which are necessary to characterise varieties (superficial soils, limited water supply, very simplified tillage, organic management, etc.).



Action 1, on analysis at the scale of the individual trial, evaluated methods for taking better account of the spatial variability of the environment, which is a source of heterogeneity and imprecision: spatial analyses, line-column models, analysis with a covariate describing the heterogeneity of the trial plot.

Action 2 on trial clustering addressed the management of missing data and weighting according to trial precision.

The OPTIRES deliverables are recommendations for variety evaluators and calculation scripts that are intended to be introduced into the processes for producing variety references at GEVES and technical institutes. The scripts from the validated tests will be introduced into the GEVES trial management computer tools, with a modernisation project currently underway.

Supporting the agricultural transition

New varieties are a lever for the agricultural and ecological transition towards more sustainable production systems, combining improved crop production and reduced pressure on the environment by taking advantage of ecosystemic functions.

The new version of the "Seeds and Plants for Sustainable Agriculture" plan published in November 2021 by the French Ministry of Agriculture and Food places plant breeding and seed quality at the heart of public policies, and more particularly the agro-ecological challenge for France.

GEVES, which carries out numerous missions within the French Technical Committee for Crop Breeding (CTPS), is closely involved in the implementation of this plan, which expands on numerous actions that have already been carried out, to develop and test innovative methods for conducting trials, to improve testing efficiency and to propose the integration of these methods into technical regulations.

This work also concerns the preparation of changes in the design of trial networks to meet the needs of evaluating varieties adapted to agroecology.

The agroecological transition is also a reality at GEVES's experimental stations.

Jean-Philippe GALICHET
Quality Manager, Variety Studies Department

"In order to carry out our experimental activities in the field or greenhouse with an agro-ecological improvement approach, in 2021 I coordinated the measurement of indicators from the Ministry's HVE (High Environmental Value) reference system. This consisted of collecting various concrete indicators from our cultivation practices at our experimental stations, in order to establish a starting point, analyse them and further develop our approach. A very positive finding is the level of biodiversity (diversity of crops, hedges, grassed strips, flowers, etc.).

This approach will lead us to put other actions in place in order to pursue our agroecological progress.

Across all species

New Plan SPAD

On 8 November 2021, the French Ministry of Agriculture and Food published the new "Seeds and Plants for Sustainable Agriculture" (SPAD) plan.

This new version, which was drawn up in close collaboration with industry stakeholders within the French Technical Committee for Plant Breeding (CTPS), succeeds the SPAD plan launched in 2016. It provides for a smaller number of actions organised around four areas:

- A diversity of varieties and species,
- High-quality food that respects the environment,
- Participatory approaches and the use of new techniques,
- Scientific expertise in support of public authorities and society.

Seeds and plants are the very basis of agricultural production. They are an essential lever for meeting the challenges of climate change, the sustainability of production methods and the need to strengthen our food sovereignty.

The renewed plan places the role of varieties, seeds and seedlings at the service of the sustainable development objectives adopted by the 193 UN member states in the framework of the 2030 Agenda, which aims to achieve a transition to sustainable development by 2030.

In this context, GEVES will bring all its expertise in support of these collective challenges.

Find out more:

Impact of the agricultural transition on variety testing methods and trial network design: RESO2 project

Agroecological production systems, characterised by an increased use of natural processes to replace the use of synthetic inputs, require an adaptation of the range of varieties available and variety characterisation. In 2020-21, the CTPS Scientific Committee referral 'Which varieties for agroecology' and the RESO research project (CASDAR 'Seeds and plant breeding') jointly conducted a reflection on the implications of the agricultural transition in terms of species, varieties, plant breeding, testing and production of seeds and plants. Identifying and characterising varieties adapted to agro-ecological systems is necessary to promote national listing for these varieties and facilitate users' choices.

The RESO2 project, which started at the end of 2021, aims to change variety testing methods and to adapt trial networks, en particular by targeting systems for national listing.

RESO2 aims to translate the proposals from the RESO project into operational actions:

- measuring traits of interest for agroecological systems (weed competitiveness, vigour and suitability for association),
- defining trials under agroecological conditions and studying various hypotheses for integration into testing networks
- adapting decision rules (VCU scales) to encourage the listing of varieties for these systems.

This project will propose changes to variety testing networks and decision rules so that each CTPS section can integrate them into lisiting procedures to meet the needs of agroecology.

Helping to implement the new EU organic regulation

GEVES has prepared the implementation in France of the new European Regulation on organic production (2018/848), which came into force on 1 January 2022, in particular on two new aspects:

- Organic Heterogeneous Material (OHM),
- Organic Varieties Adapted to Organic Production.

Following delegation by the French Ministry of Agriculture, GEVES is in charge of receiving and verifying notification dossiers for organic heterogeneous material. GEVES helped define the notification procedure published by ministerial order, which is published on the GEVES website.

For organic varieties, a temporary 7-year experiment will begin in 2022 to assess, among other things, possible changes to the listing procedures (DUS and VCU) to take into account adaptation to organic production. GEVES participated in meetings organised by the European Commission in 2021 on the evolution of DUS protocols for kohlrabi and carrot varieties.

In addition, the 2021 World Organic Congress (IFOAM) in Rennes and the visit of DUS trials at the GEVES station in Brion provided an opportunity to continue exchanges with breeders from the European Consortium for Organic Plant Breeding (ECO-PB).

GEVES is associated with the European Liveseeding project, which will be developed in 2021 (accepted in 2022) and which follows on from the Liveseed project, and will contribute to the discussions on OHM and organic varieties adapted to organic production.

GEVES supports the promotion of old varieties

With more than 350 varieties listed, old varieties represent a significant part of the French Official Catalogue of vegetable species. More than 1400 varieties of fruit species are also listed, many of which are representative of French fruit heritage.

Gardeners, market gardeners and arboriculturists therefore have access to a significant number of regularly controlled varieties, varieties that are routinely cultivated and/or of high heritage value.

For vegetable species, these old varieties registered since 1952 on lists a and b and more recently on lists c and d (old varieties threatened by erosion and varieties whose harvest is mainly intended for self-consumption) sometimes require support from GEVES and SEMAE in accompanying professionals. In addition to these regular exchanges, GEVES and SEMAE held another day of exchanges at GEVES in Brion on 29/09/21 on the regulatory procedures for the listing and maintenance of these old varieties. Financial support is another key point: the French Ministry of Agriculture supports the listing of varieties on list c and SEMAE supports the registration on list d as well as the maintenance of old vegetable varieties via a dedicated fund.

As for fruit species, 72 citrus and olive varieties have been registered on list 2, allowing the recognition of heritage varieties or clones that were previously unclearly defined, and authorising their distribution in the European Union. These steps, supported by the Ministry of Agriculture, make it possible to obtain an Officially Recognised Description.

At the interface between national listing and genetic resource management, in 2021 GEVES launched a project to identify heritage vegetable varieties (i.e. contribution to French agricultural history) among the varieties that have been cancelled and are still present in the GEVES cold rooms as a reference collection.

Find out more:

Specific species

Setting up VCU for chickpeas

In response to industry demand and a request from the CTPS section, GEVES, together with chickpea experts, has developed a VCUS system that will be implemented from 2022 onwards to evaluate genetic progress.

A joint experimental network with Terres Inovia at 6 locations, mainly in the South of France, has been chosen.This limits the need for seeds for variety testing of this species with a low rate of multiplication and avoids delaying national listing applications.

The evaluation will focus on a new grain size characteristic and the classic characteristics of earliness, flowering, height, yield, protein content, TGW, etc.
As for pests, the main problem is *ascochyta rabiei*. The need for a test under controlled conditions with validation of variety behaviour in the field has been brought to the level of the CASDAR research project AsCoLuP.
Listing rules were also formalised and included in a technical regulation approved by the Ministry of Agriculture.

Flax: strengthening the consideration of disease tolerance

The CASDAR LinicoLin project 'Optimisation of a protocol for the evaluation of flax varieties against septoria' was prepared and accepted in 2021 for a period of 27 months.
It follows on from the SeptoLin project, which laid the foundations for evaluating variety behaviour of flax to *Septoria linicola*.

Led by Terres Inovia, it aims to develop characterisation tools to finalise a protocol for evaluating the resistance of fibre and oilseed flax to septoria that can be used for future national listing applications.

GEVES is contributing to this project by producing inoculum, using strains transferred from ARVALIS. It is also very involved in the development of scoring methods and the analysis and synthesis of results.

LinicoLin extends the efforts made in recent years to evaluate tolerance to the various flax pests, and further integrate this aspect into the listing system.

GEVES involved in updating CEPP rapeseed variety sheets

Since 2021, the CTPS rapseed VCUS commission, with the support of GEVES, is now in charge of managing action sheets for CEPP (Pesticide saving Certificates), which list the rapeseed varieties eligible for these certificates.

The early flowering data produced by GEVES as part of the DUS studies are used, for example, in the expert appraisal carried out by the CTPS to decide on the eligibility of varieties for the action sheet 2017-11 "Avoiding insecticide treatment against meligethes by combining a very early flowering rapeseed variety with the main variety". This sheet was also completely re-evaluated, particularly the section describing conditions for the ecosystem service to be provided (flowering gap between the trap variety and the variety of interest), following a methodological study conducted by GEVES.

As part of the 2018-047 sheet "Controlling rapeseed turnip yellows virus by choosing a sufficiently resistant variety", the data produced by the optional "TuYV susceptibility" tests conducted in VCUS trials are assessed by the CTPS and make it possible to identify eligible varieties to be proposed for publication in the official gazette of the Ministry of Agriculture.

GEVES and the CTPS are involved in updating CEPP sheets for other species.

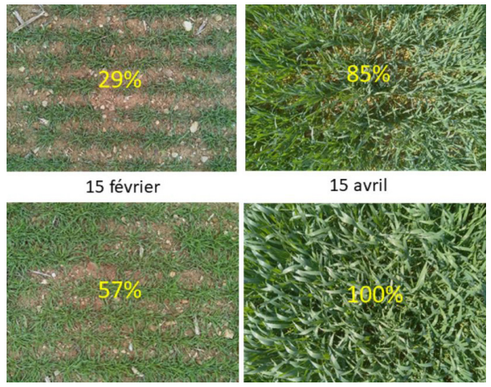
Find out more:

Towards hardier triticale varieties

Coordinated by GEVES, the CTPS VCU triticale committee has prepared changes to the testing system to encourage the listing of hardier triticale varieties.

The rules for allocating malus have been made stricter to penalise disease-sensitive varieties and the network's untreated trials are positioned in situations where disease pressure is high.

Soil cover measurements have been introduced in the trials, to assess the ability of varieties to compete with weeds (this trait is also to be considered for intra- and interspecific associations).



Différences de taux de couverture entre des variétés de triticale à 2 dates

To increase the diversity of agro-edoclimatic situations in the trial network and to take into account the diversity of triticale production systems, test locations have been introduced in organically managed plots. The network, which included 14 experimental sites with 2 treatments, fungicide treated (T) and non-treated (NT), now includes 16 sites, 9 with both T and NT treatments, 3 with the treated treatment and 4 in organic farming. All yields are taken into account when deciding whether to include the variety in the catalogue

Sorghum: a trial network to better reflect the diversity of growing environments

In 2021, the sorghum grain VCU testing network was thoroughly changed to meet the needs of farmers and the industry. The objective was to support the development of sorghum production in northern regions and to promote sorghum varieties that provide satisfactory yields to the producer even under non-optimal growing conditions.

The network is now divided into two main geographical areas: northern and southern, with 16 and 18 trials respectively, in order to increase the diversity of environments and cropping practices.

A classification of yield potential, moderate or high, of the trial platforms is defined according to the type of soil (useful reserve, etc.), management with or without irrigation, fertilisation, etc. After harvest, a group of CTPS experts, coordinated by GEVES, confirms the yield potential based on the results that can be observed.

This classification makes it possible to evaluate the performance of the varieties in 2 distinct trial typologies and to qualify the stability of the performance of the varieties under study. The most stable varieties, regardless of the environment, benefit from a bonus for listing in the official catalogue.

Taking breeder data into account for maize varieties

In 2021, the regulatory process for applicants to contribute to VCUS testing of maize was fully applied, in addition to the testing network set up by GEVES and its partners. 77% of varieties submitted for VCUS examination received additional data supplied by the applicant, a stable figure compared with 2020. The proportion of varieties submitted for DUS testing with applicant contribution increased to 93%. As a result, 75% of applications were examined with the contribution of the variety representative in DUS and VCUS testing; this percentage is strongly increasing (50% in 2020). In addition, the proportion of varieties that passed their VCUS test at the end of the first year of testing rose from 4% to 19%, i.e. 13 varieties that were proposed for national listing at the end of the first year of testing thanks to additional results provided by the breeder. These results confirmed the good performance observed in the CTPS/GEVES network. Another objective of the use of breeders' data is to significantly increase the number of high-quality experimental references and gain early access to detailed knowledge of the variety. The complementary data is used for the Varmaïs site, in the section for comparing varieties. Breeders can provide data under the official supervision of GEVES according to precise rules set out in the listing regulations. In this respect, in 2021, GEVES carried out audits of breeding companies in order to verify the conditions for acquiring and supplying additional data. In addition, GEVES supervisors in the CTPS network trials continued to visit the additional data trials previously declared by the applicants.

Diversity of plant variety profiles

As an examination office, GEVES examines varieties applying for national listing or plant variety protection.

In this capacity, the GEVES evaluates numerous variety innovations requiring market access or a plant variety right. Some innovations, resulting from long-term work by breeders, are radically different from what already exists (new characteristics, new uses, etc.), and contribute to the diversification of the varietal profiles available to users.

To characterise these innovations, GEVES regularly conducts methodological research to develop new test protocols and contributes to defining experimental methods and associated decision rules. In 2021, this included new tolerances to pests (resistance to new races of pests in vegetable species, tolerance to beet yellows, etc.), new uses for known species (edamame soya consumed as a vegetable, white flour sorghum for baking, anti-oxidant maize, biomass barley, etc.), the morphological diversity of harvested products (vegetable or fruit species) or new varieties claiming good behaviour as a companion plant.

This diversity of variety profiles is one of the levers to promote in order to meet the challenges of the agricultural transition. It features as Action No. 2 of the revised SPAD plan.

Contributing to plant health

Helping to guarantee seed health is a priority objective for GEVES.

It is essential to avoid the dissemination of seed-borne pathogens, some of which can be transmitted to the seedling during germination.

At the end of 2020, GEVES was designated National Reference Laboratory for non-quarantine regulated organisms (NQRO) whose main matrix is the seed and confirmed in 2021 as an approved laboratory for the detection of ToBRFV in tomato and pepper seeds,

GEVES is stepping up its investments and deploying an ambitious action plan. It is also investing internationally in the detection of insects in seed batches and in the definition of systemic approaches for phytosanitary certification of seed exchanges.

Evaluating resistance or tolerance to pests in new plant varieties contributes to the necessary agro-ecological transition. GEVES is developing research and development programmes on the evaluation of these resistances and on knowledge of pathogens. Of particular note are the strong investments in resistance to virus-induced yellows, which is harmful to sugar beet and winter barley production.

Sophie PERROT
Head of variety resistance testing in controlled environments

Evaluating variety resistance to pests is at the heart of the agroecological transition.

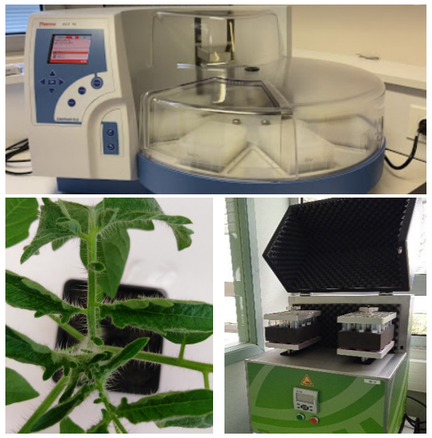
With my team, I anticipated the ToBRFV problem with the development of a test to evaluate new resistances worked on by seed companies and setting up of a project co-financed by the CPVO. We have also developed two tests for resistance of service plants to the quarantine nematodes Meloidogyne chitwoodi and M. fallax, in order to meet the needs of the industry for variety listing and breeding. I am participating in a national research intiative to develop a protocol for the evaluation of yellowing beet varieties, which aims to reduce the impact of aphid-transmitted viruses on crops and compensate for the ban on neonicotinoids. I am also involved in the epidemiological monitoring of several pests (Bremia, sunflower mildew, Fusarium lettuce, etc.), which has made it possible to validate new breeds that are important for the seed sector.

GEVES renews and extends its quarantine approval

Following the audit on 26/11/2020, the Pays de la Loire prefecture issued an order 202-DRAAF-73 on 11/12/2020 authorising plant quarantine facilities at the GEVES phytopathology laboratory. This approval, valid for 5 years, includes the laboratory's new facilities, including a greenhouse and 6 climatic modules. The list of pathogens concerned has been updated. The laboratory renewed its approval for the possession and handling of tomato brown rugose fruit virus (ToBRFV), enabling it to carry out detection testing on tomato and pepper/chilli seeds and to start work on the development of a resistance test for tomato varieties to ToBRFV, in collaboration with the CTPS. The approval extension also allows for the transfer and development of tests to evaluate the resistance of forage crucifers to *Meloidogyne chitwodii* and *fallax* for national listing of new varieties in the French catalogue.

GEVES in the fight against ToBRFV: renewal of approval, increase in capacity and initial work on evaluating varietal resistance

The Ministry of Agriculture granted GEVES a definitive approval for the detection of ToBRFV on seeds on 21/07/21, which successfully participated in the Inter-Laboratory Trial organised by ANSES using the official method MA066. Since the beginning of 2020, GEVES has been provisionally approved by the Ministry. The growing demand for this type of test, particularly in response to European regulations, has led to the optimisation of grinding and extraction equipment to increase testing capacity. Tests for method validation by studying performance criteria were carried out effectively. GEVES acquired a new SeedShaker mill, allowing simultaneous grinding of 16 (chilli) or 32 (tomato) samples. In parallel, the phytopathology laboratory worked on the development of a resistance evaluation test for tomato varieties for the seed sector with the acquisition of strains and varieties whose level of resistance is being studied. The ToBRFV resistance evaluation service is now available at GEVES using biotests and RT-qPCR detection.



Link to video (subtitles available)

Reducing plant health risks in international movement of seed

In the framework of the International Standard for Phytosanitary Measures n°38 "International Movement of Seeds", the IPPC (International Plant Protection Convention) set up a working group to draft an annex on the development and use of systemic approaches for the plant health certification of seeds.

A group of IPPC representatives and experts from 7 member countries, including for France the Director of the GEVES Phytopathology Laboratory defined the key elements of collaboration between the seed industry and National Plant Protection Organizations (NPPOs). These are based on a harmonised framework for taking into account industry practices to contribute to the reduction of the risk linked to seed-borne pests, and the recognition and verification of these systems by national organisations (NPPOs) to provide an alternative to the current system.

Dealing with the problem of insects in seed lots: GEVES takes action

The relationship between insect pests and seeds is a growing problem. The fight against these insects is becoming more and more complex due to global issues (increased trade, climate change, move towards a more environmentally friendly agriculture, etc.).

For insects, plants are part of the food chain or an obligatory host. Damage caused by insects in the field and/or during storage can have a significant impact on the economy, the environment and food safety. In addition, seeds can become important vectors for the spread of insects.

For this reason, countries are increasingly imposing restrictions on the import of seed lots to prevent the import of poor quality or insect-infested seed lots. However, currently the ISTA rules do not provide for methods to meet these demands.

To this end, a research project funded by ISTA and involving several international partners (including GEVES-SNES and ANSES-LSV) has started in 2021. The objective is to research effective methods for detecting and monitoring the presence of insects in seed lots.

The first step of the project was to identify the precise needs, and then in combination with a literature search on existing methods, decisions were made regarding the choice of seed-insect combinations to be tested. The first tests are planned for early 2022. Different insect detection and identification techniques will then be studied. This work could then lead to the proposal of methods for integration into the ISTA Rules and/or the drafting of official methods by GEVES in its capacity as NRL Plant Health for bruchids.

Tools to distinguish sunflower varieties against *Orobanche cumana*

Orobanche cumana, also known as broomrape, is a parasitic plant that attaches itself to the roots of its host, in this case sunflowers. It has been present in France since 2007 and causes very serious damage to crops. The use of varieties that are genetically resistant to broomrape is still the most effective means of controlling it. The Ortobox project, financed by the "CASDAR Seeds and Plant Breeding" research program, began in 2019. It aims to characterise and reliably distinguish sunflower varieties with regards to broomrape in the framework of national listing. The tools worked on within the project focused on:

1) development of a protocol for characterising the resistance of sunflower varieties to broomrape under controlled conditions;

2) construction of a reference collection of *Orobanche cumana* populations which are representative of existing variability in the field;

3) definition of a public and disseminable differential host set to ensure the conformity of *Orobanche cumana* races used for evaluation.

GEVES was heavily involved in the first action, and at the end of the project proposed a protocol for evaluating the susceptibility of sunflower varieties based on co-cultivation of sunflower seeds and *Orobanche cumana* in a sand/vermiculite substrate for 35 days. The results are positive, as they are comparable between laboratories and with results obtained in the field, mainly for varieties with extreme behaviour.

Trial of co-cultivation of sunflower and cumana broomrape under controlled conditions

Emergence of broomrape from sunflower roots

Developing a method for varietal evaluation of resistance/ tolerance to sugar beet yellowing virus: Yellows Resisbeet

Led by GEVES, in partnership with the French Technical Institute for Sugar Beet (ITB), the Yellows Resisbeet project started in April 2021 for 3 years, as part of the National Research and Innovation Plan (PNRI) to find alternative solutions to neonicotinoids. Its objectives are to:

- develop an evaluation protocol under controlled conditions for varietal resistance/tolerance to the 4 viruses responsible for the yellowing: Polerovirus (BChV, BMYV), BYV and BtMV.
- to define statistical models for estimating the productivity of varieties in varietal trials with heterogeneous yellowing attacks.

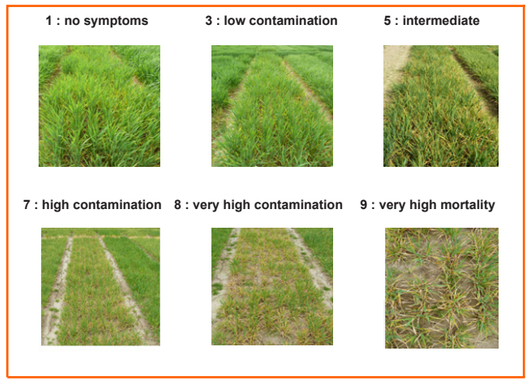
In 2021, the main outcomes of the first component are:

- acquisition of 7 expected resistant or tolerant controls,
- mastering the production method for aphid vectors of Polerovirus,
- development of field inoculation methods with viruliferous aphids for 2 viruses (B (BChV, BYV) in collaboration with the ITB,
- development of a molecular biology method for identifying and quantifying the 4 viruses,
- mastering the inoculation of the BtMV virus under controlled conditions using mechanical inoculation.

In 2022, these achievements, consolidated by interactions with other PNRI projects, will make it possible to develop the VCUS system by proposing to evaluate the resistance/tolerance to yellowing of varieties applying for listing, in inoculated field trials in addition to inoculated tunnel trials.

Progress made in the second part of the project concerns the definition of covariates that can be used in yield evaluation models in yellows-infected trials, as well as a first selection of spatial mixed models, based on the results of the OPTIRES project.

Characterising new resistance/tolerance against Barley Yellow Dwarf Virus



Barley Yellow Dwarf Virus (BYDV) can cause severe yield losses in winter barley every year, amplified by the lack of alternative solutions to neonicotinoids to control BYDV-carrying aphids, and by the scarcity of available resistance genes.

GEVES was a partner in the JNorge project, financed by the FSOV, and led by Florimond Desprez and Secobra. The objective of this project, which was completed in 2021, was to evaluate the potential of different resistance/ tolerance genes to WNJ, either independently or in a pyramid.

GEVES contributed to the development of a sampling protocol for RT-PCR analyses to identify virus species and determine the rate of infected plants. These analyses, carried out by GEVES and Arvalis, revealed the presence of the majority of MAV and PAV virus species on the sampled sites.

GEVES also validated an illustrated visual rating scale, which is now used by experimenters in the listing network to evaluate the tolerance of varieties to BYDV.

GEVES has set up trials at its Anjouère station which have revealed that certain genetics make it possible to minimise attacks and yield losses under BYDV pressure. This work in the field was completed by studies on variety characterisation in the laboratory by INRAE. This diversification and accumulation of efficient resistance genes, associated with different resistance/tolerance mechanisms should improve the sustainability of resistance to BYDV.

The BESTIM mixed technology network: boosting plant health

The BESTim mixed technology network, based on the concept of agro-ecological immunity, was launched in 2021 for five years.

This network is led by Arvalis and includes 59 partners from research, training and innovation institutes and chambers of agriculture, including GEVES.

It works on **5 areas**:

1 : Innovation watch

2 : Develop, diversify and harmonise methods under controlled conditions and in the field. Characterisation of the SDP/biostimulant distinction.

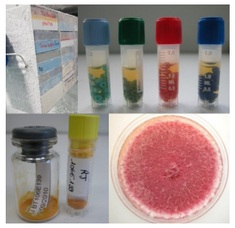
3 : Characterisation of levers and their interactions

4 : Redesign of innovative cropping systems

5 : Training and communication

In order to provide input for these areas, 38 working groups aimed at sharing expertise and results have been proposed following a workshop attended by more than 70 participants. GEVES will contribute to 7 of these groups, mainly for area 2 in methodological development.

Reference Material



Reference material: the starting point for phytopathology tests. Confidence in the results of experiments depends first and foremost on the quality of the material used: pathogen strains and well-characterised seed lots are essential for successful tests. GEVES manages reference collections (including the MATREF network) and currently offers strains of over 160 pests.

Find out more:

A new race of Bremia lactucae (Bl: 37EU)

On 1 June, following the epidemiological study led by IBEB (International Bremia Evaluation Board), the new race of lettuce downy mildew Bremia lactucae Bl: 37EU was identified and denominated. The isolate of the new race Bl: 37EU is FR19064 (EU-D sextet code: 46-15-14), representative of a new virulence pattern observed for several years in France (where it is largely widespread), Spain, Portugal, and Italy.

The differential host set was extended with the addition of 3 new varieties in the third sextet group in 4th, 5th and 6th position: Fenston, Bataille and RYZ20007.

GEVES has participated in the validation of the new race Bl: 37EU and the tests for evaluation of the resistance of varieties to this race are now available. At this stage, this race is not included in tests carried out for DUS evaluation for registration and/or protection.

Find out more

GEVES: National Reference Laboratory (LNR) in 3 competence areas

The expertise of GEVES in seed quality testing, carried out by two of its technical departments, SNES and BioGEVES, was recognised in 2017 and then in 2020 by its designation as NRL for several mandates. For these mandates, the NRL ensures the performance of official testing, methodological developments and technical supervision of approved and recognised laboratories. The aim of methodological work is to have official methods for carrying out official testing. Technical support includes training and qualifications, as well as the organisation of inter-laboratory proficiency tests, audits and technical open days. The objective is to provide technical support to the laboratories but also to provide the competent authority with elements contributing to the establishment and monitoring of laboratory networks.

LNR Semences et plants

LNR Santé des Végétaux

LNR OGM

GEVES deploys its work plan for NRL Plant Health

In November 2020, the Minsitry of Agriculture designated GEVES as NRL for plant health on Regulated Non-Quarantine Organisms (RNQO) for strawberry seeds and plants, asparagus claws and bulbs of the Allium genus, i.e. 56 lines of analysis for 34 pests. The "Pest Detection" technical unit, comprising three laboratories: Phytopathology, Physical Analysis and BioGEVES, has taken on this new mandate on a gradual basis over several years starting in 2021.


Symptôme de Cmm sur tomate / Cmm symptoms on tomato plant

In 2021, the Pathology laboratory worked more specifically on drafting the official GEVES method for *Clavibacter michiganensis* subsp. *michiganensis* on tomatoes (see photo). In parallel, the laboratory made progress on the validation of the detection method for *Botrytis cinerea/ Helianthus annuus*. The Physical Analysis Laboratory has started the drafting of the Bruchidae detection method (see photo) and is exploring other techniques within the framework of a project co-financed by ISTA. The BioGEVES laboratory focused on the transfer and verification of the detection method for *Plasmopara halstedii* on sunflower. The Unit also validated an improvement in filtration for the detection of *Ditylenchus dipsaci* nematodes on alfalfa for morphobiometric and SE-PCR tests.

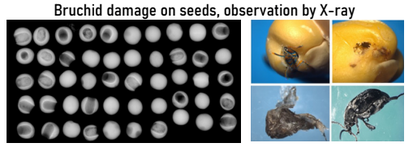
Three pest detection methods were proposed for official recognition and published in the Official Gazette of the Ministry of Agriculture in August 2021.

GEVES organised 4 "plant health" ILCs in 2021, including one for approved laboratories for the detection of *Ditylenchus dipsaci* on alfalfa seeds using morphobiometric analysis.

The list of scheduled or ongoing ILCs and the official methods are available on the GEVES - ILC website:
https://www.geves.fr/essais-interlaboratoires-eil/

Official methods (French version only):
https://www.geves.fr/laboratoire-national-de-reference/methodes/

Bruchid damage on seeds, observation by X-ray



76 seed quality testing methods formalised

On the proposal of GEVES in its capacity as NRL for seed quality, the Ministry of Agriculture published 76 technical instructions in the Official Gazette in 2021 formalising 3 pathogen detection methods, 1 sampling method, 4 Purity and Counting methods and 68 germination capacity methods.

These methods are applied for all official testing carried out by GEVES as part of its NRL mandates, or by authorised laboratories.

The sampling, purity and enumeration, and germination methods are those used at GEVES for the certification of seed lots. They have been validated within the framework of ISTA, in which GEVES is significantly involved, and are internationally recognised. They incorporate specificities provided for in particular by the annexed technical regulations.

Other methods are being developed and drafted, in particular methods for detecting pathogens that fall under the GEVES NRL plant health mandate.

Analysis of the germination quality of flax seed


Analysis of the physical quality of common wheat seed

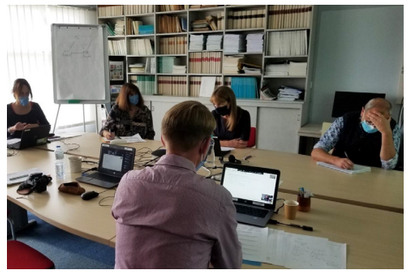
Analysis of sunflower seed health

Laboratory Open Days, a must for laboratory technical staff

Meeting of authorised plant health laboratories

Designated as the NRL for plant health at the end of 2020, GEVES co-organised for the first time with ANSES the annual meeting for approved plant health laboratories on 17 June.

This meeting was an opportunity to present the GEVES and to detail its new NRL mandate to the participating laboratories.



The 18th Seed Quality Laboratory Days

These laboratory days are a major part of technical supervision of authorised and recognised laboratories for the NRL seeds and plants mandate. For this 18th edition, organised on 16-17 September in a digital format, GEVES proposed for the first time an online workshop on the evaluation of rapeseed seedlings in germination tests. 14 laboratories participated in this workshop.

In order to overcome the difficulty of needing living material required for the exercise, samples were sent in advance to allow participating laboratories to set up the tests. During the workshop, the live broadcasting of images of the seedlings allowed participants to engage well in the session.

The seed seminar dealt with the evolution of ISTA rules and news from the SNES laboratories, the NRL Plant Health mandate and ILC statistics.

The germination laboratory led 2 round tables on the lifting of dormancy in Sunflower and cold tests on Maize.

Developing new technology & digital tools

Robotics, artificial intelligence, image analysis, molecular biology, biochemistry: these new technologies and digital sciences open up very interesting prospects for variety and seeds testing which relies primarily on manual and visual techniques and human expertise. They can lead to gains in efficiency, improvements in working conditions and the acquisition of new data.

GEVES is exploring several very promising applications.

Molecular markers will optimise the management of reference collections needed for DUS assessments of oilseed rape and hydrangea. Combined with phenotyping, it will allow better characterisation of the lodging disease in wheat. It also facilitates the identification of wheat for milling.

Robotics, image analysis and digital phenotyping are the subject of numerous studies on diverse subjects: seed germination, quantification of fusarium symptoms in cereals, counting of emergence and determination of cover rate, characterisation of plant growth dynamics, etc.

Another major development in 2021 has been making the data acquired during evaluations available for research, and making it available to facilitate the choice of maize varieties by farmers and their advisors.

Molecular markers for ornamental DUS studies

GEVES has developed a research project to develop a molecular biology tool to support Hydrangea DUS studies. This project was accepted at the end of 2021 and will be funded by the CPVO. It will last 18 months from spring 2022 and will be carried out in partnership with Bundessortenamt (Germany) and with the scientific support of INRAE Angers.

Its objectives are to optimise and secure Hydrangea DUS trials by:

- verifying the variety identity of reference varieties,
- confirming certain grouping characteristics at an early stage,
- facilitating the choice of controls to be included in the trials.

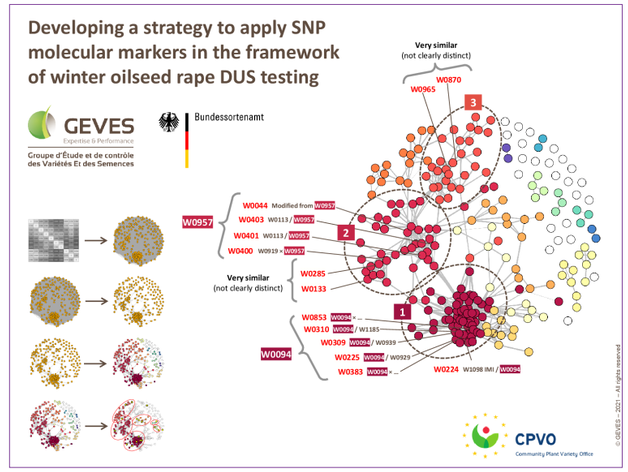
To meet these objectives, the Hydrangea collection maintained at the Gaston Allard Arboretum in Angers will be genotyped and a large number of SNP (Single Nucleotide Polymorphism) markers will be screened in order to define a set of discriminating and polymorphic markers. In parallel, markers linked to traits of agronomic and ornamental interest will be tested. Finally, and thanks to the molecular data produced, a new concept for integrating neutral and trait-related genetic information will be devised.

This project will also be an opportunity to test and understand the use of new sequencing technologies as a genotyping tool.

Using SNP markers to optimise the management of oilseed rape reference collections for DUS studies

All testing offices conducting DUS tests on oilseed rape are experiencing difficulties due to the increasing size of field trials associated with an increasing number of varieties.

The expression of phenotypic traits in oilseed rape is very sensitive to environmental variations. To take into account this high interannual variability in DUS testing, the entire reference collection has to be redescribed every year. GEVES and BSA (Germany) have conducted a joint project supported by the CPVO, aiming to develop new approaches that combine genetic and phenotypic information to avoid having to rewrite the whole reference collection every year without compromising the quality of DUS tests.



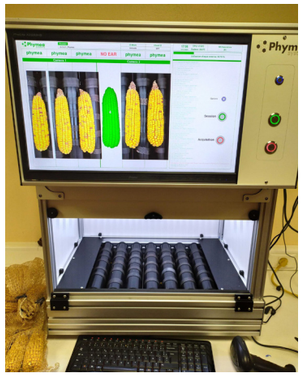
This project, completed in 2021, has identified an optimised set of 360 SNPs (Single Nucleotide Polymorphism) with good genomic coverage and high discriminatory power. From this data, a new approach has been developed that uses network analysis to define an 'optimal reference collection'. This approach uses graph theory to detect groups of related varieties based on their proximity within a network describing the genetic relationships of the varieties to each other. Depending on the method usually used to manage reference collections (COY-D or GAIA), the model could reduce trails sizes by 20-45% in the first year of study, based on preliminary genetic distance thresholds used to test the method.

So far, the method has only been tested in silico, with genetic thresholds defined on the basis of French and German collections. The molecular dataset currently represents about 80% of the French and German technical collections. A prerequisite for testing the model in situ will be to complete the genotyping of the reference collection and evaluate the relevance of the proposed genetic thresholds. The evaluation of the model under real conditions will be the focus of a second project.

Find out more

Digital Phenotyping of varieties: main developments in 2021

GEVES aims to increase the use of digital imaging for phenotyping its variety trials. Here are the four most important developments in 2021:



- **Field quantification** of Fusarium symptoms on cereal ears

This is being developed in the FSOV Fus'Eye project led by GEVES and in the joint H2020 Invite project. In 2021, the newly-developed multispectral sensor (RGB and visible near infrared) and the development of two new vectors made it possible to acquire collections of reference images of ears of corn, in microplots, from the side. From the image collections acquired, specific algorithms for fusariosis based on machine learning were developed on common wheat and durum wheat in collaboration with the University of Angers. The algorithms will be validated in 2022 on a large panel of varieties in 9 fusarium trials, with the aim of using them in variety testing trial networks from 2023. For more information: see Phytoma, February 2022, n°751, p32-36.

- Increasing use of **PHENOMAN boom** in trials

The PHENOMAN boom is a pedestrian kit for field phenotyping using RGB imaging with an image acquisition management interface compatible with the 'Cloverfield' analysis platform developed by HIPHEN. In 2021, more than 2000 microplots from GEVES variety trials were phenotyped using this tool developed in a CASDAR project called LITERAL and supported by Arvalis. Applications in 2021 mainly concerned research aspects (in wheat and rapeseed in the H2020 Invite project), methodological validations (peas, soybeans, flax and sunflower) and, for the first time, routine use on service plants to evaluate cover rate.

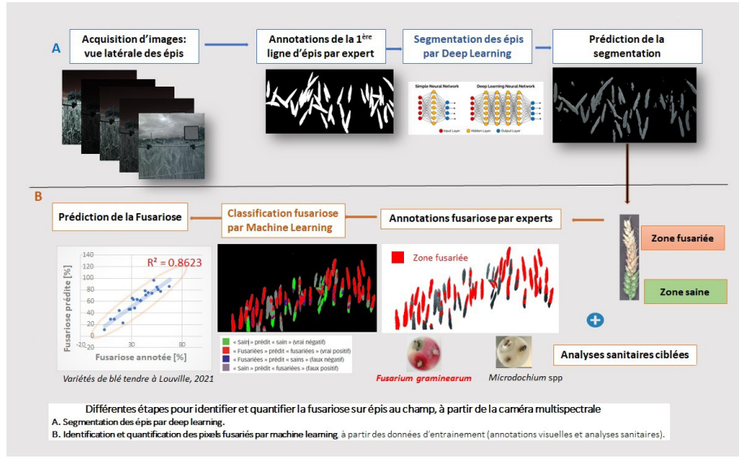
- **Drones** to certify VCUS trials and determine emergence count and coverage rate on microplots

GEVES is taking steps to certify the VCUS trials in its partner networks. Several drones are currently being put into service and a protocol will allow the first uses to begin in 2022. In addition to approval, GEVES is already considering the acquisition and analysis of images from these drones for the largest trials as an alternative to the PHENOMAN boom.

- A series of characterisations from emergence to flowering and harvesting.

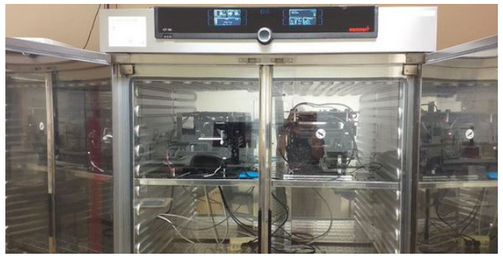
As part of the phenotyping work package of the H2020 INVITE project, a range of species were tested (maize, wheat, sunflower and oilseed rape) with several pieces of equipment at different stages of plant development. Low-cost fixed cameras were used to characterise the dynamics of sunflower emergence, young plant growth and flowering.

Hand-harvested maize cobs in the trials were closely analysed in the laboratory to determine yield components using 'Earbox', an imaging and analysis platform developed by the start-up company Phymea Systems.

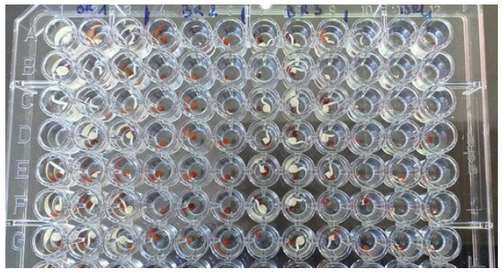


Différentes étapes pour identifier et quantifier la fusariose sur épis au champ, à partir de la caméra multispectrale
A. Segmentation des épis par deep learning.
B. Identification et quantification des pixels fusariés par machine learning, à partir des données d'entrainement (annotations visuelles et analyses sanitaires).

Automated germination monitoring: GEVES partners with start-up ScreenSeed®



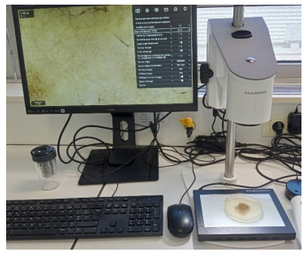
GEVES is developing its methodological expertise in seed phenotyping through its involvement in the co-development of an automated germination monitoring method. Based on the use of phenotyping robots developed by the start-up ScreenSeed®, this method enables real-time monitoring of the germination of seeds deposited in independent wells of 96-well microplates, thanks to automated image-taking. The automatic visualisation of the results is carried out via an internet application developed by the start-up.



This device, which is accessible to scientists and professionals in the sector, can be used for a number of applications such as evaluating germination of seeds from different genotypes, screening molecules, agents or products applied to seeds or studying the effect of treatments on germination. It has already been tested with *Arabidopsis thaliana* seeds as well as with seeds of small cultivated species (carrot, lettuce, tomato, rapeseed).

This development is the result of a partnership with the start-up ScreenSeed®, which has been in place for more than two years, and which will be completed in 2021 with the implementation of a joint service offer supported by GEVES.

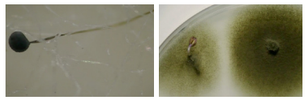
Making the invisible visible ... Pathology at the cutting edge of technology



Recently brought in from Denmark, the Tagarno magnifier allows us to make the invisible visible.

This magnifying glass allows GEVES to take very precise photos and to focus on stacking: it ensures that the photo is in focus on different levels.

Thanks to this camera magnifier, we are able to take high quality photos to enrich the reference collection and the descriptive sheets for pests.



This magnifying glass is also a real-time observation tool for the remote training courses provided by GEVES.

Improve characterisation of the resistance of cereal varieties to pests by combining phenotyping and genotyping

CAP PHENOGEN (2020-2023) is a project led by GEVES in partnership with Arvalis, INRAE and UFS, supported by the CASDAR Seeds & Plant Breeding research programme. Its objective is to carry out the proof of concept of the contribution of genotyping in addition to phenotyping to improve characterisation of the resistance of cereal varieties to 6 pests.

This project made it possible to validate a scenario for evaluating the resistance of soft wheat varieties to eyespot that combines phenotyping with the marking of a resistance gene, the Pch1 gene. This evaluation scheme, validated by the CTPS Straw Cereals Section, can be used routinely since 2021. All the varieties will continue to be evaluated in the first year at two experimental sites with increased contamination and will be genotyped in parallel to detect the presence or absence of Pch1. However, in the second year, only some of the varieties are re-introduced into the field: varieties with intermediate resistance and varieties for which the resistance gene has not been detected.

The project also provided an opportunity to propose a revision of the CTPS bonus threshold for resistance to eyespot: by aligning the CTPS bonus threshold with OADs and the CEPP threshold for common wheat, and by lowering the bonus threshold from 6 to 5.

This first proof of concept will make it possible to explore this approach for other pairs (mosaics in wheat and barley, WNJ in barley) in 2022, after validation of the performance of the selected markers. In addition to simplifying field trials, this complementary strategy between phenotyping and genotyping provides access to information on the sources of resistance and their sustainable management.

Varmaïs, the new reference website for maize variety evaluation in France

Varmaïs is an online tool for consulting variety evaluation references from the registration and post-registration networks in France, and for helping to choose grain and forage maize varieties. It was developed by GEVES, Arvalis Technical Institute and UFS. After a preview at Les Culturales trade show in June 2021, Varmaïs was launched on 10 September 2021.

Available free of charge and with open access, Varmaïs has been designed to serve farmers, breeders, technicians from advisory and supply structures, seed companies and all players in the maize sector. Each year, Varmaïs presents the results of more than 450 varieties tested in around 400 trials spread over all maize production areas in France.

Find out more:

Data valorisation: progress in 2021

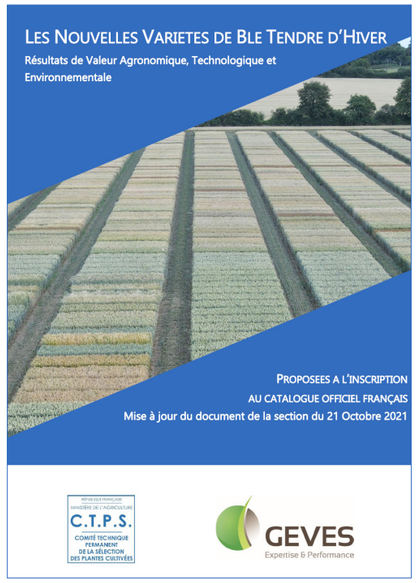
For all the varieties registered in French national list, GEVES publishes on its website the main results of the DUS examination results and the summary of the VCUS results, on which the listing decision is based (see Search the French Variety Catalogue tab). Some tables (cereals VCUS characteristics), with a more open format, are available in the section Agricultural plants/ French Catalogue and results available for the plant and sectors (French versions only).

GEVES is working on several projects to improve the interactivity of the data or a more open format to facilitate their use.

The data acquired from testing for national listing can be used for research programmes, under well-defined conditions, as is the case with the European Invite project. In this project, the varieties are coded, and the breeders have given their consent.

In order to ensure the continuity of variety testing and continuity between registration and post-registration studies, validated data is/can be transmitted to technical institutes.

In addition, all protocols, regulations and results are made available and easily accessible on the website on the Access to Documents page.



French National List

Test Results

Protocols & Regulations

Plant Genetic Resources

Biodiversity of cultivated species and their wild relatives is essential to meet new agronomic, societal and environmental challenges. It is essential to promote their characterisation, conservation and dissemination.

With this objective in mind, GEVES has continued its missions relating to the structuring of public-private networks for the conservation of plant genetic resources, stakeholder and the structuring and enrichment of the national collection. It has endeavoured to improve communication and information in this area.

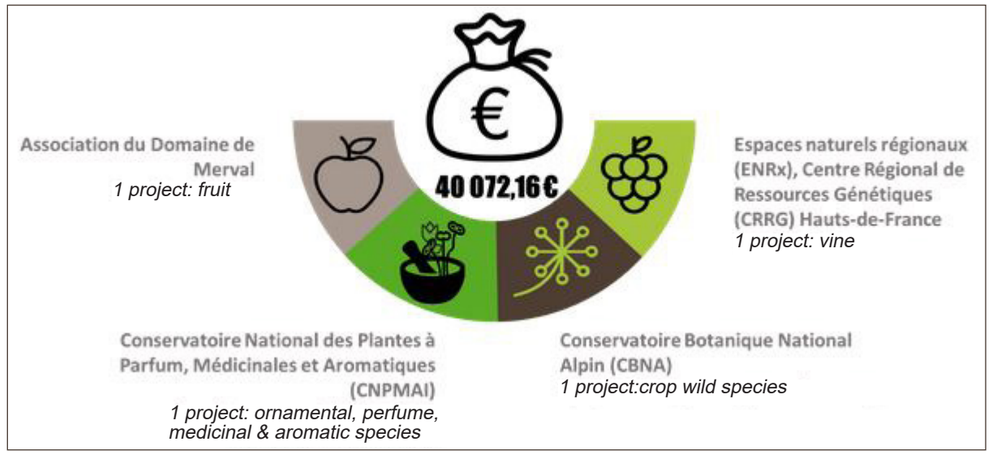
In order to increase the financial means of support for these essential activities and to raise awareness of these issues amongst the general public, GEVES has played a major role in setting up an endowment fund for the preservation of plant genetic resources of cultivated plants and their wild relatives, which was launched in April 2021.

Pascal Coquin, Technical Secretary for the CTPS Vegetable Section
Coordinator of the network for chicory genetic resources conservation

The conservation and use of old varieties registered in the French National list is essential to preserve historical heritage, especially regional heritage, for the plant sectors and for amateur gardeners. It also provides a reservoir of properties and genetic characteristics that can help in the breeding of varieties adapted to climate change, new pathogens, society needs, etc. We know that a plant variety exists if someone is still able to produce the seeds. This is what is at stake in our missions and in particular in my activities when I identify vegetable varieties which are in danger of being removed from the official catalogue due to the withdrawal of the last official maintainer. I coordinate with the technical teams to carry out variety checks in the field to validate the status of a new official maintainer. I carry out these missions with enthusiasm and I have definitely noticed a growing general interest in these subjects. The support fund set up in 2020 by Semae for the maintenance of old varieties, and the endowment fund for the preservation of biodiversity of cultivated species and their wild relatives (created in 2021 by eight players from the world of plant genetic resources from different backgrounds, including GEVES) are proof of this and provide additional support for the many players in France involved in this task of biodiversity conservation.

4 new projects for the conservation of plant genetic resources funded by the Ministry of Agriculture

Every year, the national coordination unit at GEVES organises a call for applications on behalf of the Ministry of Agriculture, which is aimed at French stakeholders (in mainland France or overseas) involved in the conservation, characterisation and development of plant genetic resources of cultivated species and their wild relatives (except forest trees). 4 projects were funded in 2021.



The National Collection is growing

In 2021, the first contributions of resources to the National Collection, according to the new procedure adopted in July 2019 by the CTPS Plant Genetic Resources Section, have been added:

- **202 rose bushes** of old 19th centruy rose varieties and botanical roses from the private collection of Madame Thérèse Loubert,
- **19 hydrangeas**, mainly from the 20th century from the work of the Mouillère family from the Shamrock Association's collection,
- **209 new hydrangea accessions,** mainly Hydrangea macrophylla from Europe and a diversity in the genus Hydrangea with 13 subspecies from Europe, Japan and the United States from the company Boos Hortensia,
- **17 new French potato varieties** contributed by the public-private potato cooperation network, led by INRAE in Ploudaniel, which complete the 98 varieties already contributed to the International ITPGRFA Treaty's multilateral system,
- **34 accessions** of 11 wild related species donated by the Bailleul National Botanical Conservatory including wild forms of carrot, cabbage, garlic, flax, bellflower and angelica.

2 new public/private conservation networks: beans and onions

GEVES has invited several stakeholders to work together to safeguard plant genetic resources (PGR); the Charters of the cooperation networks for the management of HARICOTS (*Phaesolus vulgaris*) and ONIONS (*Allium cepa*) resources were signed in 2021. These networks bring together a wide range of players with two major objectives: to share the conservation of the RPGs and to identify accessions to be added to the national collection by the networks.

The signatory partners for the 'bean' network are:

The collection managed by the network includes about 1600 accessions of old varieties and scientific material mainly from INRAE's work.

As for the onion network, the stakeholders involved are:

The collection managed by the network includes about 150 lots of local, French and international varieties or populations, mainly from INRAE's work. The first general assembly of the new network was held on 12 October 2021.

Webinar on new health regulation developments

An information and exchange webinar on changes in the new health regulations at EU level and for the Overseas Territories was held on 29 April 2021 for managers of plant genetic resources collections, directly concerned by their activities of introduction, maintenance and dissemination of plant material. It was jointly organised by the General Directorate of Food of the Ministry of Agriculture, the RARE infrastructure and the National Coordination for the Conservation of Plant Genetic Resources. The webinar was attended by 85 participants.

New PGR webpage: new name and new look

The web page Curators and the National Collection Registers has been redesigned as:

Who are the collection curators officially recognised by the state? Which resources have been added to the national collection?

This new webpage provides visitors with clear and easy-access information for both topics. The new presentation is more informative and intuitive; each theme begins with an explanation and a simplified visual.

It is divided into two sections:

1. **collection curators who have obtained official recognition from the Ministry of Agriculture**
2. **resources added to the French National Collection.**

New: Detailed data related to curators who have obtained official recognition and the resources that have been added to the national collection are now also available for download, allowing the user to make extract and search specific data.

Find out more

GEVES helps launch the "Collections and Biodiversity Fund"

GEVES was significantly involved in the preparation of an Endowment Fund for the preservation of biodiversity of cultivated species, known as the Collections & Biodiversity Fund, for which it is one of the eight founding members. At the first Board of Directors meeting on 19 April 2021, Marion GUILLOU was appointed President and Audrey DIDIER was appointed Director.

The aim of this Fund is to preserve biodiversity in the long term, through support and appropriate financing, in order to avoid any irreversible loss of living plant heritage, which is a key source of innovation for the future.

Founders

National & international communication

GEVES is the national organisation of one of the largest seed and plant production countries. It has a specific mission as a centre of technical expertise, providing services in these fields at international, European and national levels.

GEVES's experts are very involved in international organisations (UPOV, CPVO, ISTA in particular) for the development and harmonisation of seed and variety quality testing methods.

Their involvement in exchanges on the implementation of EU regulations helps to share the French experience.

In collaboration with other examination offices, it provides training for experts from other African or Asian countries in particular, contributing to the promotion of these evaluation methods worldwide.

GEVES develops communication actions aimed at a wide audience based on the impartiality and quality of its expertise through its presence at trade fairs and in particular its newsletter, which has significantly increased in frequency and distribution.

Corinne GUIMIER
System auditor for ISTA accredited laboratories
Vice-Chair of the ISTA Sampling Committee

Re-accreditation audits of counterpart laboratories are very enriching, allowing the development of new contacts, and the observation of different organisations and practices to meet equivalent requirements and provide reliable results for similar tests. The year 2021 was special because all audits were carried out remotely, which allowed me to implement a new way of working but also confirm my conviction that direct exchanges on site are more fruitful when possible.

The prospect of chairing a technical committee from 2022 onwards is a new challenge, which will enable us to improve our knowledge and develop new cooperation in the field of seed lot sampling.

For varieties

GEVES, new coordinator and manager of the EU database for melon variety descriptions

This 3-year project, co-financed by the CPVO, brought together 5 entrusted EU examination offices for melon species (Netherlands, France, Spain, Portugal, Slovakia). The aim was to create a database tool, for use by these examination offices in order to routinely share melon variety descriptions needed for official DUS studies. This joint database was completed in early 2021. It runs under the GEMMA application, created by GEVES. The Dutch Office (Naktuinbouw) led the creation of this tool, and now GEVES will take over the tool's management for 3 years including the development of new improvements.

This collaborative work combines the DUS studies carried out by each of these Offices. It pools administrative and morphological data as well as standardised images for well-known melon varieties. Knowledge of varieties is therefore better shared and the choice of potential control varieties to be planted in DUS trials is reinforced.

At the beginning of 2021, this EU tool contained descriptions of more than 3300 varieties, for which GEVES contributed 40% of the data. Each year, it will be completed with data produced by each partner. CREA, the Italian office, newly accredited for the species, will be joining the group of founding offices and will build on the tool with its data and contributions.

It should be noted that GEMMA, the computer structure used for this tool, developed and maintained by GEVES, is also used by the entrusted offices for other species such as potato, hemp and peach.

14th seminar of the European VCU group

Organised by Agroscope (Switzerland), this seminar brought together in September 2021 VAT experts from 22 examination offices and representatives from the European Commission.

GEVES contributed to discussions on the revision process of the European seed regulation. the importance of a strong national listing system and an evaluation of crop value and use taking into account sustainability issues in the context of climate change. GEVES and the other offices shared the changes they are implementing in their evaluation and national listing systems to adapt to these issues:

- protocols for emerging pests,
- adaptation of experimental conditions in response to effects from climate change and solutions for reducing chemical pesticide use,
- development of protocols for new species (e.g. chickpea) or new uses (e.g. medicinal hemp),
- evaluation for organic production with a testimony of the experience of GEVES on the complementarity between evaluation for conventional and organic farming...

GEVES also spoke about the progress made in 2 research programmes: OPTIRES and H2020 RUSTWATCH

International training on DUS and protection

Following a very successful experience in 2020, and in response to requests from Chinese counterparts, the DUS training course included in the IPKey China programme was renewed in 2021. Coordinated by CPVO and including the participation of experts from several European examination offices, the video-conference programme allowed GEVES to share its expertise in Tomato DUS testing and the use of molecular biology in Maize DUS testing. More than 100 Chinese participants benefited from this training.

The project to strengthen and promote the OAPI (African Intellectual Property Organization) plant variety protection system has entered its second year. Due to the Covid context, training courses and field assessments were postponed until 2022. Nevertheless, awareness seminars on the plant variety protection system were organised by videoconference in each OAPI Member State: GEVES experts, together with experts from UPOV, CPVO, NAKT and SEMAE, presented general information on DUS and the management of a reference collection, as well as on the link between national listing, protection and certification in France. GEVES also continued to provide remote support to the OAPI examination offices, which were already operational or in the process of being opened

GEVES & UPOV

GEVES participated remotely in UPOV working groups in which it contributes technical, statistical and computer development expertise each year.

At the Technical Working Party for Vegetables (TWV), GEVES presented:

- work carried out on the EU database of melon variety descriptions; this database tool was created by and for European examination offices to routinely share the descriptions of melon varieties needed for official DUS studies

- the Harmorescoll research project, which aims to share reference material for resistance testing. This presentation led the TWV Working Group to consider that access to reference materials and the availability of control varieties are essential for the conduct of DUS testing of disease resistance characteristics, and that the availability of inoculum, example varieties and control varieties for disease resistance characteristics in the different guidelines should be updated.

For the UPOV Working Group on Biochemical and Molecular Techniques (BMT), GEVES presented the research project on the use of SNP marking to optimise the management of oilseed rape reference collections in DUS testing, through the development of new approaches that combine genetic and phenotypic information to optimise oilseed rape DUS trials without compromising their quality.

GEVES responded to the inventory carried out by UPOV on the use of molecular marker techniques by species studied. The results of the inventory show that France is one of the Member States that makes the greatest use of molecular marker techniques for DUS and varietal identity testing.

GEVES & CPVO

At European level, GEVES experts participated actively in various technical working groups, for the development of protocols, consolidation of operating rules for examination offices with the CPVO, and discussions on future developments, whether for ornamental, fruit, agricultural or vegetable species.

At the meeting on agricultural plants, GEVES presented and shared several points reflecting its technical expertise:

- the organisation of maize DUS and the distribution of varieties over the three DUS test sites, which provided food for thought for the distribution of varieties at EU level,

- the management of alfalfa DUS studies, which enabled the writing of the CPVO alfalfa protocol to be completed.

During the meeting on vegetable plants, GEVES was able to put forward its expertise in disease resistance tests and presented methods for assessing uniformity for these characteristics, as well as the latest news from the Harmorescoll research project (providing material needed for laboratory disease resistance tests).

Several meetings took place during the year 2021 at the initiative of the CPVO with the aim of harmonising and improving the Technical Questionnaires filled in by applicants, which are necessary for conducting DUS tests; GEVES actively contributed to these developments, for many species.

For seeds

GEVES continues to contribute actively to ISTA's activities

More than 10 GEVES collaborators involved in the technical and executive committees of ISTA, participate in the development and validation of seed quality testing methods, in research projects (germination/vigour, insect detection), scientific and technical communication, carrying out audits and discussions on ISTA's strategic orientations.

Despite the continued difficulties of face-to-face meetings in 2021, the activities continued via events organised at remotely.

ISTA General Assembly

The ISTA General Assembly took place on 3 June 2021, presenting the activities of the ISTA Secretariat and the Executive Committee, and the final proposals for amendments to the ISTA rules to be voted on. There were also presentations on the activities and achievements of the 20 ISTA Technical Committees.

Among the amendments adopted were clarification of sample dividing materials, clarification of how to report moisture content results for some species in Table 2C, addition of a temperature for germination of *Eustoma exaltatum*, addition of Crepe Cellulose Paper for soybean germination, the addition of Agar substrate for germination and in particular for *Pinus* seeds (validation of a quinoa germination method), the possibility to use methylene blue to help in the identification of *Ustilago nuda*, and the harmonisation of seed pre-treatment methods in 5 seed health test protocols.

Within the Executive Committee, good progress was made in setting up an initiative to attract new and younger members to ISTA. ISTA-funded projects are particularly aimed at using new technologies; projects for a new website and electronic certificates are underway.

In the accreditation department, there has been a lot of activity to conduct remote audits postponed from 2019, or planned for 2020, bringing the number of audits to be performed in 2021 to 73. At present, 237 laboratories are members of ISTA, of which 146 are accredited in 82 countries.

Plant Heath Seminar

The Plant Health seminar was organised over 3 days in May 2021. GEVES was involved in the preparation of the seminar, as well giving presentations. The topics covered included regulatory aspects of plant health, new threats (epidemics), regulations, new detection methods and alternative control measures.

Webinaires

GEVES participated in two webinars: (ISTA) Proficiency Tests (PT) Standards, Procedure and Objective and (ISSS/ISTA) Phenotypic plasticity of seed traits.

Alfalfa seed pests: their identities revealed!

Alfalfa is a key legume and can be the target of seed-borne pathogens. A literature review has identified 15 of these pathogens, 4 of which can be seed-borne. This data has added an eleventh crop to the ISTA list of seed-borne pests.

Find out more

Communication

Accueil de visiteurs

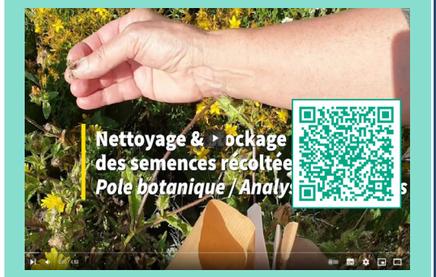
In 2021, GEVES was once again able to receive visitors (after the closed period linked to Covid). Across its units and laboratories, GEVES welcomed about a hundred groups, i.e. 900 people (mainly in person and some by videoconference), to discuss general topics on the variety and seed sector, the missions and activities of GEVES and more technical aspects of these activities. This communication mission is a collective and shared mission, with the involvement of more than 200 GEVES agents across GEVES's different locations this year.

- Various communication actions for the general public were carried out: A presentation/visit was organised at the Anjouère unit in October, as part of the **Regional Company Open Days (Journées régionales de la visite d'entreprise)**, and attracted 50 visitors.
- Experts from the Magneraud unit were present at the **Balade à la ferme** exhibition in La Rochelle in December and to promote the stages from the wheat variety to bread.

At the request of the Young Economic Chamber of Angers, which organised the **national congress of the Young French Economic Chambers** in October 2021, on the theme of agicultural and ecological transition, GEVES created an educational aid, in the form of a plant to provide information and raise awareness (among the 1000 participants) on the role of plant varieties in the agroecological transition.

A botanical garden for seed identification

Why does GEVES cultivate weed species and harvest their seeds? These videos present how the GEVES botanic garden works, and its links with other botanical gardens around the world! Discover how our experts clean the harvested seeds, which are then stored and used for the physical analysis laboratory collections.



Trade shows

The January 2021 edition of the SIVAL show in Angers did not take place due to Covid.

On the other hand, the GEVES teams participated in the Culturales open field trade show for field crop producers organised by Arvalis, at Terralab-Béthény (near Reims), on 15-17 June 2021.

GEVES, as the body responsible for evaluating varieties for marketing authorisation, emphasised the current and future testing criteria and practices that will make it possible to anticipate the "Varieties for tomorrow" for all types of farming. The major role of varieties in supporting changes in practices as well as meeting climate change challenges was underlined. The field crop experts present explained:

- How are tests for national listing in the French Official Catalogue carried out?
- What technical data is produced from these trials (yield, quality, pest resistance and tolerance to abiotic stresses, etc.)
- How and where can these variety references be found?
- How do evaluation methods adapt and make it possible to propose new variety references created collectively to support the agicultural and ecological transition?
- How are the needs of organic agriculture are taken into account by the French Catalogue (presentation at the trade show's Organic Village).

Pour en savoir plus :

50th anniversary of the French Plant Variety Rights system

The French office in charge of examining applications for variety protection received its first application on 10 November 1971 for a vine variety. The system was set up and in its first year of operation offered protection for several species such as wheat, barley, oats, rice, maize, potatoes, peas, beans, lettuce, roses, carnations, flax, tomatoes, strawberries, plums, peaches, pears, quince, cherries, apricots, vines and poplars. Find out more about plant variety protection below.

50th anniversary of France's UPOV membership

France joined the International Union for the Protection of New Varieties of Plants (UPOV) in 1971. France was involved in the creation of UPOV: in 1957, France submitted the idea of organising an international conference, followed four years later, on 2 December 1961, by the signature of the first act establishing UPOV. This particularly important step marked the beginning of a specific sort of protection for plant varieties thanks to an intelligent approach and the determination of a few countries.

Yvanne MERESSE
Directrice de l'INOV

1971-2021: The first years of French variety protection

On the occasion of the 50th anniversary of plant variety protection in France, and the 50th anniversary of France's UPOV membership, INOV is pleased to inform you of the publication of a book which can be consulted here.

The plant variety certificate is a unique system among all intellectual property rights. It is the only right whose object of protection - the variety - is really tested. This book highlights historical elements, provides an understanding of the legislative evolution, and provides statistics on the protection trends of the first fifty years. The year 2021 is an important year. Indeed, the first French law appeared in 1970 with the implementation of its first protection office in 1971. It is also the 50th anniversary of France's membership in the International Union for the Protection of New Varieties of Plants (UPOV). Time to go behind the scenes of this fabulous system! This book is available in French only.

GEVES staff

The GEVES staff are at the centre of the expertise, reliability, rigour, high-quality work, and impartiality that make up GEVES's essential values.

In the continued difficult context due to COVID, their strong investment made it possible to maintain GEVES's activities, despite necessary risk prevention restrictions.

The Quality of Life at Work survey, conducted in November 2021, confirms the commitment of GEVES's staff, the majority of whom are proud to work at GEVES, satisfied with their quality of life at work and ready to recommend GEVES.

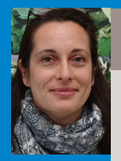
The new GEVES agreement on working from home, adopted in November 2020, was deployed in 2021. It responds to the growing interest to work from home, and helps to support a positive work/life balance.

The investments made in collaborative and remote work contribute to the success of this new change in working methods for a significant portion of GEVES staff.

Particular attention is paid to the training needed to maintain and develop or acquire new skills, which are essential for the quality of expertise.

The modernisation and adaptation of facilities and equipment contribute to improving health and safety at work.

The Economic and Social Committee (CSE) and its committees, which were set up at the beginning of 2020, have played an important role in all these aspects and in the implementation of internal regulations at GEVES, a new set of general regulations for GIP staff and an agreement on the Economic and Social Database at GEVES.



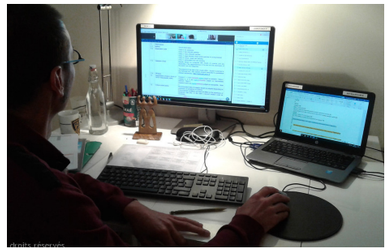
Stéphanie CHRISTIEN
Health, Safety and Working Conditions Committee

Becoming secretary of the CSE Health, Safety and Working Conditions Committee was not something I had originally envisaged, but I was very enthusiastic to join this committee. As a first-aid worker since I was a teenager and following various personal events, I was keen to work on health and safety issues for all GEVES staff. Although strongly impacted by issues related to the Covid crisis from the beginning of its mandate, the CSSCT fully embraced its role in 2021. These actions have made it possible to highlight the strengths of the GEVES in terms of health and safety, as well as points of vigilance that need to be assessed. One of my acheivements in 2021? The ongoing trial of inclusive masks in one of the GEVES teams to help people with hearing impairments maintain communication. My next goal? That the notions of Health and Safety and Improvement of Working Conditions are not just a passing trend, like New Year Resolutions, but that they become automatic for everyone, because we are all players in this field.

Remote and collaborative working

Societal changes, sustainable development and the expansion of our national and international activities are the main challenges of the GEVES mobility strategy. It aims to limit travel in order to reduce the environmental footprint of GEVES, and support a positive work/life balance. In addition, it facilitates collaboration between agents and partners, regardless of their location.

The IT units are continuing to adapt the GEVES IT system, which has been underway for several years.



In 2021, the transformation of the fixed equipment fleet was completed and replaced by mobile peripherals. Despite an exceptional context of shortages, this second phase made it possible to cover all the needs of the agents whose equipment had to be adapted. Thanks to the RDS portal and VPN client, this equipment allows secure access to GEVES data, regardless of the place of work or mission. The particular context of the COVID 19 pandemic and the success of the new teleworking agreement reveal a tenfold increase in the use of these tools.

The project to modernise, harmonise and unify our telephone communication systems began in 2021. Staff at the Brion and Magneraud units now benefit from a solution that allows them to call and be called with a single number on their computer equipment without geographical constraints. The synergy between this new technology and the office automation tools favours exchanges and workstation ergonomics. 2022 will be the year of migration for the remaining units

Working from home: the new normal

In November 2020, a new telework agreement was signed between the GEVES management and the CSE for implementation on 1 January 2021. The Covid crisis and mandatory working from home postponed its entry into force to 1 September 2021. T

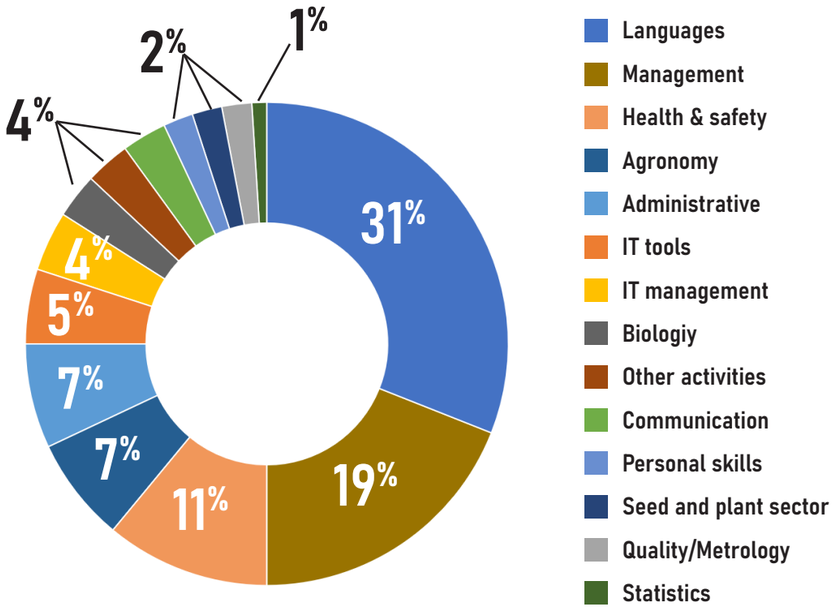
To allow better management and faster follow-up of requests, we opted for a workflow system via our existing Intraqual tool. We accompanied this system with a guide reminding us of good practices for organising our working environment and rhythm in order to avoid RSI and visual fatigue linked to working on a screen and to find the right tools to facilitate remote and collaborative work while remaining cyber vigilant.

As soon as we opened the applications, we noticed a strong interest in this way of working. As a reminder, in 2020, GEVES had only ten or so people teleworking regularly. Since the beginning of 2022, 135 GEVES staff regularly telework between 1 and 2 days a week!

GEVES photo - COVID/quarantine period

In 2021: 4,424 hours of staff training!

Training courses attended by staff in 2021:



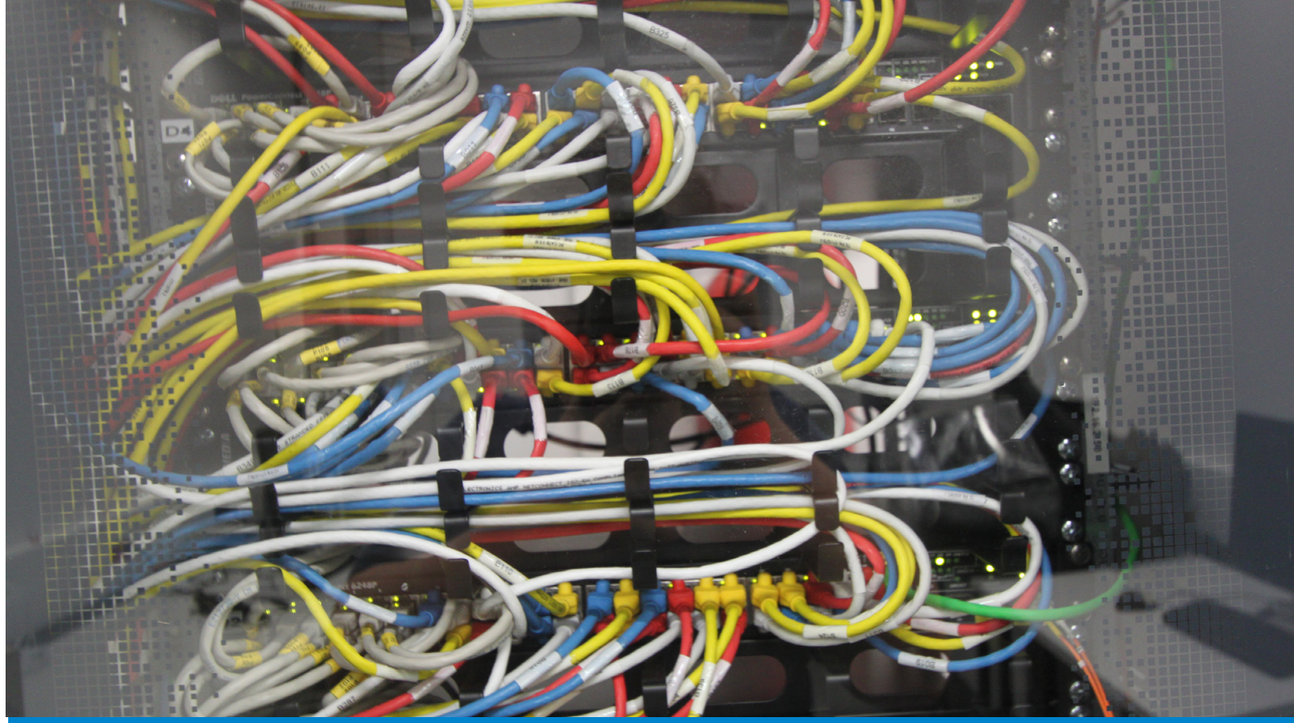
Quality of social dialogue

Set up in January 2020, the new social dialogue bodies - the Social and Economic Committee (CSE) and its commissions - continued and consolidated their activities in 2021 with 8 CSE meetings and 5 CSST (Health, Safety and Working Conditions Commission) meetings.

In 2021, the GEVES internal regulations were drawn up and approved, setting out the terms and conditions for the application of health and safety regulations, the general conditions work organisation and the obligations of staff members, including those relating to professional ethics, in particular provisions relating to impartiality, respect for individuals, prevention of moral or sexual harassment and sexist behaviour, and the general and permanent rules on discipline and staff members' rights of defence.

At the same time, the GIP's general staff regulations were revised. In accordance with the provisions of the GEVES founding agreement, they deal in particular with recruitment, remuneration, leave and social assistance conditions. Approved by the Board of Directors on 14 December 2021, these new general regulations now include provisions relating to temporary or seasonal staff, the taking into account of gender diversity in the recruitment process and the creation of a sustainable mobility bonus.

An agreement on the establishment of an economic and social database at the GEVES has been prepared. It should enable the CSE to have access to all the information necessary to usefully exercise its competences.



Christelle LAVAUD
IT team

I have been working in the IT department since 2003 after various enriching experiences in different sectors of GEVES. In my first role, I worked on analysing rapeseed distinctness using molecular markers in the BioGEVES laboratory. Then in the SEV, I coordinated the interface between users and the IT department for various projects such as GAIA or the implementation of variety description sheets. In my current role on the Systems and Networks team, based at the Magneraud station, I sometimes install equipment and provide first-level maintenance, or answer users' questions on the daily use of the machines and software installed. But these activities have changed considerably in recent years! The centralisation and harmonisation of backups, the deployment of supervision tools and, most recently, the increase in working from home has made tasks considerably easier.

For the development and evolution of our applications, technological and methodological change is also underway. Three members of the team have now been trained in a new tool, enabling us to provide users with personalised and interactive data display interfaces that highlight the data produced by all GEVES sectors.

The growing number of operational projects has led us to implement tools to support users in IT project management with more efficiency and structure. The collaboration and involvement of users throughout the project is essential, but a balance must be found in order to continue their core business activities. We are moving forward step-by-step to meet all these new challenges!

Commitment to sustainable practices & modernising facilities

As a national evaluation office and official laboratory for a rapidly evolving seed and plant production sector, the activities of GEVES are also evolving, and consequently the needs for facilities and equipment.

In 2021, new ornamental plant testing facilities were completed in order to adapt to the increase in this activity at GEVES's Brion station, in substitution for the United Kingdom as a result of Brexit. A new series of major investments were also completed at the Cavaillon unit.

Furthermore, the SNES laboratories in Beaucouzé date back almost thirty years: it is essential to modernise them in order to improve working conditions, reinforce health and safety and adapt laboratory capacities. The first construction phase was carried out in 2021.

The modernisation of facilities and development of activities are also aimed at making GEVES's missions more sustainable, with a strong commitment to the agro-ecological transition of its experimental fields. At the same time, an action plan has been drawn up to reduce GEVES's energy dependence, which will be implemented in 2022.

New greenhouse at the Brion station

The recent addition of more than 300 species and interspecific crosses evaluated for DUS has required GEVES to invest in new infrastructures. At the Brion station, new facilities include a 1500m² platform for potted plants, mainly dedicated to chrysanthemum DUS tests; and a 2400m² greenhouse including an 1100m² compartment that is entirely insect-proof, equipped with a shading and cooling system with roof sprinklers. It houses more than 1300 varieties of the national Chrysanthemum collection of the natural season type. The rest of the greenhouse is more versatile to accommodate other ornamental/aromatic/perfume/medicinal species activities (cutting, potting, rearing and overwintering of plants) as well as activities related to the unit's missions for vegetable species (DUS and variety check trials) and plant genetic resources (safeguarding and characterisation of orphan species accessions). This greenhouse is equipped with a powerful boiler room and fertilisation station that benefit the other greenhouses and tunnels of the station, contributing to securing the quality of trials under cover.

New construction work phrase at the Cavaillon-Carpentras station

For several years now, GEVES has been modernising the facilities at the Cavaillon-Carpentras unit, built in 1978, to meet the increase in activity and adapt to new needs related to studies on ornamental species. At the end of 2021, a 700m² glass greenhouse was delivered, ensuring better control of seedling production for some forty vegetable species, while freeing up space for perennial collections of ornamental species. A new natural gas boiler room now supplies the station's horticultural infrastructures. Specialising in fruit vegetables, the unit will now benefit from a new 300m² observation room that will facilitate the flow, observation and conservation of plant material throughout the year. 250m² of office space and 450m² of new sheds complete these works, which will help to adapt the working environment and maintain the quality of trials.

Laboratory renovations underway!

Works to modernise and renovate the SNES facilities was launched in 2021. They have the dual aim of improving working conditions and health and safety (sound, heat, ergonomics and air treatment) and adapting capacities to changing demands. In 2021, these works concerned :

Sampling laboratory and customer services:

- Construction of a new sample reception room
- Installation of a dividing room with new dividing stations co-designed with the GEVES teams
- Construction of two sampling chambers (entry/exit) to create a one-way process and a dressing chamber
- Renovation of offices

Before/After: Sampling laboratory

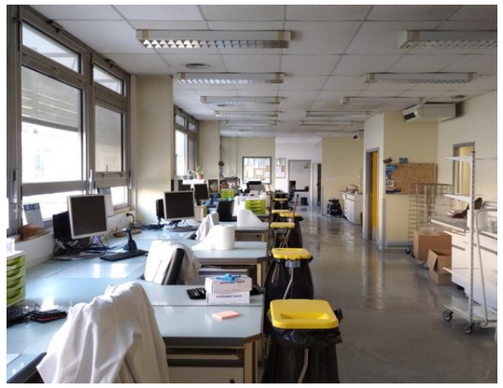

Before/After: Customer services


Germination laboratory:

- Installation of innovative suction systems on each bench. These new benches were co-designed with the GEVES teams
- Creation of a space dedicated to application of seed solutions and chemical product storage

Before/After Germination Laboratory






During the construction works, temporary work areas were set up to maintain activity, in strict compliance with the quality systems in force. The daily commitment of the SNES teams made it possible to carry out testing activities and these important building works simultaneously. This modernisation of the GEVES laboratories will be spread over several years. Renovation works in the Physical Analysis laboratory, which will be carried out in 2022, were prepared in 2021.

Agroecology at GEVES's experimental units

Launched in 2018, the first measures were aimed at reducing the use of pesticides, in particular the use of CMR substances and glyphosate, while maintaining a high level of results in our trials.

Targeted investments have been made: mechanical weeding equipment (hoe, rotary hoe, spiked harrow, etc.) equipped with a self-guiding system, shredders and cultivators to facilitate the mechanical destruction of plant cover, and unwinders/rollers to facilitate the use of insect-proof nets.

By increasing the use of hoeing, mechanically destroying intercropping cover crops and by being more selective in our use of plant protection products, a descreasing trend in the use of pesticides has been observed at GEVES over 4 years: compared to 2018, the use of CMRs in 2021 has decreased by 50% and use of glyphosate has decreased by 75%.

The evolution of cultivation practices at our experimental stations also aims to foster functional biodiversity and improve soil fertility and irrigation practices.

Concrete actions have been undertaken: systematic planting of plant cover composed of complex mixtures during intercropping, creation of grass and flower strips with adapted management, planting of hedgerows, installation of perches for birds of prey and bird nesting boxes, diversification of rotations with the introduction of new crops (lentil/camelina mixtures, spring oats, soya, sorghum, etc.), introduction of plant cover in place of cash crops at the limit of economic profitability, introduction of drip irrigation on ornamental shrub collections.

Training courses at local and national scale have been set up (soil conservation agriculture, mechanical weeding, economical irrigation management, etc.) as well as participation in groups for discussion and exchange on agro-ecological practices, particularly with INRAE experimental units.

In order to gain recognition for these agroecological orientations, a feasibility study for HEV certification has been undertaken.

Philippe GARREAU
Germination Laboratory Team Manager

Renovation works on the germination laboratory carried out between March and December: a project in two phases with real added-value.

The first phase was to work out an organisation in terms of space and management of the flow of tests to ensure continuity of the laboratory's activities.

The second phase was the integration of the new laboratories, which allowed us to improve hygiene, safety and ergonomics for better working conditions.

GEVES: a unique & official organisation in France

GEVES is a **Public Interest Group** with three founding partner organisations:

- French National Research Institute for Agriculture, Food and Environment (INRAE) - 60%
- French Ministry of Agriculture and Food (MAA) - 20%
- French Interprofessional Organisation for Seeds and Plants (SEMAE) pour 20 %

This unique set-up ensures GEVES's **independence** and **neutrality** in carrying out its activities in accordance with its regulatory and official missions and mandates. The union of state, research and sector expertise ensures that all aspects of the sector are fully taken into account.

Governance of GEVES

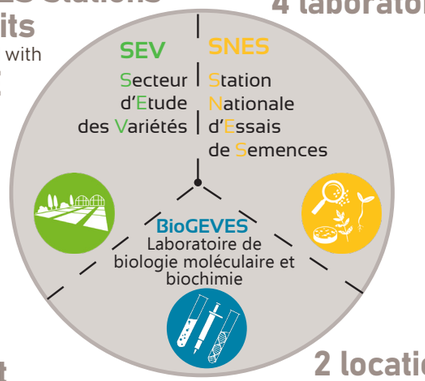
GEVES's Executive Board of Directors is composed of 13 members:

- 6 representatives from INRAE
- 2 representatives from the French Ministry of Agriculture and Food
- 2 representatives from SEMAE
- 2 staff representatives from GEVES
- The President of the CTPS

as well as a government controller (Ministry of Research) and a State Controller.

Organisation of GEVES in 3 operating divisions

5 GEVES stations & 7 units associated with **INRAE** centres



4 laboratories

2 locations 3 units

+ support services

Activities

To carry out its missions, GEVES performs a wide range of activities:

- Description of varieties and evaluation of genetic progress
- Quality testing for seeds and seedlings
- Methodological research
- Management of plant genetic resources
- Training courses
- Consulting and expertise
- International cooperation
- Monitoring of the French network of seed testing laboratories
- Organisation of Proficiency Tests (PT)
- Communication

GEVES's missions

GEVES has official, regulatory missions and carries out testing activities and methodological development for:

- National listing of new varieties in the Official French Catalogue
- Plant variety protection
- Official seed testing as part of its NRL mandates for seeds, GMOs. and plant health (RNQP-matrix seeds)

GEVES is also responsible for the national coordination of plant genetic resources on behalf of the Ministry of Agriculture

GEVES is the National Reference Laboratory for:

- GMO detection: GMOs in maize (seed) and soya, rapeseed and flax (seed and vegetative parts) by Decree of 19 octobre 2011
- quality testing of seeds and propagating material by Decree of 1 March 2017
- plant health by Decree of 20 November 2020

GEVES is as an approved laboratory for certain seed health quality tests and accredited by ISTA for all species. It carries out official testing, particularly for seed exports: for phytosanitary passports and certificates as well as Orange and Blue International Certificates. GEVES makes its specialised expertise openly available to the plant and seed sectors, providing high-quality services to a range of private clients.

FOCUS

Quality, Recognition & Accreditation

N° 2018/78826.1

ACCREDITATION N°1-1316 et N°1-6176 Listes des sites et portées disponibles sur www.cofrac.fr

ISTA ACCREDITED LABORATORY FRDL0200

GEVES benefits from a global and harmonised Quality Management System.
GEVES is recognised as follows:

- Certification ISO 9001: version 2015 - BioGEVES and VCUS variety testing (Value for Cultivation, Use and Sustainability)
- Accreditation of GEVES's SNES and BioGEVES laboratories by Cofrac according to ISO 17025 standard
  - GEVES Beaucouzé: Cofrac N°1-1316 (since 2002)
  - GEVES Le Magneraud: Cofrac N°1-6176 (since 2004)
- Accreditation by ISTA since 2001 (N°FRDL0200) for seed testing
- Entrusted by the CPVO for DUS variety testing since 2012.

Annual Report 2021 Annexes

- ✔ Variety testing activities 55
- ✔ Varieties registered in the French Catalogue in 2021 60
- ✔ Quality testing for seeds and varieties 62
- ✔ Resources 68
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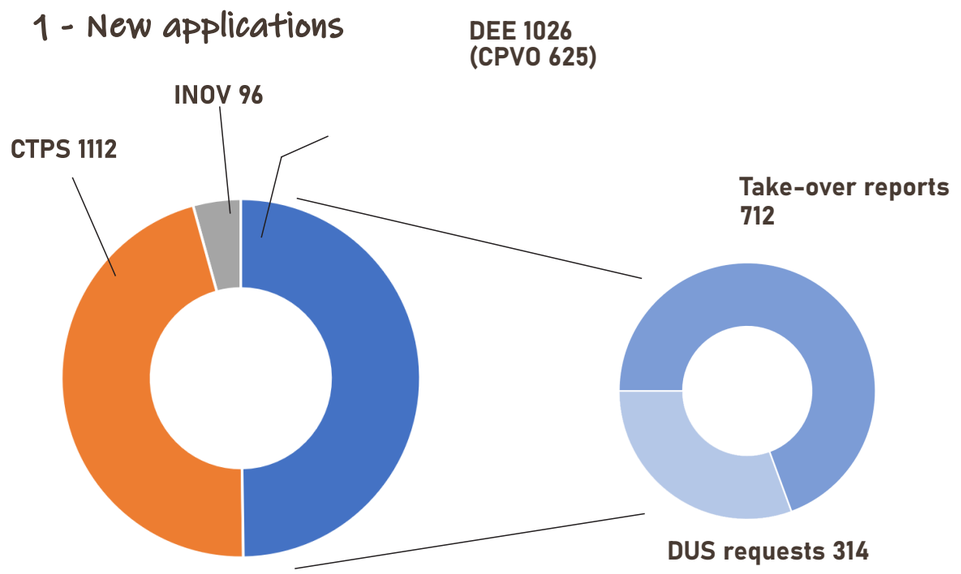
Variety testing activities

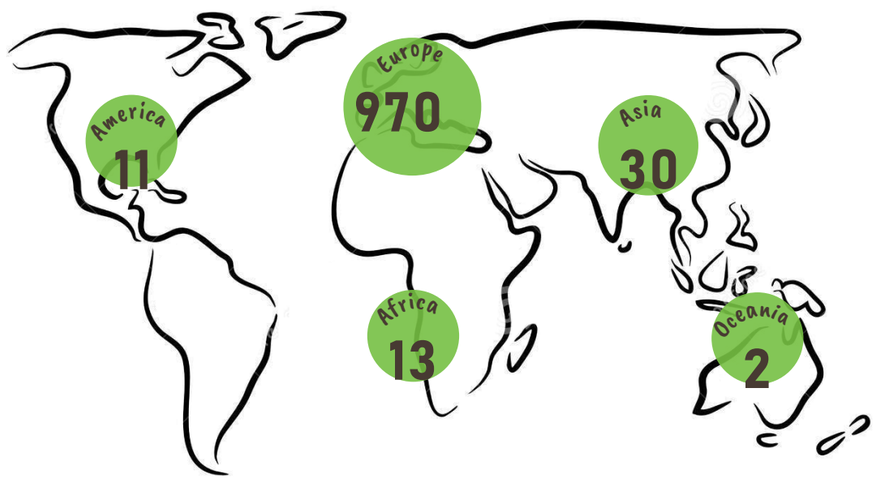


Applications from abroad - DEE

70% take-over reports

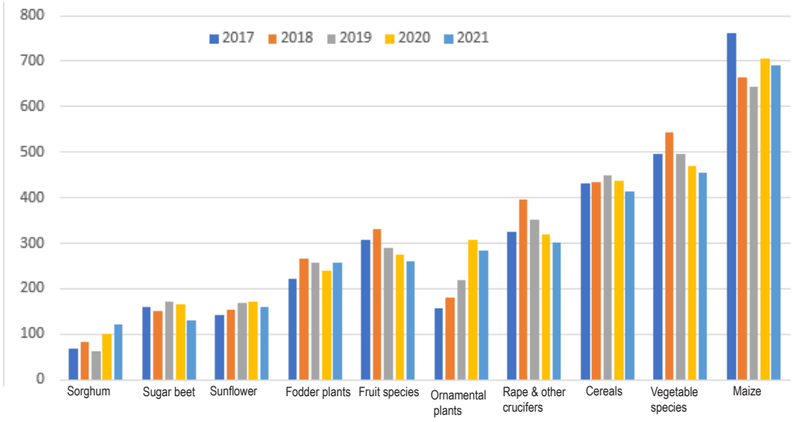
30% new DUS studies for:

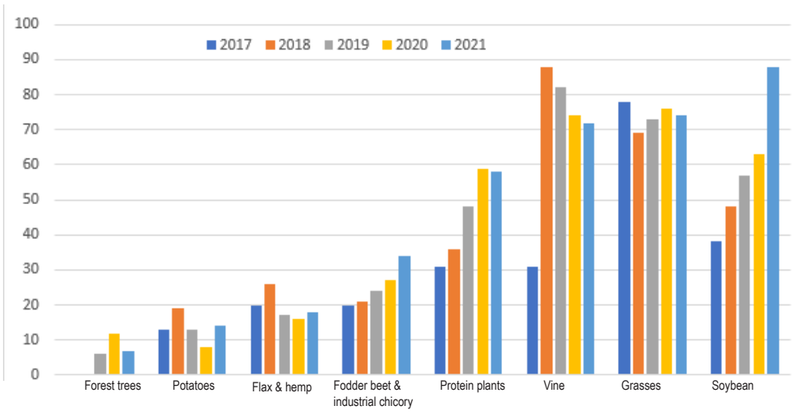
- ▸ CPVO: 219 dossiers
- ▸ Netherlands: 27 applications,
- ▸ Germany: 26 applications,
- ▸ Switzerland: 16 applications,
- ▸ Denmark: 15 applications
- ▸ Belgium: 7 applications.



2 - DUS studies

Evolution of no. DUS cycles from 2017 to 2021





Total volume DUS: 3455 cycles across 152 species

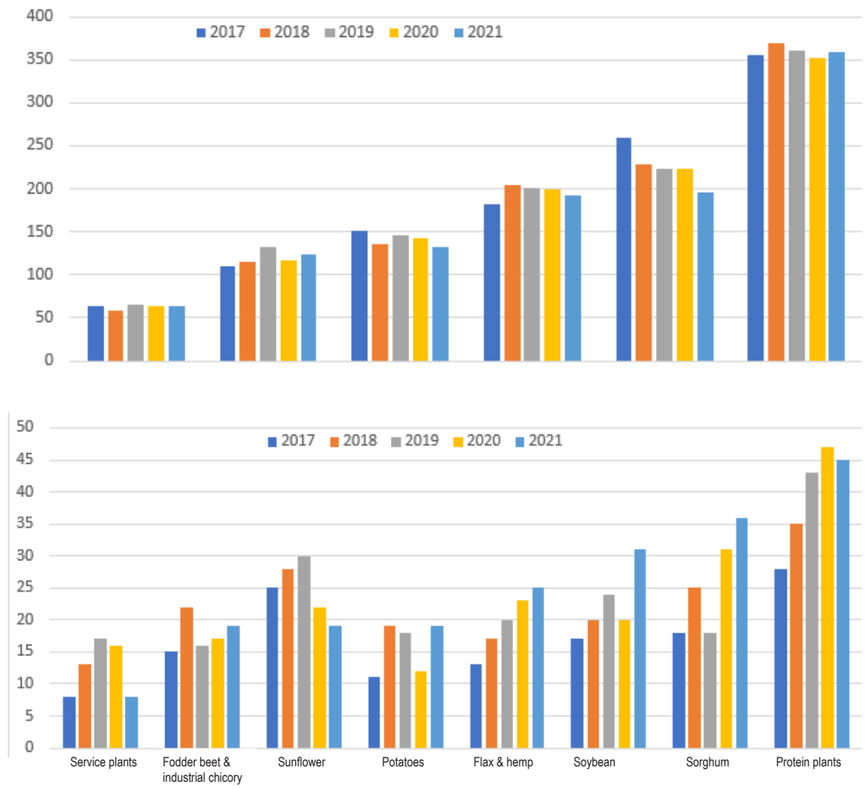
- **2 712** conducted at GEVES
- **481** subcontracted to other organisations (INRAE or other)
- **262** subcontracted to other EU examination offices

DUS reference collections

Total no. of varieties making up the collection	2021
Beet & industrial chicory	1684
Cereals	6155
Rape & other crucifers	4459
Flax & hemp	328
Maize & sorghum	12348
Fodder & grass plants	3428
Protein plants	1874
Sunflower & soybean	3301
Total agricultural species	33577
Vegetable species	29586
Ornamental species maintained in vivo at GEVES	3052
TOTAL	66215

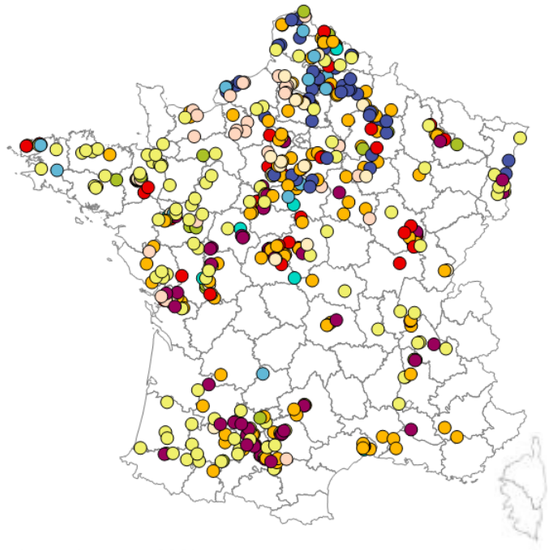
3 - VCUS studies

Evolution of no. of VCUS cycles from 2017 to 2021



Total VCUS volume: 1,261 study cycles across 58 species + 137 optional assessments

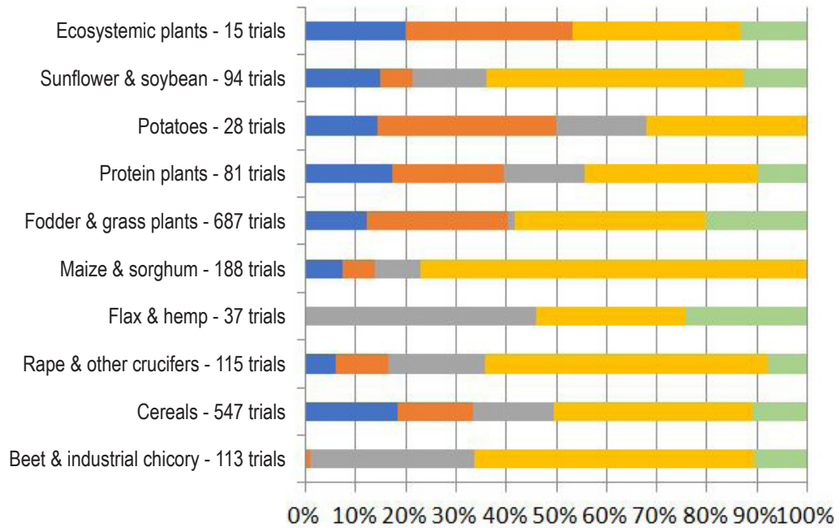
VCUS trial network



1905 VATE trials including :
- **1475** trials for evaluation of overall value
- **373** trials for study of specific characteristics (behaviour against pests, lodging, cold, earliness, etc.)
- **53** trials at breeder's request to check one or more variety characteristics (specific quality profiles, behaviour against pests, behaviour under certain management, etc.). This concerns nearly 10% of candidate varieties.

Variety testing activities

VCUS networks: multi-partner networks



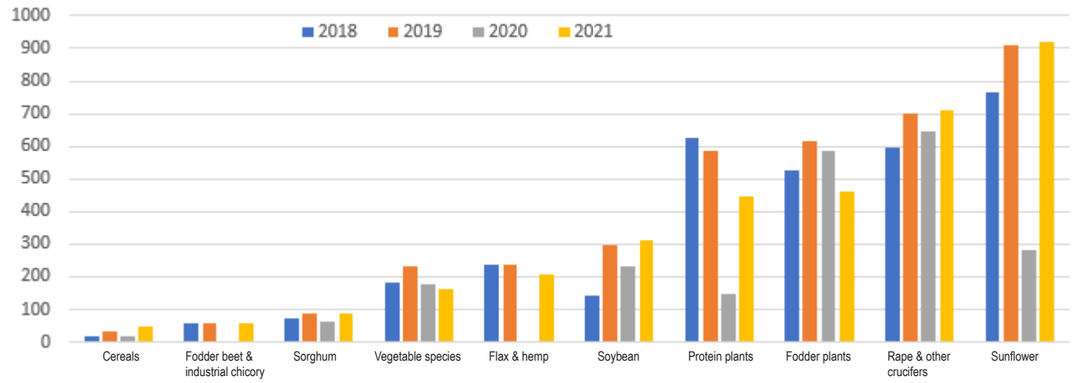
ITA: Agricultural Technical Institutes

Other: professional organisations, agricultural schools & colleges, cooperatives/trade unions, international counterparts.

Evaluation of the value of use in the laboratory: 40,000 technological tests carried out at GEVES or in partner laboratories

4 - Variety checks

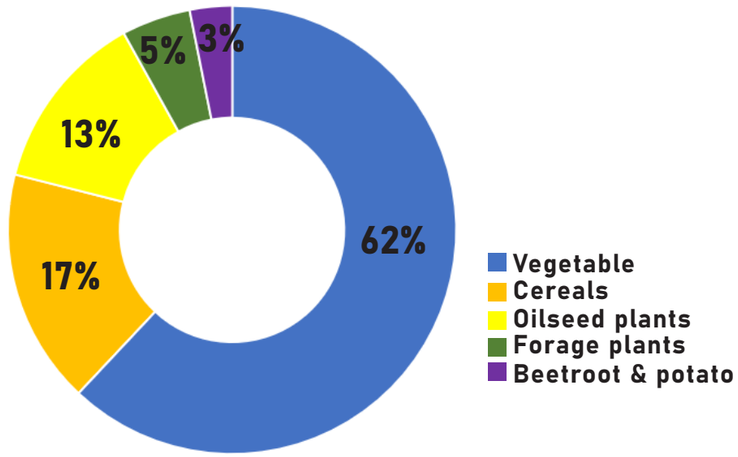
Evolution of no. of lots inspected for SEMAE



Varietal checks are mainly carried out on behalf of SEMAE as part of seed lot certification in order to verify variety identity and purity.
For maize, controls are carried out by INRAE and FNPSMS; and for cereals, by Arvalis. GEVES provides the corresponding reference sample: 850 lots in 2021.
135 controls were also carried out for other clients.

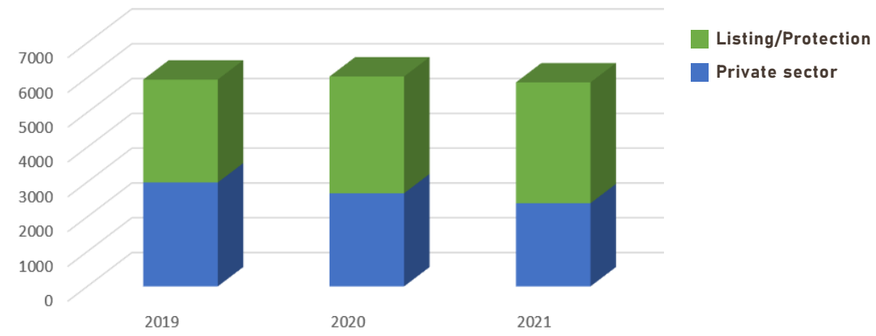
Variety testing activities

5 - Variety evaluation activity in a controlled environment and inoculum production

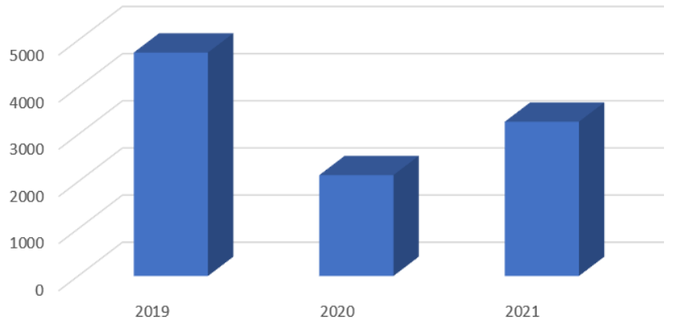


5863 tests in 2021

Evolution and distribution of Variety Resistance activity



Evolution and distribution of inoculum activity between 2019 and 2021



Varieties registered in the French Official Catalogue in 2021

See all varieties registered in the Official French Catalogue: www.geves.fr/catalogue/

Varieties registered by order of the Ministry of Agriculture and Food, on the proposal of the CTPS and based on the evaluations carried out by GEVES for the following lists:

A: Agricultural varieties whose seed can be multiplied and marketed in France and the EU

B: Agricultural varieties whose seeds can be multiplied in France for export outside the EU

C: Conservation varieties grown in specific regions, threatened by genetic erosion and marketable in the region of origin

P: Hybrid components

AGRICULTURAL SPECIES	A	B	P	TOTAL
Beet & Idustrial Chicory	**46**	**3**	**0**	**49**
Fodder beet	4			4
Sugar beet	39	3		42
Indstrial chicory	3			3
Cereals	**56**	**26**	**4**	**86**
Spring oat	1			1
Winter oat	1			1
Spring naked oat	2			2
Durum wheat	1	1		2
Common winter wheat	33	15	2	50
2-row spring barley	5	5		10
2-row winter barley	3	2		5
6-row winter barley	9	3	2	14
Rice	1			1
Triticale	3	1		4
Rape & other crucifers	**31**	**8**	**0**	**39**
Winter oilseed rape	26	7		33
Fodder radish	2			2
White mustard	1	1		2
Brown mustard	2			2
Lin et Chanvre	**7**	**2**	**0**	**9**
Hemp		2		2
Spring flax	5			5
Spring Linseed	1			1
Winter Linseed	1			1
Maize & sorghum	**47**	**55**	**0**	**102**
Maize	44	51		95
Fodder sorghum	1			1
Sorgho	2	4		6
Fodder & Grass Plants	**38**	**2**	**0**	**40**
Cocksfoot	5			5
Tall fescue - fodder	1			1
Tall fescue - grass	2			2
Slender creeping red fescues	2			2
Chewings fescue	1			1
Strong creeping red fescues	1			1
Lucerne	3			3
Fodder perennial ryegrass	5			5
Turfgrass perennial ryegrass	3	1		4
Italian ryegrass (annual type)	5	1		6
Italian ryegrass	2	0		2
Hybrid ryegrass	2			2
White clover	1			1
Balansa Clover	1			1
Arrow-leaf clover	1			1
Red clover	3			3
Protein plants	**39**	**0**	**0**	**39**
Spring field bean	6			6
Winter field bean	3			3
Lentil	5			5
White lupin	1			1
Chickpea	2			2
Spring protein pea	14			14
Winter protein pea	8			8
Potatoes	**4**	**1**	**0**	**5**
Potatoes	3	1		4
Potatoes - starch industry	1			1
Sunflower, Soybean	**13**	**10**	**0**	**23**
Soybean	4	1		5
Sunflower	9	9		18
Vine	**7**	**0**	**0**	**7**
Vine	7			7
				0
TOTAL agricultural species	**288**	**107**	**4**	**399**

Varieties registered in the French Official Catalogue in 2021

a: Varieties whose seed may be certified "basic seed" or "certified seed" or controlled as "standard seed"and marketed in France.

b: Varieties whose seed can be controlled only as "standard seed" and marketed in France.

c: Conservation varieties grown in specific regions, threatened by genetic erosion and marketable in their region of origin

d: Varieties without intrinsic value for commercial production but created to meet specific growing conditions and marketable in France

VEGETABLE SPECIES	a	b	d	TOTAL
Garlic	1			1
Aubergine	3			3
Carot	1			1
Leaf chicory, (Italian type, Witloof)	2			2
Endive	2			2
Brocoli	2			2
White cabbage	2			2
Cauliflower	11			11
Savoy cabbage		1		1
Courgette	13		1	14
Shallot	1			1
French bean	4			4
Lagenaria siceraria	1			1
Lettuce	26			26
Corn salad/lamb's lettuce	3			3
Sweet or pop corn	3			3
Melon	1			1
Watermelon	2			2
Turnip		1		1
Onion	4			4
Pepper	12	1		13
Spinach beet	1		1	2
Pea	3			3
Radish	1			1
Solanum lycopersicum x solanum habrochaïtes	2			2
Tomato	48			48
Total vegetable species	**149**	**3**	**2**	**154**

List 1: Varieties with an official description whose seedlings may be marketed and certified within the European Union

List 2: Varieties with an officially recognised description and marketed for the first time before 30/09/2012, whose propagating material may be marketed within the European Union (certification on a case by case basis)

List A: Varieties whose propagating material may be marketed within the European Union

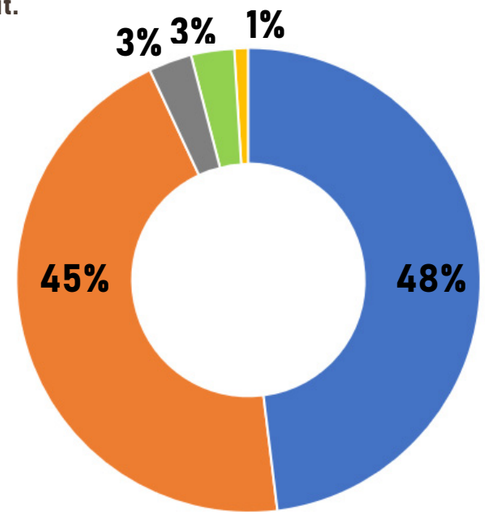
FRUIT SPECIES	List 1	List 2	TOTAL
Stone fruit	**17**	**75**	**92**
Abricot	4		4
Olive		74	74
Peach	11		11
plum		1	1
Japanese Plum and hybrids	2		2
Pome fruit	**2**		**2**
Apple	2		2
Small fruit		**11**	**11**
Raspberry		11	11
Other	4	7	11
Sweet Cherry	4		4
Clementine		1	1
Mediterranean Mandarin		1	1
Orange		5	5
Total fruit species	**23**	**93**	**116**

TOTAL varieties registered in the French Catalogue in 2021:
Agricultural + vegetable + fruit varieties = **669**

Seed quality testing activities

In 2021, 89280 tests were carried out.

Regulatory tests represent 50% of the activity. A very large part of the sector's testing is devoted to tests seed exportation: Orange International Certificates (OIC) and Blue International Certificates (BIC), seed health tests and counting of invasive plant species for phytosanitary certificates.



Seed sector
Regulatory - SOC
Listing - Protection
Regulatory – Regional Food Dept./ Fraud
Other

Breakdown of tests performed in 2020 by species group

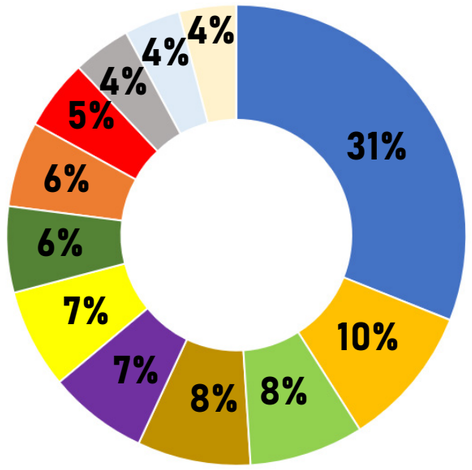
Seed sector: tests for private operators in the context of R&D, production or national/international trade (OIC, phytosanitary certificate tests, etc.)

Regulatory – Regional Food Dept./Fraud: tests for public authorities such as the Regional Food Service and the Regional Directorate for Food, Agriculture and Forestry.

Regulatory - SOC: tests for the SOC as part of the certification of commercial lots, monitoring of recognised company laboratories, commercial and territorial controls and phytosanitary passports.

Listing - Protection: analyses commissioned by the CTPS for variety registration and for the CPVO and INOV for the plant variety protection.

Other: tests carried out in the framework of development and validation of methods, studies and profiency tests.



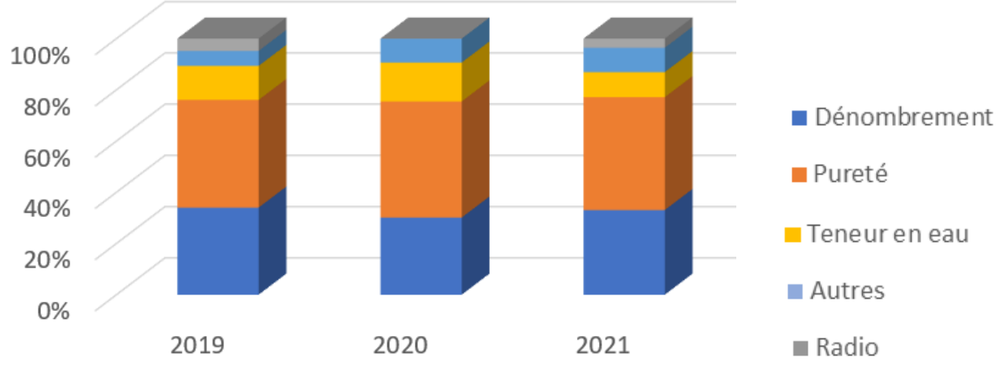
Vegetable
Cereals
Protein plants excl. soy
Fibre plants
Beetroot
Oilseed (rape) & Crucifers
Fodder legumes
Maize & sorghum
Oilseed other (sunflower)
Soy
Other
Fodder grasses

Activities by laboratory

Seed physical quality tests

27,120 tests

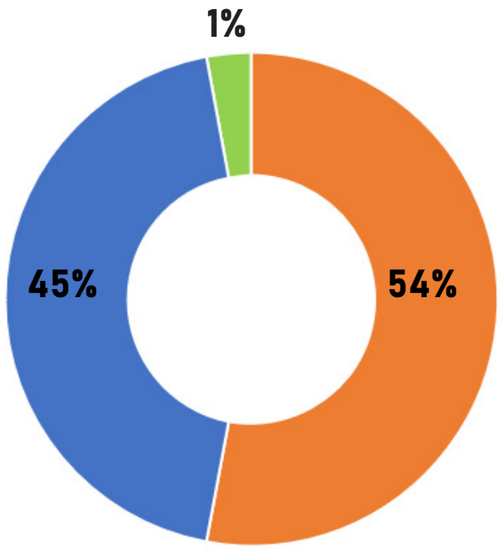
Breakdown by activity



More than 27,000 tests performed in 2021. The slight decrease is mainly due to the evolution of certain technical regulations abolishing water content tests for the certification of certain species (flax).

Breakdown by requestor

Seed sector
Regulatory - SOC
Listing - Protection

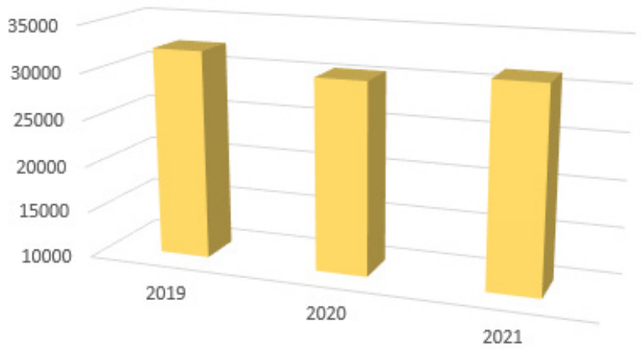


Activities by laboratory

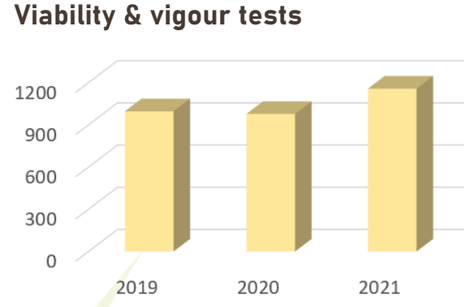
Seed germination quality tests

32,634 tests

Germination tests

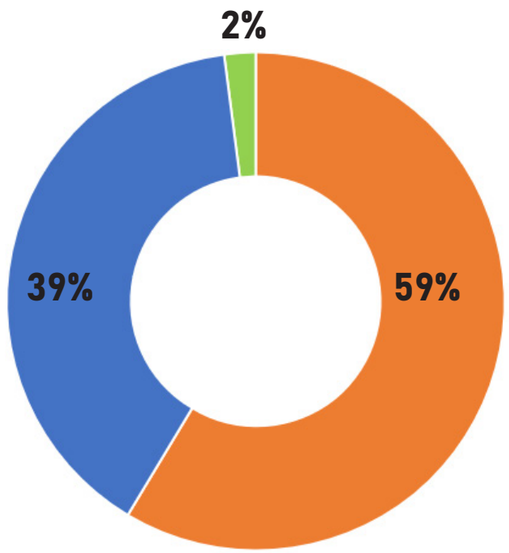


Viability & vigour tests



Breakdown by requestor

Seed sector
Regulatory - SOC
Listing - Protection

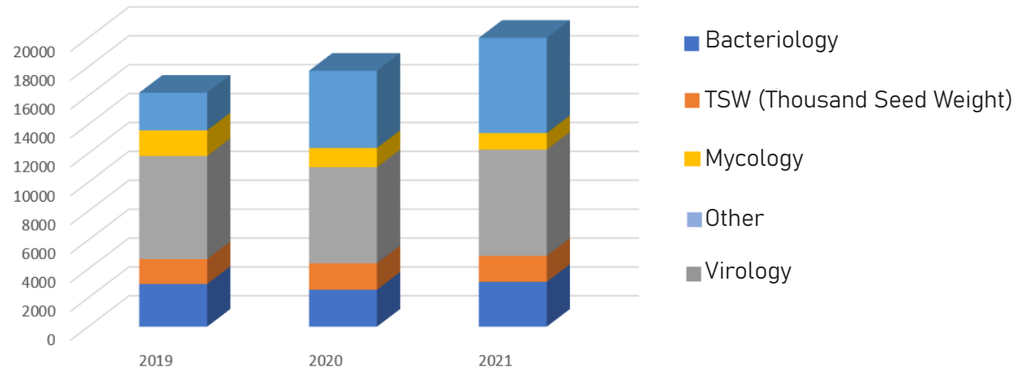


Activities by laboratory

Seed health quality tests

Breakdown by activity

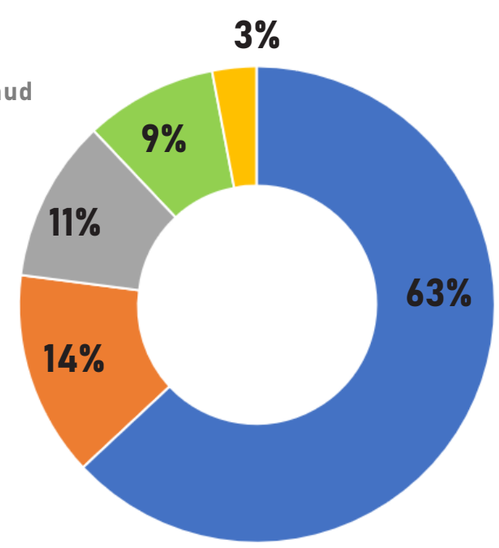
21,737 tests



Breakdown by requestor

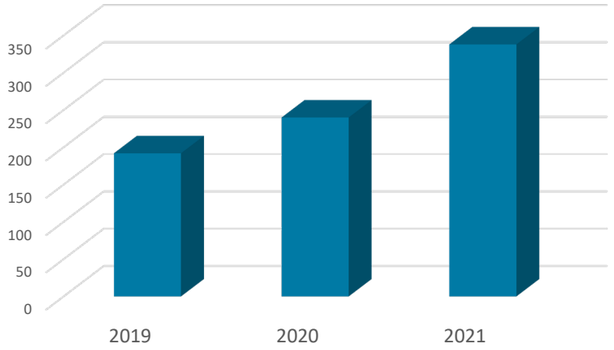
Seed sector
Regulatory - SOC
Listing - Protection
RegulatoryRegional Food Dept./Fraud
Other

Sharp increase in seed health testing, particularly for the seed trade (phytosanitary certificates and passports, etc.) and tests for ToBRFV detection, for which capacities have been increased fivefold this year



Laboratory activities

Laboratory activity: Evaluation of the effect of treatments (biocontrol, biostimulation, alternative treatments, etc.) on seeds and seedlings under controlled conditions



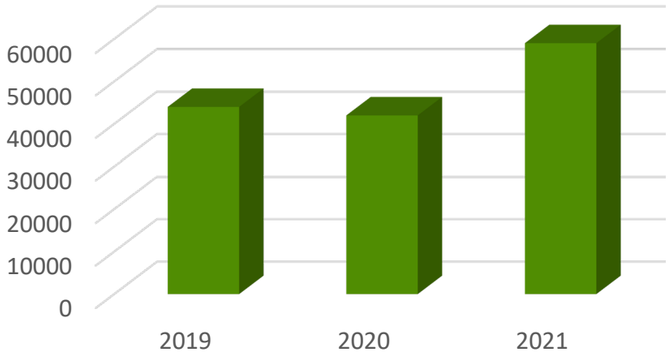
Development of this activity in relation to the agro-ecological transition, in all areas (biostimulation, biocontrol, other treatments). The activity also includes a strong R&D component (development of pathotests)

Laboratory activity: Phenotyping of seeds

PHENOTIC SEMENCES & PLANTES

Phenotic – images analysed

The Phenotic platform is a research platform for seed and plant phenotyping. It is the result of collaboration between INRAE, GEVES, the University of Angers and the Institut Agro site d'Angers
GEVES contributes skills and equipment for seed phenotyping: germination benches, Eloncam, Tomograph.
In 2021, the activity increased in terms of image analysis, in particular due to the QUALILEV and SUCSEED research projects.



IT Systems

3 Departments

Databases & Developments | Systems & Networks | Biostatistics

16 staff

28 strategic projects over **3** years

An evolving IT team to respond to the 2030 strategy

7 new technologies (programming, CRM, automatic dashboards, application flows, cloud, remote collaboration, biostatistical platform, etc.)

2 new management tools (ticket management, project management)

A flexible, robust and secure IT infrastructure

5 clusters & **25** hypervisors

150 virtual servers

1 000 To of useful data

Data valorisation

5 client databases merged with the CRM project

1 industrialisation project of data sharing with partners

3 data publication projects: API Agro Catalogue, Vegetable DUS, VCUS Maize (VarMaïs)

Adapting to new uses and societal transformations

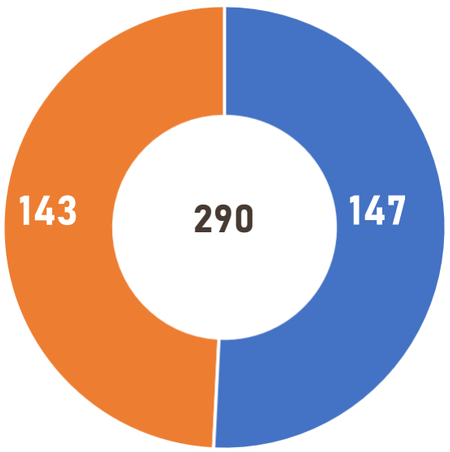
150 mobile stations

1 telephony accessible on all equipment (telephones, computers, etc.)

2 secure remote access technologies (VPN and virtual offices)

Human Resources 2021

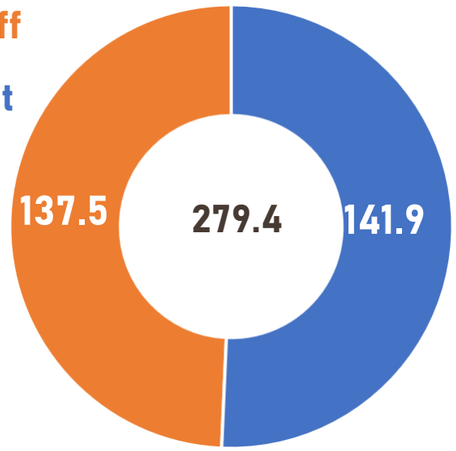
Natural persons
31/12/2021



INRAE staff

Permanent GIP staff (CDI)

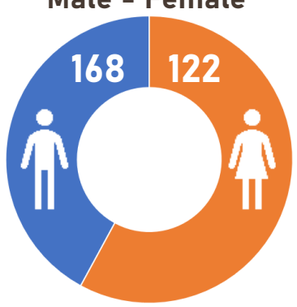
Full Time Equivalent
31/12/2021



Fixed-term GIP staff (CDD)

207 staff recruited ⇨ 82,91 full time equivalent

Male - Female



GIP staff average age: 43

INRAE staff average age: 48

56 staff over 55 years

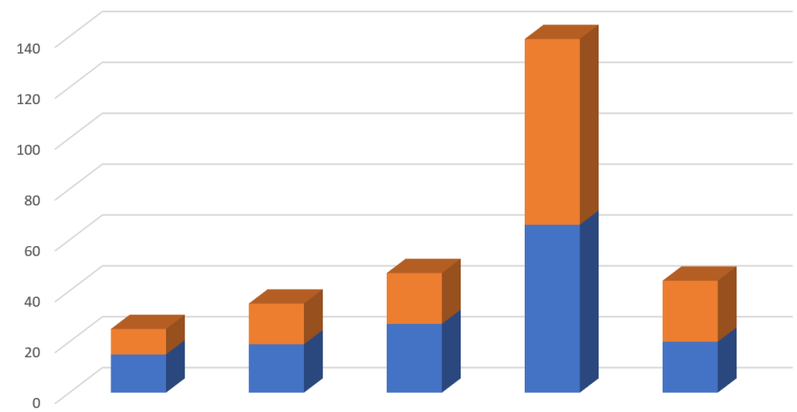
9 staff over 60 years

Permanent staff	GIP	INRAE	TOTAL
New staff	15	5	20
Departures	8	6	14

Human Resources 2021

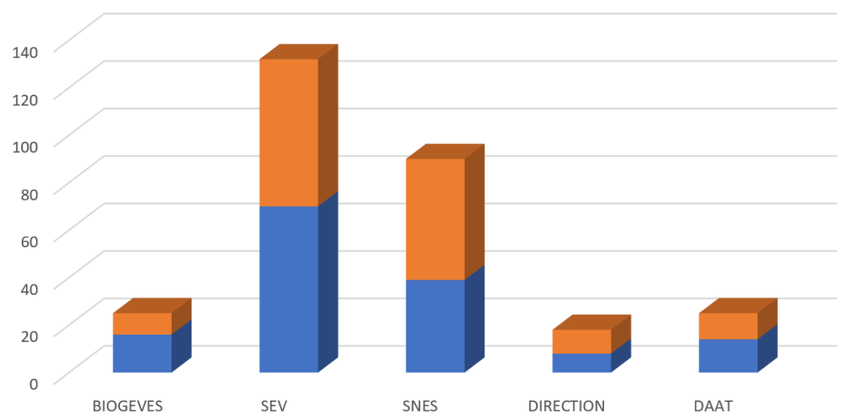
Breakdown by grade and status

CDI GIP INRAE



Breakdown by sector and status

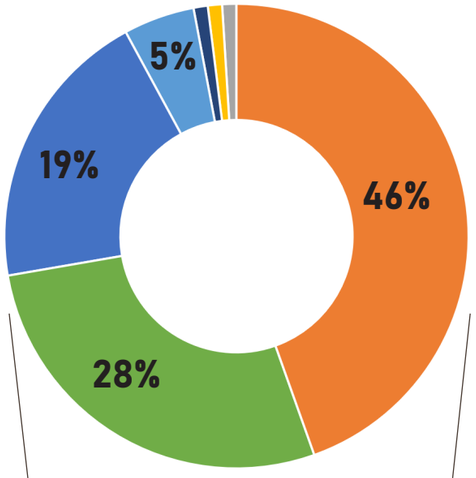
CDI GIP INRAE



Budget 2021

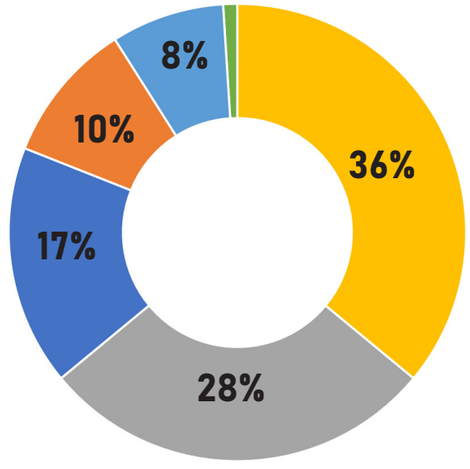
Operating income: 30 420 K€

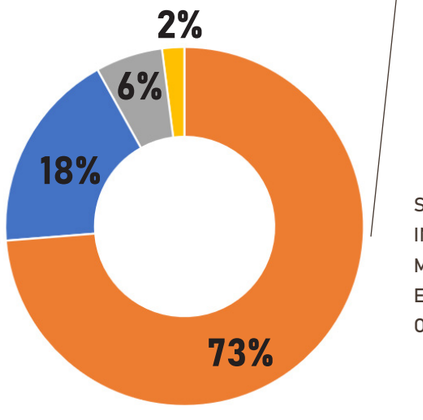
Seed testing revenue	19%
Variety testing revenue	46%
Other services revenue	1%
Subsisdies/agreements	5%
INRAE funding	28%
Other products	1%



Operating costs: 30 627 K€

Purchases	17%
External costs	10%
INRAE funding	28%
Staff costs	36%
Depreciations	8%
Other costs	1%



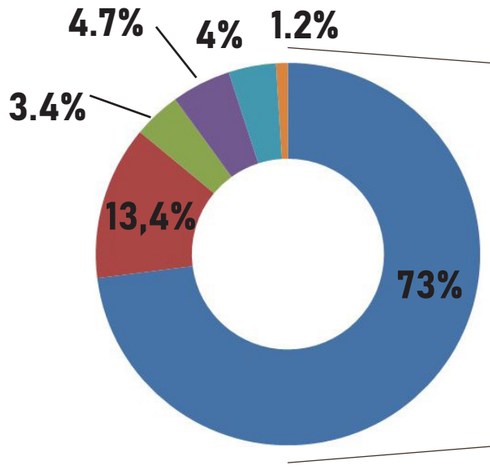


	amount in K€	in %
SEMAE	2 177	18
INRAE	8 606	73
Ministry of Agri.	669	6
EU	290	2
Others	39	0

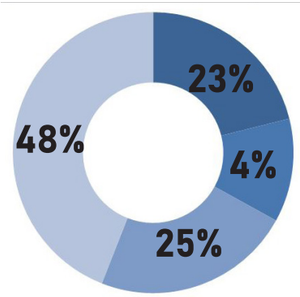
Contributions from GEVES founding members and other bodies

Budget 2021

2021 Investments



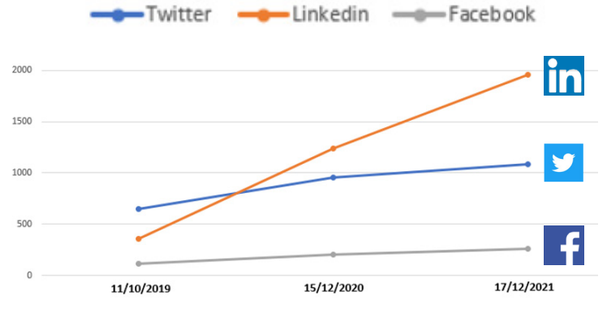
Development/construction	73,0%
Agricultural material	13,4%
Scientific material	3,4%
IT projects	4,7%
IT	4,0%
Diverse	1,2%



Development/construction	4%
Development ornamental facilities	23%
Cavaillon Unit renovation	48%
SNES lab renovation	25%

Communication

- Increase in followers:



- Monthly GEVES Info newsletter:

- ✔ **54 144** emails sent in 2021
- ✔ **4448** subscribers in Jan. 2021 (Fr + En)
- ✔ **4793** subscribers in Dec. 2021 (Fr + En)

[See all newsletters and subscribe]

GEVES's Resources

Laboratories & experimental fields

Locations	Lab surface area (m²)	Surface area of cold rooms, growing rooms (m²)	Greenhouse & tunnel surface area (m²)	Field surface area (eha)	Surface provided (en ha)
Beaucouzé	2 360	980	430		
Anjouère			1 200	175.1	18
Brion		100	6 481	35.2	2.4
Le Magneraud	365	590		73.9	59
Montpellier				39.6	3
Cavaillon Carpentras		146	8 260	57.5	-
TOTAL	2 725	1 816	16 371	379.8	82.4

Experimental surface areas

Locations	Trials surface area		% DUS & CV trials surface area	% VCUS trials surface area	% Other trials surface area	No. species tested
	Field (ha)	Sheltered (m²)				
Anjouère	33.20	350	71	28	1	73
Brion	5.22	3 100	98	-	2	51
Le Magneraud	22.52		80	18	2	23
Montpellier	7.79		61	37	2	26
Cavaillon Carpentras	13.00	9 100	96	-	4	42
TOTAL	81.73	12 550	78	20	2	155

Glossary

A

AFNOR: French national organisation for standardisation
ANSES: French Agency for Food, Environmental and Occupational Health & Safety
APV: Pre-marketing authorisation
Arvalis: French arable crops R&D institute
ASFIS: Association for training of seed industry professionals

B

BioGEVES: GEVES Biochemistry and Molecular Biology Laboratory
BIA: Pests and pathogens
BIC: Blue International Certificate (ISTA)
BIO: See OIC
BMT: UPOV working group on biochemical and molecular techniques
BRG: French Genetic Resources Bureau
BSA: Bundessortenamt (German counterpart)
BSPIC: French Seed and Integrated Pest Management Office (Ministry of Agriculture)

C

CASDAR: Special Allocation Fund for Agricultural and Rural Development
CEPP: Plant protection product saving certificate
CIR: Research Tax Credit
CIRAD: French Agricultural Research and International Development Organisation
CISAB: CTPS Commission for Organic Agriculture
CISPS: CTPS Commission for Ecosystemic Plants
COFRAC: French Accreditation Committee
CPPSI: Collaboration for Plant Pathogen Strain Identification
CPVO: Community Plant Variety Office
CRPM: French Rural and Maritime Fisheries Code
CRGAA: FAO Commission on Genetic Resources for Food and Agriculture
CTIFL: French Interprofessional Technical Centre for Fruit and Vegetables
CTPS: French Permanent Technical Committee for plant breeding
CV: Variety control

D

DAAT: Technical Support Service (GEVES)
DEE: Foreign application for study
DGAL: French Directorate General for Food (Ministry of Agriculture)
DGCCRF: French Directorate General for Competition Policy, Consumer Affairs and Fraud Control
DHS: See DUS
DOR: Officially Recognised Description
DSN: GEVES website for seed testing requests
DUS: Distinctness Uniformity Stability

E

EIL: See PT
ECPGR: European Cooperative programme for Plant Genetic Resources
ELISA: Immuno-enzymatic method
ETP: See FTE
ETPT: See WYE

F

FAO: Food and agriculture organization of the United Nations
FEDER: European Economic and Regional Development Fund
FRB: French Foundation for Research on Biodiversity
FSOV: Plant Breeding Support Fund
FSRSO: Support Fund for Oilseed Research
FTE: Full time equivalent
FUI: Single Inter-Ministry Fund

G

GEVES: French Variety and Seed Study and Control Group
GIP: Public Interest Group

I

IBISA: Infrastructure in Biology, Health and Agronomy
IBEB: French Institute of Environmental Biology and Biotechnology
INOV: French National Office for Plant Breeders' Rights
INRAE: French National Research Institute for Agriculture, Food and the Environment
INVITE: INnovations in plant VarIety Testing in Europe to foster the introduction of new varieties better adapted to varying biotic and abiotic conditions and to more sustainable crop management practices.
IRHS: Research Institute for Horticulture and Seeds
ISHI: International Seed Health Initiative
ISO: International Organisation for Standardization
ISF: International Seed Federation
ISTA: International Seed Testing Association
ITAB: French Technical Institute for Organic Agriculture
ITEIPMAI: Interprofessional Technical Institute for Perfumer, Medicinal and Aromatic Plants
ITPGRFA: International Treaty on Plant Genetic Resources for Food and Agriculture

L

LBPV: Laboratory of Plant Biology and Physiology
LED: Light Emitting Diode
LIMS: Laboratory Information Management System
LNR: See NRL

M

MAA: French Ministry of Agriculture and Food
MATREF: French National Network of Reference Material
MOBIDIV: Mobiliser et sélectionner la diversité cultivée

N

NAKT: Naktuinbouw (Dutch counterpart)
NBT: New Breeding Techniques
NIAB: National Institute of Agricultural Botany (British counterpart)
NIRS: Near Infra Red Spectrometry
NPPO: National Plant Protection Office
NRL: National Reference Laboratory

O

OAPI: African Intellectual Property Organization
OECD: Organisation for Economic Cooperation and Development
OCVV: See CPVO
OIC: Orange International Certificate (ISTA)

P

PCR: Polymerase Chain Reaction
PGR: Plant Genetic Resources
PHENOTIC: Instrumentation and imaging platform for seeds and plants
POPAM: Ornamental, Aromatic and Medicinal Plants
PT: Proficiency Test
PVP: Plant Variety Protection
PVR: Plant Variety Right

Q

qPCR: Method for measuring the initial amount of DNA

R

RNE: French National VCUS Testing Network
RNQP: Regulated Non-Quarantine Pests
RT-PCR: Real Time Polymerase Chain Reaction

S

SEMAE: French Interprofessional Organisation for Seeds and Plants (formerly GNIS)
SEV: GEVES Variety Study Department
SFR QUASAV: Federative Research Structure for Plant Quality and Health.
SNES: GEVES National Seed Testing Station
SNP: Single Nucleotide Polymorphism
SOC: French Official Service for Control and Certification of Seeds and Plants
SPAD: "Seeds and Plants for Sustainable Agriculture" government plan
SRAL: Regional Food Service (Ministry of Agriculture)
SSR: Simple Sequence Repeat
SUCSEED: Stop the Use of Cides in Seeds

T

TIRPAA: See ITPGRFA
TWA: UPOV working group for agricultural plants
TWC: UPOV working group for computer programs and statistics
TWF: UPOV working group for fruit plants
TWO: UPOV working group for ornamental plants
TWV: UPOV working group for vegetable plants

U

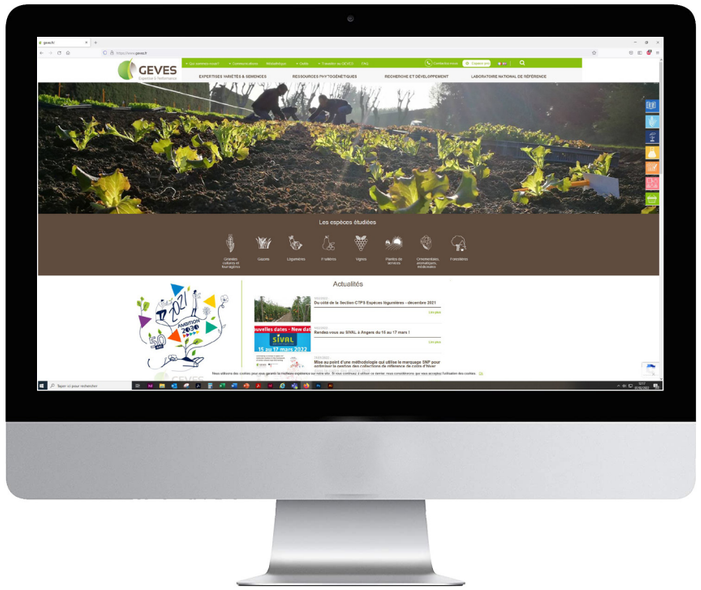
UPOV: International Union for the Protection of New Varieties of Plants
URGI: INRAE Genomics Research Unit
UFS: French union for seed companies & plant breeders
UMR: Mixed Research Unit
UMT Capte: Mixed Technology Sensors and Remote Sensing Unit

V

VATE: See VCUS
VCUS: Value for Cultivation, Use and Sustainability

W

WYE: Work Year Equivalent



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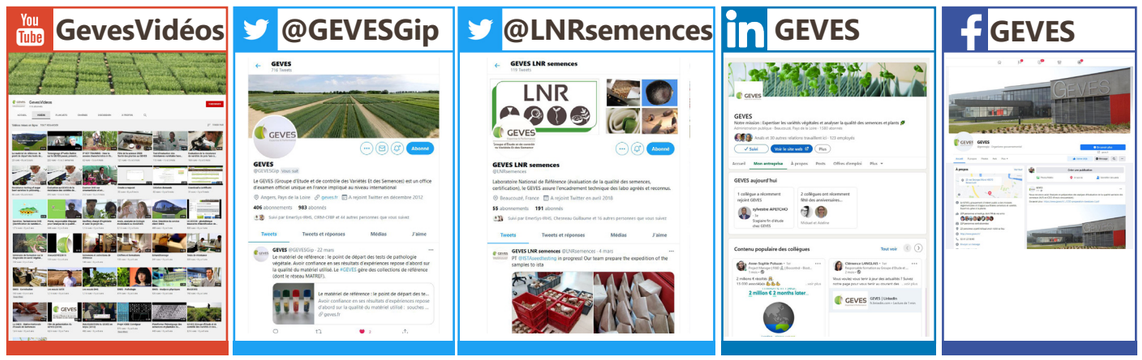

GEVES
25 rue Georges Morel
CS 90024
49 071 BEAUCOUZE cedex

Head of Communication:
nathalie.auge@geves.fr
contact@geves.fr
prenom.nom@geves.fr

Head of Communication:
+33 (0)2 41 22 86 38
Reception:
+33 (0)2 41 22 58 00

Publication Director: Alain Tridon - CEO of GEVES
Synthesis, coordination and layout: GEVES Communication Department - Nathalie Augé - Pierre Lerebours
Photo credit: GEVES
The GEVES teams contributed to the preparation of this report.

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