ANNUAL REPORT 2020

French Variety and Seed Study and Control Group

GEVES
Expertise & Performance

FOREWORD

Positioned upstream of the agricultural and food production chains, seeds and plants are a key element in meeting the economic, and environmental, and food safety challenges brought on by the agricultural and ecological transition.

The new version of the Seeds and Plants for Sustainable Agriculture plan prepared in 2020 aims to strengthen the contribution of plant genetics and the quality of seeds and plants to meeting these challenges.

In 2020, the International Year of Plant Health aimed to increase awareness of the consequences of international trade on the spread of plant pests, and the need for preventative health measures and plant health monitoring.

Through its missions as a national reference laboratory, and its responsibilities in the evolution of methods and their international standards, GEVES has a major, recognised role in guaranteeing the quality of seeds which are used in France or exported. These missions are now extended by its designation in November 2020 as a national reference laboratory in the field of plant health, and as an approved laboratory for the detection of a particularly devastating tomato virus, ToBRFV, in March 2020.

Defining a strategy is an important step in consolidating the efficiency and coherence of GEVES's activities, helping to prioritise them and adapt them to the realities of tomorrow. This is the objective of the strategy note: GEVES - Ambition 2030, approved by the Board of Directors in July 2020. It confirms GEVES's commitment to contribute ever more effectively to the excellence of the seed and plant sector in the service of the agicultural and ecological transition, at national, European and international levels.

Preparing for the future also means continuing to invest in research and development, modernisation, and security and adaptation of working resources, whether in terms of equipment, facilities or IT systems.

The essential nature of the seed and plant sector has been confirmed by the circumstances of 2020 caused by the COVID-19 pandemic.

GEVES, a national examination office, has continued its missions, including during the periods of lockdown, helping to guarantee the continuation of supplies at national and global level and to ensure new plant variety testing. The social and economic committee set up on 1 January 2020 played an important role, involving staff representatives in the decisions that had to be taken to manage this situation and adapt to constantly changing circumstances.

It is thanks to the commitment of GEVES's staff, in a difficult context for all, that we owe this very positive outcome: we would like to thank them most sincerely.

We hope you enjoy reading this annual report.

Christian HUYGHE
Chairman of GEVES

Alain TRIDON
CEO

SUMMARY

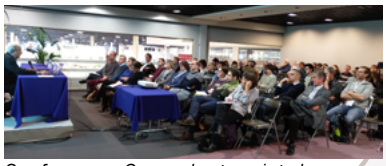
HIGHLIGHTS FROM 2020

GEVES has adapted to the COVID-19 situation by organising the maintenance of its activities required to ensure the smooth functioning of the plant and seed sectors.

NATIONAL

SIVAL
Angers - France

Stand in the Research/Innovation/ Training space with the theme "Plant Health", and with a stand with the CPVO presenting variety protection by PBR (plant breeders' rights).



Conference: *Can a plant variety be heterogeneous?*

Kick-off of Harmorescoll project

Economic and Social Committee set up at GEVES

ToBRFV detection

GEVES was appointed as an approved laboratory by the Ministry of Agriculture for official ToBRFV analyses on seeds.

Construction works began at the Brion Experimental Unit, to create a 2600 m² glass greenhouse and a 2000 m² outdoor cultivation platform mainly for Hydrangea and Chrysanthemum species.

Further south, the Cavaillon station is continuing to invest in renovation and development in order to meet the increase in activity for ornamental species and to improve working tools for vegetable species.

Extension of the pathology laboratory: 200 m² further growth chambers used for

JANUARY FEBRUARY MARCH APRIL MAY

INTERNATIONAL

Salon IPM
Essen - Allemagne

GEVES shared a stand with CPVO, Bundessortenamt, Niab and Naktuinbouw at this ornamental fair.

Round table facilitated by GEVES at the **Seminar on seed quality management** at Bangkok

ISTA Annual meeting

GEVES participated in the ISTA annual meeting which voted on amendments to seed testing methods in the ISTA rules.

French-Russian meeting of the seed industry

Moscow RUSSIA

54th TWV - BRAZIL

UPOV

GEVES participated in this working group on vegetable crops, which brings together **90 people** from **31 countries/ organisations.**

Promotion of GAIA software - PERU

GEVES agents travelled to Latin America to train 12 DUS experts in Quito in the use of GAIA software, a variety comparison tool developed by GEVES.

A YEAR MARKED BY COVID-19

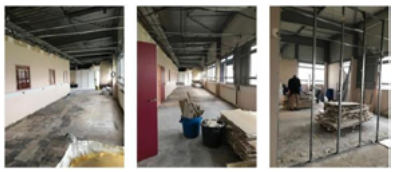
Videoconferences — 8 Social & Economic Committee meetings

Activity maintained during lockdown — Masks and hand gel — Working from home

First virtual edition for the 17th Laboratory Days
Annual meeting with approved laboratories:
80 people registered

GEVES designated NRL in the field of plant health

Building works began to completely renovate 500 m² of GEVES's Beaucouzé station for sampling and customer services.



"Seeds and Plants for Sustainable Agriculture" plan validated by the CTPS

Approval of the 2030 Ambition Strategy Note by the GEVES Board of Directors

Research projects Sucseed and Mobidiv kick off: On the way to no pesticides! GEVES is a partner in two collaborative research projects on seed microbiome (Sucseed) and on mixtures of species and varieties (Mobidiv).

Closing seminar of the Peamust project

Closing seminar of the AKER project

pest resistance testing, including quarantine pathogens, and a 150m² greenhouse

Renewed quarantine approval for the pathology laboratory

JUNE — JULY AUGUST — SEPTEMBER — OCTOBER — NOVEMBER — DECEMBER

Organisation of the 51st TWF by GEVES

Together with the UPOV office, GEVES organised this working group on fruit trees, which brought together more than 80 international participants.

52nd TWO

More than 70 participants from 22 countries/organisations including GEVES attended this working group on ornamental species.

49th TWA

100 experts from 30 countries/ organisations including GEVES examined developments in DUS methods on agricultural plants.

Distance training for Chinese DUS experts

As part of the EU IP Key programme, GEVES contributed to a DUS training course for Chinese counterparts.

38th TWC and 19th BMT

Organised in the same week and with joint meetings, the working groups on Automation and Computer Programs and the group on Biochemical and Molecular Techniques brought together 100 participants from 40 countries. GEVES submitted proposals on image analysis, statistical tests and molecular methods.

Meeting of EU DUS experts

The various CPVO working groups divided by species type met throughout autumn. The GEVES presented proposals for DUS protocols.

Biocontrol and Seeds, GEVES at ABIM 2020

KEY FIGURES

VARIETY TESTING

FIELD TESTING

2 312 lots
Variety controls

3 516 cycles
of DUS studies
for all species

1 286 cycles
of VCUS studies
for agricultural species

Biomolecular and biochemical tests

Variety resistance tests

Plant Variety Protection (PVP)

PVP & National Listing

Other examination offices

National Listing

13 000
for listing & PVP

2 863
for listing & PVP

4 672
for private clients
Inoculum production: 1864

Plant variety rights delivered by CPVO & INOV

664 new varieties registered in the French Catalogue in 2020

57 451 varieties in reference collections

Vegetable **27 669**

Ornamental **3 788**

Agricultural species **25 994**

25
tons of seed prepared and shipped for VCUS tests

160 host/pest combinations for variety resistance testing

250 species/pest combinations for seed health testing

350 staff members

462 hectares
of experimental fields

12 315 m² of greenhouses & tunnels

82 000 visitors on our website
www.geves.fr

+200
visitors welcomed

50 oral presentations

FROM 2020

SEED QUALITY TESTING

LABORATORY TESTING

83 614 tests

- **31 191** Germination quality
- **27 169** Physical quality
- **17 719** Seed health
- **4 364** Pest detection by molecular biology

17 training courses
83 trainees

16 Laboratory proficiency tests
166 participants
1 363 samples prepared

9 Laboratories audited
1 remote audit

PHENOTIC SEMENCES & PLANTES
42 000 images &
146 000 seeds
analysed using 2D/3D x-ray & germination

€29.19m turnover

10% dedicated to research

2 687 m² of laboratories

8 publications

20 scientific posters

6 Newsletters

Social media


GEVES
AMBITION
2030
GEVES AMBITION 2030
GEVES
www.geves.fr

A strategy for the next 10 years

GEVES AMBITION 2030

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.

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.

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

Plant Health

2020: International Year of Plant Health

A key theme for GEVES: guaranteeing seed health is essential to avoid the dissemination of pests carried by seeds, some of which can be transmitted to the seedling during germination. Evaluating the resistance of new plant varieties to pests and diseases plays an important role in the agricultural and ecological transition.

GEVES is developing research and development programs in order to test these resistances and increase its knowledge of pests. GEVES is strengthening its variety and seed testing capacities using molecular markers of resistance genes and the use of faster and more specific pest detection methods.

In 2020, GEVES's skills were again recognised: GEVES was designated as the National Reference Laboratory for regulated non-quarantine pests (RNQP) whose predominant matrix is seeds and as an approved laboratory for the detection of ToBRFV on tomato and pepper seeds.

The SIVAL trade fair in January 2020 and regular articles in the newsletter were opportunities to address this crucial subject and communicate with the larger public.

Valérie Grimault,
Head of the Pathology Laboratory

"Plant Health was in the spotlight in 2020, albeit slightly overshadowed by the pandemic. Although we were not allowed to organise the events we had planned, the year was rich in news with new regulations on the ToBRFV virus and sugar beet virus yellows. I find it motivating to respond to these topical issues and to contribute through our work to plant health. Reducing pesticides, facing climate change, agroecology, evolution of pests, the pathologist is never bored!"

GEVES named NRL in the field of Plant Health

In November 2020, the Ministry of Agriculture and Food has designated the GEVES Technical Unit for Pest Detection as National Reference Laboratory (NRL) in the field of Plant Health for five areas of competence:

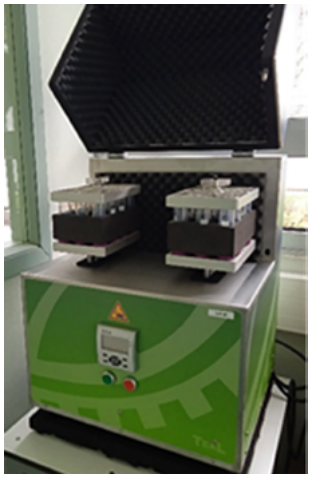
- Phytopathogenic bacteria: Regulated non-quarantine bacteria on true seed
- Phytopathogenic viruses: Pepino mosaic virus on true seed
- Phytopathogenic fungi: Regulated non-quarantine fungi on true seed, strawberry plants, asparagus crowns and bulbs of the *Allium* genus.
- Phytopathogenic nematodes: Regulated non-quarantine nematodes on true seed, strawberry plants and bulbs of the *Allium* genus.
- Insects, phytopathogenic mites and beneficial mites: Regulated non-quarantine bruchids of true seed.

This designation as NRL confirms GEVES as a technical reference for research and development of methods for the detection of regulated non-quarantine pests (RNQP) whose main matrix is seed. As such, in addition to carrying out official testing, the GEVES will provide scientific and technical assistance, as well as coordinate and support the activities of official laboratories.

With this new mission, GEVES will further contribute to plant pest detection and preventive phytosanitary measures, which are the subject of EU and national regulations, and are essential for food security as well as for the agricultural and ecological transition.

Detection of the ToBRFV tomato virus: GEVES only approved laboratory in France in 2020

ToBRFV (Tomato brown rugose fruit virus) is a tomato and bell pepper pest of the Tobamovirus family that emerged in 2016 in tomato varieties that were previously resistant to this virus family.



ToBRFV is classified as a quarantine pest as of 1 November 2019 (3-year surveillance plan), is seed and contact transmissible, and is highly detrimental to crops and seed production.

The Pathology and BioGEVES laboratories anticipated the new quarantine regulations for this virus and have developed a detection method based on the Seed Extract PCR principle, in partnership with ANSES. The monitoring and anticipation of the GEVES teams, thanks to their expertise and their involvement in international bodies such as ISHI-Veg, have made it possible to respond to the urgent need of the industry to test a large quantity of tomato lots from January 2020. Based on a rapid prescreening, this method has allowed the analysis of a large number of samples; in 2020, GEVES has performed more than 3000 analyses on tomato and bell pepper.

GEVES was appointed as an approved laboratory (COFRAC accreditation) by the Ministry of Agriculture for official ToBRFV seed testing just before the lockdown period during which it continued to provide these analyses. In order to meet increasing demand for testing, a call for applications from other laboratories was launched by the Ministry in order to organise the delegation of testing. At the same time, GEVES acquired equipment to increase efficiency and better meet the needs of the sector (seed shaker, extraction robot).

A new faster and more specific method to detect *Ditylenchus dipsaci* on alfalfa

In response to the threat posed by *Ditylenchus dipsaci* stem nematodes to alfalfa production, GEVES is proposing a new official high throughput method for the detection of *Ditylenchus dipsaci* on alfalfa seeds and a test to confirm the viability of isolated nematodes.

This method has been developed in partnership with ANSES-LSV, UFS and FNAMS, as part of a collaborative project (Dityluz) funded by the Ministry of Agriculture.

Used in particular for the certification of seed lots, it is based on a principle of pre-selection by molecular biology (Seed Extract PCR) which makes it possible to rapidly identify negative seed samples which are then released more quickly compared to the previous method. In addition, the capacity of the laboratory is increased with a throughput up to twice as high as the conventional method.

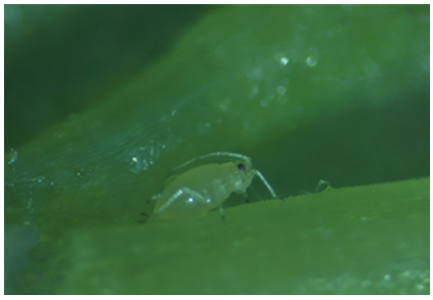
On the proposal of GEVES, National Laboratory of Plant Health Reference, the Ministry of Agriculture has formalised this method, publishing it in its Official Bulletin in November 2020.

Appearance of coloured (left) and non-coloured individuals (right) observed by binocular microscope to verify viability of Ditylenchus dipsaci.

GEVES contributes to the development of resistance tests for sugarbeet varieties against virus yellows

Following the reduction of pesticide use in France, in particular neonicotinoids, sugar beet crops are much more exposed to virus yellows. The search for varieties with resistance to virus yellows is therefore a priority for the plant sector.

GEVES is collaborating with INRAE (France's National Research Institute for Agriculture, Food and Environment) and ITB (French Technical Institute for Sugar Beet) in the ExTraPol project, which aims to increase knowledge of the epidemiology of these viruses and to produce an optimised and reliable resistance test protocol. As of 2019, GEVES and the CTPS have set up a new testing characteristic for evaluating the resistance of beet varieties to aphid-transmitted virus yellows. In compliance with sanitary precautions, viruliferous aphids are multiplied at GEVES and then placed on test plots in the CTPS network to contaminate the varieties being studied. The first varieties with declared resistance to virus yellows were tested in 2019/2020. but no yellows resistance could be demonstrated.



In 2020, the high pressure of viruliferous aphids generated significant yield loss. Epidemiological studies concluded the presence of several different viruses (BChV, BYMV, BYV and BtMV). A National Research and Innovation Plan on sugar beet yellows will be launched in 2021 in order to find operational solutions against the virus within 3 years. GEVES will participate in collaboration with ITB, INRAE and seed companies on the axis on variety testing using genetic resistances research.

https://youtu.be/0Q-3JpFGLTw

How can we contribute to plant health? Healthy and protected seeds, resistant varieties

Understanding how pests act, evolve, and attack plants and seeds, knowing how to identify them, and assessing how plant varieties can resist or be susceptible, and also measuring the effectiveness of biocontrol products: all this contributes to better plant health. This is the mission of a part of GEVES's teams, who are specialists in plant health.

fête de la Science 2020

As part of the **Fête de la science 2020 (Science Festival)**, an event organised annually across France, our plant health experts welcomed visitors to the Beaucouzé station on 6 October 2020, sharing their knowledge, expertise and passion through workshops, visits and videos.

https://www.youtube.com/watch?v=ZQxw2_0FcBQ

https://www.youtube.com/watch?v=vRGntWV8XGk

https://www.youtube.com/watch?v=t3dNq_HXTc0

Accompanying the agricultural & ecological 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.

In 2020, the French Technical Committee for Plant Breeding (CTPS) prepared a new version of the "*Seeds and Plants for Sustainable Agriculture (SPAD)*" plan. GEVES carries out many activities within this committee, and has a very active role in the preparation and implementation of this plan, which places varietal improvement and the quality of seeds and plants at the heart of public policies, and in particular of the agricultural and ecological challenge for France.

The agricultural and ecological transition is also a challenge for variety listing in the official French Variety Catalogue, and in particular for methods of evaluating the agronomic, technological and environmental value of varieties, which guide breeding choices.

GEVES defines and experiments with innovative methods for conducting trials, including methods which comply with the specifications for organic agriculture, and proposes their integration into regulations for listing.

GEVES is investing in improving understanding of seed and plant microbiota and the possibilities of protection offered by biocontrol products by participating in R&D programs such as SUCSEED approved in 2020.

Julie Gombert,
National Coordinator for VCUS testing

"The agricultural and ecological transition reinforces the need for ambitious regulations in terms of the orientation of varietal innovation. The RESO project that I am leading is part of this objective. Supported by CASDAR Seeds and Plant Breeding, RESO began in Autumn 2020. In collaboration with the CTPS Scientific Committee, it aims to establish recommendations on the identification and evaluation of varieties adapted to agroecology. Short- and medium-term developments on experimental set-ups and variety assesment methods will be proposed."

Biocontrol and biostimulation of seeds and seedlings: a look back at a pivotal year

Alternative treatments such as biocontrol and biostimulants are a lever for reducing the use of pesticides and synthetic inputs in the context of agricultural and ecological transition.

Seeds, the first link in the agri-food production chain, are increasingly emerging as an interesting potential vector for these solutions. GEVES supports public and private players by providing them with its expertise and methodological expertise on seeds.

Alongside the PlantAlliance and Biocontrol Consortium communities, GEVES contributed to the drafting of the position paper "Towards seed protection using biocontrol strategies", which describes the priorities for R&D&I for seeds and biocontrol. A new working group will address the ambitions of developing knowledge and methods/tools carried by this position paper by setting up collaborative research projects.

In addition, the pathology and germination laboratories at GEVES offer their expertise in seeds and seedlings for the support and methodological development of alternative treatments under controlled conditions. The increase in this activity demonstrates the contribution of GEVES to research and expertise for evaluating the effectiveness and phytotoxicity of these treatments.

2021 will bring major advances in these fields and for GEVES a source of new expertise and collaborations. Indeed, GEVES is a partner in the SUCSEED (Stop the Use of pestiCides on SEEDs) project (2021-2026), one of the winners of the PPR "Cultiver et Protéger Autrement" (Growing and Protecting Differently), which aims to guarantee the physiological and health quality of seeds without using conventional pesticide products. In addition, GEVES is associated with the RMT BESTIM, which aims to adapt the concept of ecological immunity to plant systems to help develop knowledge for new agroecological crop systems and methodologies for evaluating the solutions being studied.

IPHARD project: new varieties for new cropping systems

At the beginning of 2020, the IPHARD project led by the INRAE Field Crops Experimental Unit in Auzeville (UE GCA) and involving players in the soybean and sunflower sectors, including GEVES, was launched with the support of the the CASDAR "Seeds and Plant Breeding" programme. This project aims to contribute to the development of varieties adapted to more sustainable agricultural and food systems in south-western France.

To this end, the project, the results of which are expected by 2024, is studying the genetic resources available for a soybean crop sown in a cereal (barley or wheat) for relay cropping, and for a sunflower crop sown as a catch crop following peas.

GEVES will be responsible for providing all available data on soybean and sunflower varieties registered in the French catalogue in order to bring out different ideotypes and test them in the new agronomic practices targeted by the project. At the end of this project, it will be possible to take into account these new uses and the associated testing methods for variety studies for variety listing.

Accompanying the agricultural & ecological transition

SPAD2: a new "seeds and plants for sustainable agriculture" plan

Following the renewal of the CTPS in November 2019, the Ministry of Agriculture commissioned the CTPS to propose a revision of the SPAD plan.

https://agriculture.gouv.fr/plan-semences-et-plants-pour-une-agriculture-durable

After drawing up an assessment of the actions set out in this initial plan, the CTPS consulted all its stakeholders to contribute to the revision. This material made it possible to propose an outline for the revised SPAD plan, highlighting the role played by plant material (varieties, seeds and seedlings) in support of global issues, the UN's sustainable development objectives.

Setting out the French ambition in terms of seeds and plants to be successful in the agricultural and ecological transition, the document translates into 4 focal areas and 31 actions. Among the major themes addressed are the diversity of plant cover, the contribution of seeds and plants to quality food that respects the environment, the value of participatory approaches and new techniques, and the role of scientific expertise in support of public authorities and society. This draft plan was approved by the Plenary Committee of the CTPS in November 2020. It should be published in the first half of 2021 by the Ministry of Agriculture, giving it its full political dimension, as a plan contributing to France's goals for the agricultural and ecological transition.

GEVES has provided key contributions to the drafting of this plan, and is committed to ensuring the steering and implementation of its actions.

What's new for testing varieties and registration schemes?

Varieties with innovative characteristics are regularly presented for national listing; GEVES and its partners set up the appropriate trials to evaluate them. In particular, new species or typologies are developed to meet the expectations of diversifying diets. Pulses (lentils, chickpeas, etc.) are being worked on more and more. An increasing number of species are offering varieties for specific uses in human nutrition (yellow-seeded flax, white flour sorghum, etc.), and we are seeing the development of vegetable uses for varieties of so-called "agricultural" species (rutabaga, groundnut, edamame soybean, etc.). Among the new species supported this year are alfalfa X varia and plantain, which should be more adapted to climate change. New varieties of malting barley are appearing that can reduce the energy bill of industrial malting and brewing processes.

For hemp, a laboratory test for the evaluation of tolerance to broomrape *(orobanche spp)* was validated. For rapeseed, the terms of entry of varieties for use as a companion plant for trapping pollen beetles have been defined.

Thanks to adapted registration procedures, old varieties, local ecotypes and ecotypes which are representative of French plant heritage are being included: in 2020, GEVES, with the experts of the CTPS, examined 77 olive varieties, 21 citrus varieties, 11 raspberry varieties, 1 plum variety, 10 traditional vine varieties, 1 Savoy cabbage variety and 1 black radish.

What progress has been made for including Organic Agriculture in 2020 ?

In collaboration with the CTPS "Cereals" Section, GEVES has built a testing system for durum wheat for use in organic production. The study methods for organic common wheat have also been reviewed: a common bunt test has been introduced, double experimentation between organic and conventional networks has been eliminated in order to establish a testing zone for organic varities that now covers the whole of France, while the specific tests for studying yield regularity factors have been maintained. Several CTPS Sections have plans to introduce trials in organic conditions into the national trial networks for certain species (flax, triticale), as already currently exists for soybean. The question of setting up organic seedling production chains has been raised in the Vine and Fruit Species Sections, in consultation with the INAO.

GEVES, in collaboration with the CTPS, is involved in monitoring the implementation of EU legislation and its new regulation (2018/848). In 2020, together with the CTPS Organic Agriculture Commission (CISAB), GEVES monitored the drafting of delegated acts concerning the marketing of organic heterogeneous material and began working on organic varieties suitable for organic production, varieties that could be marketed in the context of a temporary experiment. France has informed the European Commission that it wishes to participate in this experimentation, and GEVES has proposed several of its DUS experts to join the working groups in charge of working on adapted DUS protocols. CISAB and GEVES have been in contact with breeders and stakeholders in the organic sector to understand what is expected of this type of variety.

Can a variety be heterogenous?

Seed regulations are based on the description and distinction of varieties that are stable over time to ensure fair trade. Uniformity is not an end in itself but allows for distinction/description and guarantees stability, which ensures that the characteristics of the variety are maintained. This requirement for uniformity may be questioned by the current transition of agricultural systems towards sustainability and resilience to climate change.

The new EU organic regulation also questions the uniformity standards of DUS.

In 2020, GEVES focused on the reasons for minimum requirements in terms of uniformity and how the current system was constructed. In particular, it explained the degrees of heterogeneity already accepted according to species and genetic types, the difference between relative uniformity and uniformity assessed by the counting of off-types. It recalled that there is already a higher tolerance for heterogeneity in some catalogue lists and outlined some possible ways to reconsider these standards.

These communication actions on the uniformity of varieties were based in particular on the organisation of a conference held at SIVAL on 14 January 2020:

https://www.geves.fr/news/geves-at-sival-trade-fair-2020/

In addition, a web page was created on the GEVES website explaining the relative notion of uniformity in DUS:

https://www.geves.fr/information-for-all-species/what-is-a-variety-2/uniformity-in-dus-testing-a-relative-notion/

Enhancing knowledge on variety & seed testing

GEVES, thanks to its expertise and R&D resources, is constantly innovating to adapt its variety and seed testing methods so that they contribute to the essential challenges of the agricultural and food sector and the agricultural and ecological transition. It is involved in more than 50 research and development projects, and devotes 10% of its budget to these projects.

GEVES is a partner in several key projects. Some of them were completed in 2020: AKER on sugar beet, PeaMust on protein crops. Others are starting up: SUCSEED, which aims to propose alternative solutions to the use of pesticides on seeds; MOBIDIV, which aims to bring about a systemic change towards pesticide-free agriculture by mobilising and breeding intra and inter-specific crop diversity.

At the same time, GEVES is stepping up its investments to build collections of reference materials for resistance testing and specific purity analyses.

It is also working on the development of rapid phenotyping methods to assess variety resistance to mycotoxin accumulation in cereals.

These are just a few illustrations of the diversity of GEVES's investments in enhancing knowledge in order to carry out its missions and beyond in support of the agricultural and food sector.

Aurélia Gouleau,
Head of Scientific Coordination

"The GEVES 2030 strategy has confirmed GEVES's involvement in research as a core activity. I am excited about the variety of research projects currently being carried out at GEVES, which will enable us to gain new knowledge and develop innovative methods for seed and variety testing."

Botany at the heart of the Physical Analysis Laboratory

Tests for specific purity, other seed determination and species identification are based on the observation of seeds' external morphological characteristics. It is therefore thanks to a thorough knowledge of botany that it is possible to carry out these analyses.


Seeds sown in the greenhouse for the lab garden.

The laboratory has several seed collections:

- a general collection (17 000 species) serving as reference specimens for identification, currently undergoing inventory and updating of the nomenclature;
- a technical collection (563 species) including species frequently encountered in analyses and regulated species. It enables the national reference laboratory (NRL) to carry out its missions: training, inter-laboratory proficiency tests, production of technical documents.

The seeds come from the laboratory's activities, from the production of the GEVES botanic garden or from exchanges with international botanical gardens.

In order to enrich these collections, for the 2019/2020 exchange season, the laboratory has made seed requests to 110 international botanical gardens. More than 2100 samples representing nearly 1,300 species were received. In order to replenish the laboratory with sufficient quantities for NRL activities and to ensure the continuity of the collection, 164 species were sown in 2020 in our garden and already almost half of them have been harvested.

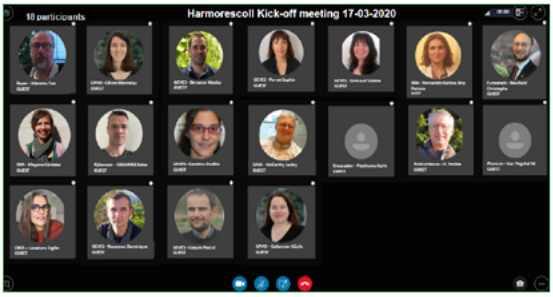
The forthcoming publication of a GEVES Index Seminum will enable us to strengthen exchanges with national and international botanical gardens.

Harmorescoll project: a European platform to improve DUS testing

Initiated in March 2020, Harmorescoll aims to improve the availability of reference material (control varieties, differential hosts, pest isolates) for DUS resistance testing of vegetable varieties. The project is co-financed by the CPVO, led by GEVES and the Naktuinbouw, and involves members from EU examination offices and the seed industry.

Once a year, the participants meet to discuss progress and set future objectives. The first meeting took place online in October with 22 participants.

The project reviewed CPVO and UPOV protocols to define the reference material needed: 145 strains of 58 pest species and 455 varieties of 15 crops. Their availability in existing initiatives or collections will then be checked. Rules for their validation are being drafted. The next steps will define the conditions for supply and the organisation of a series of validation tests by the examination offices and seed companies. Finally, an organisation will be set up to ensure the availability of validated material for DUS.



https://www.researchgate.net/project/Harmorescoll-Setting-up-an-EU-system-for-harmonized-collections-of-reference-isolates-controls-and-differentials-to-facilitate-disease-resistance-testing

Enhancing knowledge for seed and variety testing

Closing of the PeaMUST project

The PeaMUST research project, funded by the ANR over 8 years and led by INRAE, ended at the end of 2020. The project brought together 28 public and private research and development partners from breeding to processing. Its objective was to improve and stabilise the yield of peas and field beans by studying adaptation to multiple stresses and using biological regulations.

GEVES played an important role through its participation in WP5 (Technical and economic evaluation of genotypes and selection methods) and organisation of experiments at the Anjouère Experimental Unit over several years. It has also developed new technology for phenotyping seeds using 3D X-ray tomography to measure the severity of bruchid damage on bean and pea seeds. This technology was used to evaluate more than 4000 seed samples from collections or populations tested under conditions of natural bruchid infestation in the field.

The actions carried out for PeaMUST have led to major advances in pea genomic breeding, identification of molecular markers associated with resistance to major stresses in peas and field beans (aphanomyces, frost, bruchids), exploration of plant architecture to protect against stresses, and the unprecedented development of genomic resources and tools (gene validation, crop models). Some of these advances may be applied in tests and analyses conducted by GEVES.

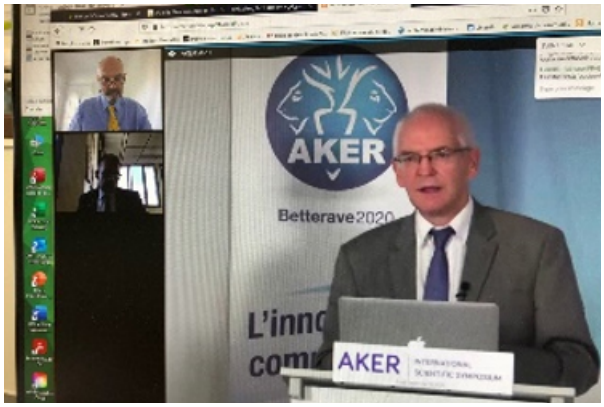
Find out more: https://www.peamust-project.fr/peamust_eng/

Closing of the AKER project

This research project was aimed at improving sugar beet yields. It was conducted over 8 years by 11 partners (public and private) and was very successful. It led to major advances in the use of new phenotyping technologies correlated with genotyping data, and in the organisation and mobilisation of a large number of partners, including academic research, applied research and companies.

GEVES played a major role in this project, particularly in phenotyping i.e. the measurement of observable characteristics (internal constitution of seeds by 3D X-ray tomography, measurements of rooting speed, measurement of germination kinetics on benches in relation to temperature).

Find out more: *http://www.aker-betterave.fr/en/*



10%
of budget dedicated to research

7
New research projects in 2020

58
Research projects

Developing new technology & digital tools

New technology - robotics, molecular biology, artificial intelligence, image analysis, biochemistry - is opening up interesting prospects for variety and seed evaluation, which currently rely mainly on human expertise and manual and visual techniques.

Several promising avenues are already being explored. For example, the INVITE project is an opportunity to develop phenotyping using digital imaging. It completes the work already undertaken in the evaluation of cereals resistance to fusarium. Similarly, image analysis from drones will support trials and testing emergence or vigour at emergence.

With the Aker and PeaMust projects, GEVES has extended the set of characteristics that can be measured on seeds to include internal measurements in three dimensions with tomography, monitoring of germination, including at low temperatures (5°C), and measurement of the growth of young seedlings in the dark.

In order to further explore and implement the contributions of new technology and digital tools, an engineer from GEVES is currently starting a PhD project aimed at using imagery and artificial intelligence to analyse the physical quality of seeds. GEVES is also strengthening its biochemical resources to develop the use of NMR and near infrared spectroscopy.

Arnaud REMAY,
Head of the Genotyping Unit at BIOGEVES Laboratory

"In 2020, the circumstances of Covid-19 disrupted the sowing of variety trials. The resources and skills of the genotyping unit were mobilised in order to partially compensate for this lack of field trials. This is the case, for example, for maize, for which the team processed twice as many samples as in previous years within a similar timeframe, thanks to the automation of certain steps in the analytical process. Molecular tagging was also used for the first time in the context of varietal controls on sunflower. These analyses were implemented without any prior development, thanks to the genotyping strategy already in place for this species within the framework of DUS studies. These two examples illustrate the potential of the molecular methods developed at BioGEVES."

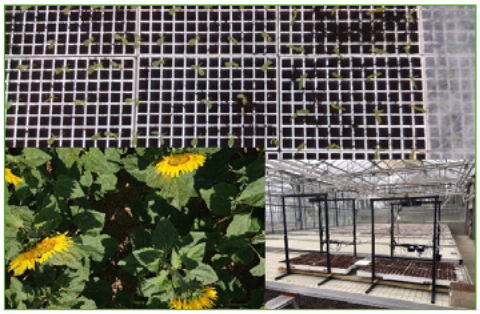
GEVES phenotyping actions for the EU INVITE project

The INVITE project (INnovations in plant Varlety Testing in Europe) aims to improve variety testing methods and the information available to decision-makers and farmers on varietal performance under a wide range of biotic and abiotic conditions.

Based on the analysis of DUS and VCU traits of target species (apple, tomato, wheat, maize, sunflower and ryegrass), traits were selected for testing the use of digital phenotyping. A synthesis paper entitled "On the need of low-cost imaging systems for new approaches in plant variety testing protocols" was presented to the UPOV Technical Working Party on Automation and Computer Programs in September 2020.

GEVES contributed in 2020 to experiments in controlled conditions and in the field to evaluate new phenotyping tools on sunflower and maize (counting at emergence, ground cover and height with a connected stake). The algorithms used to obtain these traits are being developed using deep learning techniques. For sunflowers, the estimation of flowering is being analysed using images taken in the field with a pedestrian kit. The feasibility of these counts is also being explored using images obtained by drones.

For wheat, quantification of Fusarium head blight was carried out jointly with Belgian and Swiss colleagues, using different spectral tools (multispectral camera by GEVES, hyperspectral camera by the CRA-W in Belgium, fluorescence camera by Agroscope in Switzerland). GEVES's assessments are based on advances made in the FSOV Fus'eye project (2018-2022), in particular algorithms based on machine learning to quantify fusarium. In addition, a pedestrian kit vector, developed with INRAE, is being finalised for the use of multispectral sensors in the field.



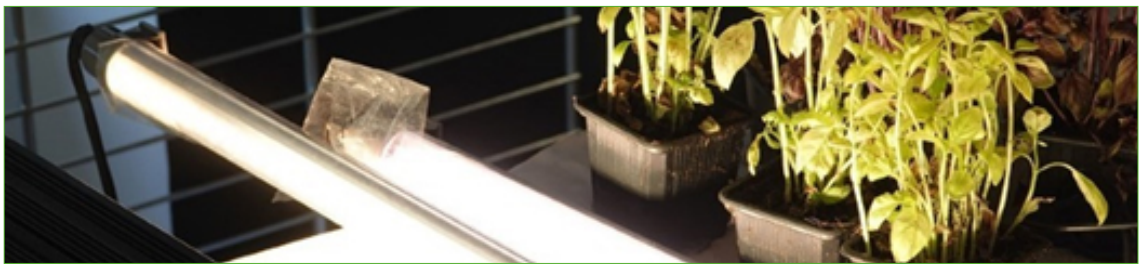
The development and validation of these tools will continue within the framework of the Invite project, with the aim of making the tools available to testing offices and variety testers for DUS and VCU.

PathoLED: a tool for sharing experimental data

In plant pathology, the study of host-pathogen pairing can require conducting tests in growth chambers, on the resistance of varities or the pathogenicity of strains. In controlled conditions, the light settings are important in order for the tests to be successful.

The current transition to the use of LED light can be tricky. Following the PathoLED workshop which gathered nearly 100 participants in 2019, GEVES shares its experiences with LEDs by communicating its experimental conditions (pathosystem, light spectrum, ...) and its test results (comparison with those obtained with other light sources). In 2020, the international year of plant health, this tool aimed to contribute to a better understanding of various pathosystems. The information was collected on the PathLED web page:

https://www.geves.fr/tools/patholed/



Developing new technology & digital tools

IT tools for plant tools

The expertise of GEVES has always been recognised. Its position in the sector, its partnerships and its missions provide an ideal context for the use of new computer technology.

Over the last decade, the use of digital imaging has increased in phenotyping platforms, tomography and spectrometry. GEVES is committed to adapting its IT infrastructures to the ever-increasing needs for storage, memory and a tenfold increase in "intelligence": processing capacities.

This evolving architecture makes it possible to study and implement the artificial intelligences that will drive the expertise of tomorrow. Data strategies will make it possible to cross-reference and process information in order to extract new scientific knowledge. Opening the doors of information systems are bridges between GEVES and its partners to carry out research projects and better exploit data.

In order to apply IT concepts to support our experts' work, we are, for example, supervising students in the development of connected objects such as mini phenotyping hothouses or probes for seed conservation rooms.

Technological monitoring allows us to propose innovations to optimise the testing methods used at GEVES. For example, regular advances in geolocation will soon help In the laboratory, as in the field ("hello" self-guidance, satellites and drones), IT will be more essential than ever.

Molecular markers in addition to phenotyping to better characterise variety resistance after registration in the French Catalogue

CAP GENOPHEN (2019-2020) and CAP PHENOGEN (2020-2023) are two projects led by GEVES, in partnership with ARVALIS, INRAE and UFS, and supported by the "CASDAR Seeds and Plant Breeding" programme.

CAP GENOPHEN aims to:

- validate the list of markers linked to resistance genes available for six host/pest pairs in common wheat and winter barley, based on a bibliographical study and a survey of the sector,
- define the conditions of access to non-free markers and formalise them in application agreements for VCU testing,
- set up a scenario combining phenotyping in the field and marking of the PCh1 resistance gene against eyespot in common wheat. This development, validated by the CTPS Cereals Section, will make it possible to reduce the costs of field testing and facilitate the characterisation of resistant varieties that benefit from a registration bonus.

CAP PHENOGEN will continue to test the concept of combining phenotyping and resistance gene detection in VCU tests for the six identified pests.

Three actions will be carried out:

- validate molecular methods.
- assess the possibility of setting up scenarios combining phenotyping and genotyping.
- define ways of using information on identified resistance genes within strategies for the spatial and temporal deployment of resistance sources and the preservation of their sustainability.

Plant Genetic Resources

Cultivated biodiversity includes a great wealth of species and varieties of varying ages. Humans need this diversity of cultivated species and their wild relatives to meet new agronomic, societal and environmental challenges. It is therefore essential to conserve, characterise and disseminate them.

GEVES assists the many managers of plant genetic resources collections in their efforts to obtain official recognition, thanks to a support fund financed by the GNIS and the Ministry of Agriculture. GEVES, in support of the Ministry, is also involved in international schemes: the FAO's global plan and The GenResBridge project on the implementation of a European strategy for genetic resources.

In order to increase the financial means of support for these essential activities and to raise awareness of these issues amongst the general public, the GEVES has contributed to the preparation of an endowment fund for plant genetic resources that will be active from 2021.

David Hidrot,
Director of the Cavaillon-Carpentras Unit / Member of the public-private Solanaceae network

"In 2021, the GEVES Cavaillon-Carpentras unit will continue its involvement in the network of plant genetic resources of seed-propagated Solanaceae, by describing about 30 accessions of peppers, 30 eggplants, and by multiplying a small number of tomato batches.

In addition to validating this material for entry into the network collection and/or the national collection, these characterisations also enable GEVES experts to perfect their knowledge of the variability offered by these species and their related species.

In 5 to 6 years, more than 2000 accessions will have been observed and characterised, finalising work initiated more than 30 years ago.

It should be noted that the management of the network and the conservation of seeds are managed by the CRB - GAFL of Montfavet (INRAE) and the regeneration of batches is carried out by other members of the network.

The unit also coordinates the national Cynarae network and since 2018 it has been involved in the description and conservation of Allium accessions (A. cepa, A. porrum)."

Recognition of managers & inclusion in the national collection

The CTPS Plant Genetic Resources (PGR) Section gave favourable opinions concerning the official recognition of the Aveyron Regional Chestnut Conservatory (ACRC), subject to its registration with the regional food service (Ministry of Agriculture), and the first entry into the national collection of 202 roses proposed by Mrs Loubert, in accordance with the new procedures set up in July 2019.

Plant Genetic Resources Conservation

GEVES is continuing its involvement in existing cooperation networks for the management of PGR: steering of the *Cynarae* and chicory networks (leadership, coordination of regenerations, etc.), characterisation of eggplant and chicory, post-regeneration control of chicory and carrying out a carrot evaluation trial.

New networks are continuing to be set up with the launch of the Lactuca network in 2020, bringing together 6 private and public actors.

As for onions and beans, discussions were rich and the creation of these two new networks should be completed in the first half of 2021. Onion characterisation and bean multiplication and characterisation activities continued at the Brion station.

A study has also been started to evaluate the potential heritage interest of withdrawn varieties, some of which are still included in the GEVES reference collections. The first information allowing the sorting of varieties has already been collected on about ten vegetable species. The procedure for the emergency safeguarding of these varieties is currently being developed.

1st Technical Workshops on Plant Genetic Resources

Two online workshops were jointly organised by the Directorate-General for Food (Minsitry of Agriculture) and the secretariat of the CTPS PGR Section on 22 and 23 October 2020.

About 40 stakeholders participated in these workshops, representing public and private conservatories, public research institutes, technical institutes, private companies and individuals. The participants highly appreciated the direct interaction with the Ministry of Agriculture's representative, the presentation of applications for recognition and inclusion in the national collection, and the discussions with other stakeholders. The comments and questions from stakeholders on the procedures and their operational implementation will feed the work of the CTPS PGR Section.

Second Global Action Plan for PGR for Food and Agriculture: a quick overview

Together with the French general directorate for food safety (DGAL - Ministry of Agriculture), GEVES drafted the report on the follow-up of the second global action plan provided to the FAO in December 2020.

4 major themes were broken down into 18 priority actions and 58 indicators (period 2014-2019):

- *in situ* conservation and management
- *ex situ* conservation
- sustainable use
- sustainable institutional and human capacity building

The Global Action Plan in figures

97 projects relating to characterisations and increasing diversity

785 species inventoried *in situ*

118 players surveyed

32% replied

119 312 samples **distributed**

12 improvement networks including 6 EU & international

124 312 accessions of **762** different species conserved *ex situ*

This is the number of projects financed in 2020 for an amount of €120k by the support fund set up by the Ministry of Agriculture.

Summaries of the projects funded in previous calls for applications and the results obtained are available on the dedicated page of the GEVES website.

National & international collaboration

As the national organisation of one of the largest seed and plant production countries, GEVES has a specific mission as a centre of technical expertise, supporting issues related to these fields at international, EU and national levels.

Many GEVES experts are driving forces in the working groups of various international organisations (e.g. UPOV, CPVO, ISTA, ISHI-Veg and ISF) for the development and harmonisation of seed and variety quality assessment methods.

In collaboration with other examination offices, it provides training for experts from other countries, contributing to the worldwide promotion of these testing methods.

GEVES, an independent national examination office and official laboratory, acts as a trusted third party between public authorities and private stakeholders from range of backgrounds. In this capacity, it accompanied GNIS to Russia to explain the organisation of the seed sector in France.

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

Carole Dirwimmer,
involved in international collaboration activities

"This year my challenge was to be able to communicate and provide training, within GEVES but also internationally, without having the possibility of physically meeting my correspondents. Whilst maintaining training sessions in the field, we also produced short videos which proved to be a useful tool for sharing knowledge, as the potential audience is much wider than when participants have to travel!"

GEVES at the Franco-Russian seminar on the seed sector in Moscow

Given the importance of Russia in the sales of French seeds and seedlings, the French Embassy in Moscow and the GNIS jointly organised a seminar with the National Union of Breeders and Seed Producers of Russia on 24 January 2020 which was well attended.

GEVES took part in this seminar, which was structured in four parts:

- which Catalogue to respond to climate change,
- the expectations of the Russian seed industry in view of the objectives of the Russian Federation,
- a cross presentation of the guarantees of genetic quality and health quality fo seeds and seedlings by both countries' administrations,
- constraints and opportunities for the seed sector in Russia.

On 23 January 2020, Alain TRIDON exchanged views on the organisation of tests, evaluations and entries in official variety catalogues with GEVES's counterparts in Moscow:

- Rosselkhoztsentr - Federal Seed Quality Control Centre
- Gossortkommissii - State Plant Variety Commission

GEVES at ISTA

The International Seed Testing Association (ISTA) aims to develop and publish standardised and harmonised seed quality testing methods to facilitate international seed trade.

GEVES is highly involved in the governance and technical work of the ISTA: within the Executive Committee which decides on strategic orientations, and by participating in or chairing the technical committees or working groups which, among other tasks, are responsible for the development of methods at international level.

In 2020, the GEVES validated or developed methods for water content, purity, other seed determination, germination, vigour and pest detection, supervised proficiency tests and conducted audits.

Through ISTA, GEVES has contributed to:

- drafting of the "ISTA Reference Pest List" of seed pests of some forty non-vegetable plant species with the aim of identifying those for which seeds are a pathway of dissemination,
- updating and enrichment of the flowers manual with new species sheets,
- evolution of germination methods for rapeseed and sunflower,
- harmonisation of the concentrations and duration of pre-treatment with hypochlorite for fungus detection analyses,
- finalisation with its Scottish counterpart - SASA - of a project on embryo staining for better detection of loose smut in barley.

National & international collaboration

GEVES at UPOV

Each year GEVES participates in the UPOV working groups, contributing with its technical, statistical and IT development expertise.

During the UPOV working group on automation and computer programs (TWC), GEVES presented Pathostat, a new statistical decision support tool for the analysis of laboratory variety resistance tests to pests. This application, developed as part of the Pathostat-veg project led by GEVES, aims to improve and harmonise decision rules for the interpretation of biotest results, in order to improve consistency between applicants' declarations and the results of official DUS tests.

https://www.geves.fr/tools/pathostat/

At the same group it was announced that France will coordinate a ring-test on the use of COYD and U, statistical techniques to judge the distinctness and uniformity of a variety on the basis of quantitative data from plant observation.

https://www.geves.fr/news/upov-working-group-on-automation-and-computer-programs-twc-september-21-23/

For the UPOV Working Group on Biochemical and Molecular Techniques (BMT), GEVES shared its thoughts on the interest of combining phenotyping and genotyping in DUS studies, stressing the importance of a legal framework to give access to non-free markers, with fair treatment between all applicants.

In July 2020, France and GEVES hosted the TWF, Technical Working Party for Fruit Crops. The meeting was initially scheduled to take place in Nîmes, but was eventually held virtually.

Online DUS training for Chinese and African experts

With travel restricted in 2020, it was essential to rethink international cooperation programmes and find new training methods which were adapted to the circumstances of the pandemic. The IPKey China cooperation programme, financed by EUIPO (European Intellectual Property Organisation) and the European Commission, was able to continue by mobilising online tools. Chinese experts from MARA and the SFGA took part in a three-day online training course on the principles of DUS.

This experience was innovative not only in its format but also in the composition of its team of instructors: some twenty experts from French, Hungarian, Spanish, German, Czech and Dutch examination offices coordinated by the CPVO, contributed by preparing presentations that were as interactive as possible. Numerous videos were shared to illustrate the principles of DUS, providing a concrete overview of the work and notations carried out in the field.

The GEVES team briefed 50 experts from all over China on the fundamentals of DUS, the use of molecular biology in DUS, and the practice of DUS testing on maize. All presentations were recorded and can now be used in other circumstances and form the basis of a common catalogue of communication tools for European examination offices.

The same type of remote training is used in the cooperation programme with the African Intellectual Property Organisation (OAPI), to train DUS experts and future experts in the OAPI area.

https://www.youtube.com/watch?v=EQeK51jkHTo

GEVES at the CPVO

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

OCVV
Office Communautaire des Variétés Végétales

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

- the use of an additional characteristic for DUS rapeseed, to distinguish varieties with a HOLL profile (high in oleic acid and low in linolenic acid),
- its proposals in drafting the CPVO DUS protocols for Alfalfa and Cocksfoot and in the revision of the DUS Hemp protocol,
- the progress of the results of the SNP Oilseed rape project on the use of SNP molecular markers to manage the reference collection.

At the meeting on vegetable crops, GEVES was able to present its expertise on DUS pepper and volunteered to pilot a future ring-test between EU examination offices. The Harmorescoll research project (provision of materials for laboratory testing of disease resistance) was also presented.

The GEVES Info newsletter goes monthly

In order to further communicate its information and expertise, in 2018 GEVES launched a newsletter "GEVES Info" (in French and English) which informs a wide audience about GEVES's activities, including:

- the regulations and their evolution,
- variety and seed testing and evaluation activities,
- the CTPS's missions and the varieties listed in the French Official Catalogue,
- INOV's missions
- research projects, method improvements, participation in conferences and symposia representative of public/private and international collaboration
- training courses offered to stakeholders in the plant and seed sector

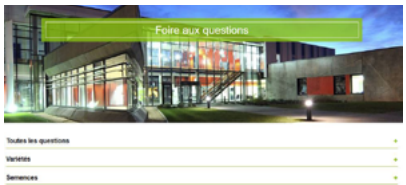
Since then, this newsletter has gone monthly, with more than 5000 readers receiving its information each month. As 2020 was the year of "Plant Health" promoted by the FAO, a specific section in these newsletters was created to highlight numerous activities related to this key theme (development of methods for evaluating variety resistance to pests, a major issue for reducing pesticide products, pest detection in seeds, evaluation of biocontrol and biostimulation products, etc.).

Browse and subscribe to the GEVES newsletters: https://www.geves.fr/newsletter-en/

A new look for our FAQ!

What are the requirements for marketing seeds? How can I check the variety of a vegetable? Can molecular markers replace field testing?

Visit our website to discover the answers to frequently asked questions.



Nathalie AUGÉ, Head of Communication

"2020 was a year of major change for everyone in terms of communication. The impossibility of meetings, face-to-face events, and welcoming visitors has made us adapt by using digital technology, in particular with the creation of virtual trade fairs such as ABIM (Annual Biocontrol Industry Meeting) and the Salon du Végétal (French international tradeshow for flowers & plants). We increased the frequency of our newsletter, updates of the GEVES website, and production of mini-videos. We also offered video-conferences with students and professionals in the sector and increased our presence on social networks to maintain our mission of providing information on varieties and seeds. "

GEVES's staff

Our staff embody the expertise, reliability, rigour, high quality of work, independence and impartiality that are essential values of GEVES. In the very delicate context caused by COVID-19, their strong commitment made it possible to carry out the vast majority of activities, despite the constraints linked to the necessary health precautions. This context has led to changes in working methods, in particular a significant increase in working from home for those activities that allow it.

GEVES's new teleworking agreement, adopted in November 2020, responds to the growing demand for working from home and helps to promote a better work/life balance.

Specific attention has been paid to the training needs necessary to maintain and develop new skills, which are essential for high-quality expertise.

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

Set up at the beginning of 2020, the Social and Economic Committee (CSE) and its commissions have played an important role in representing all employees to the general management on all these aspects.

Thibaut DECOURCELLE
Secretary of the Social and Economic Committee (CSE)

"My commitment to the CSE is a desire to participate in the GEVES collective, and to help improve working conditions through constructive dialogue with the management. As a staff representative on the CSE, I try to bring the questions and requests of colleagues to the attention of the management, in consultation with the other elected representatives. Our mandate in the CSE started in 2020 and was quickly impacted by the health crisis: after our first meeting, all meetings were organised by videoconference! Our priority has been to integrate the health provisions into the GEVES environment as effectively as possible. We found that GEVES employees went to great efforts to deal with this unprecedented situation. We are now continuing the construction of the GEVES CSE after our first project which concerned the revision of the teleworking agreement. For me, it is an exciting experience that is rich in exchange of ideas".

CSE GEVES

New teleworking agreement

The first teleworking agreement at GEVES dated back to 2014. The management team and the Social and Economic Committee (CSE) wanted to revise this agreement in order to adapt to this rapidly expanding working method.

The context of the health crisis with the massive and rapid deployment of teleworking was an opportunity for collective reflection on this type of work organisation.

In order to promote the well-being of employees, flexibility and GEVES's performance, this new agreement is in line with GEVES's wish to pursue a Human Resources policy which is consistent with the GEVES Ambition 2030 guidelines in order to promote cohesion, well-being and to strengthen and optimise health and safety at work.

This agreement allows for three forms of telework: regular (1-2 days per week), flexible (maximum 30 days per year), and occasional to respond to exceptional and temporary situations.

It also opens the possibility of teleworking outside the usual home, such as in co-working spaces.

GEVES has included an ambitious multi-year plan in its IT strategy, aiming to renew its IT equipment and improve telephone solutions in order to provide all staff with tools adapted to working from home.

Ensuring safety and health at work

Works have been carried out in the GEVES laboratories to improve analysts' workstations with an approach combining workstation ergonomics and toxicology. The aim was to find the right solution to protect staff from chemical risks caused by the dust and vapours produced during tests on treated seeds, and from the risk of musculoskeletal disorders (MSD) linked to the postures and gestures required to carry out the tasks. Numerous exchanges were held between analysts, the construction team and the service provider responsible for building the workstation prototype that will equip the sampling and germination laboratories in 2021.

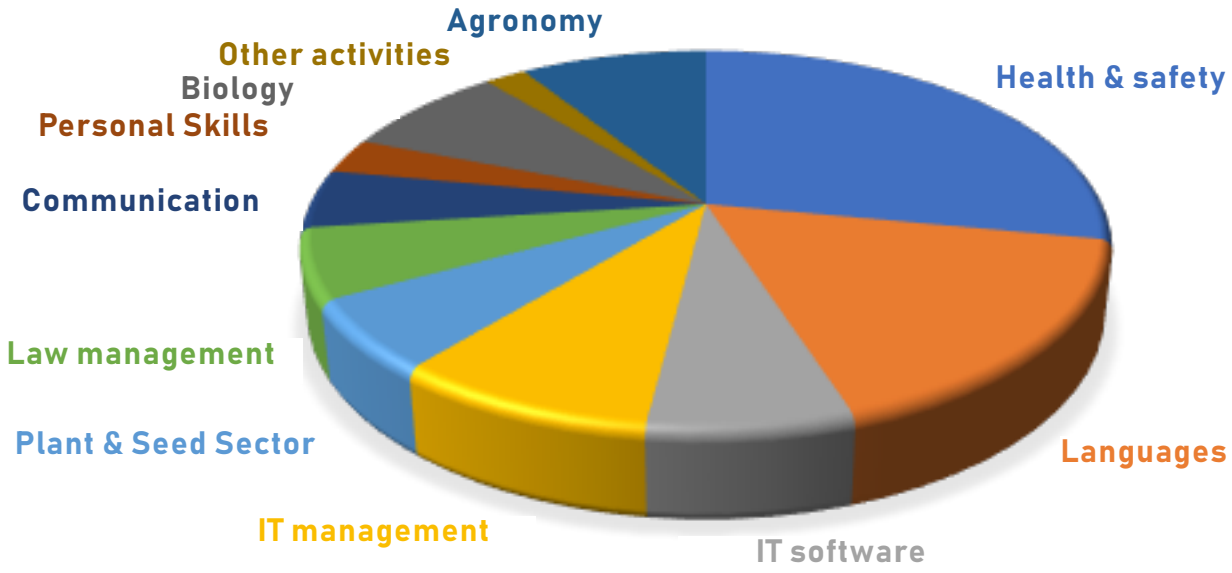
Another major investment in 2020 to guarantee the health and safety of employees in the workplace will be to ensure that regulatory inspections on buildings and equipment are carried out, and to monitor the observations. To meet these challenges with a guarantee of efficiency, GEVES has acquired an adapted web tool, trained the personnel in charge of these inspections locally, and informed the management team and Unit Directors accordingly.

A study was carried out in 2020 with the help of an ergonomist to prevent the risks of MSD induced by the development of hoeing activities, a consequence of the reduction in the use of herbicides.

GEVES's staff

Training of GEVES's staff: essential for maintaining and developing expertise.

The main themes of the training courses attended by GEVES staff are presented in the diagram below:



An example of technical training:

Mastering the SORTEX Series A Bichromatic Optical Sorter

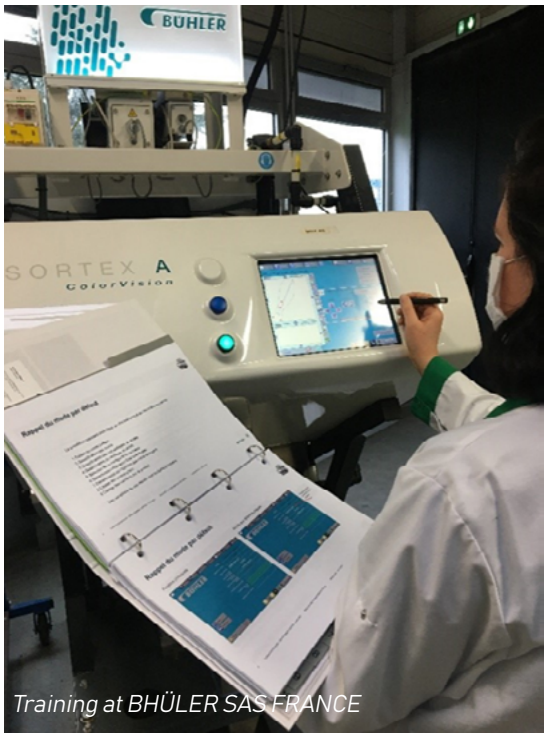
This optical sorter has a finishing sorting role which facilitates the cleaning of lots from seed companies which are mostly equipped with this machine. It sorts seeds by colour and bichromatically with programs defined according to the species being analysed. An essential part of the programme consists in defining the acceptance and rejection zones.

This four-day training course aimed to enhance our knowledge and allow staff to create new seed sorting programmes across all species and to improve or adapt existing programmes.

It was divided into two parts:

- theory: presentation of the machine, colour sorting, infrared, two-colour technology and interface of the navigation screen.
- practical: creation of programmes, adjustment of parameters, basic maintenance of the machine.

This new knowledge is applied to micro-cleaning analysis and can also be used for method and project development (e.g. sampling).



Training at BHÜLER SAS FRANCE

Training at BHÜLER SAS FRANCE

Commitment to sustainable practices & modernising facilities

As a national examination office and official laboratory for a rapidly and regularly evolving seed and plant production sector, GEVES's activities are also evolving.

It is therefore essential to adapt our facilities to the changing needs in pathology, laboratories and observation rooms, but also to respond to increases in activities. This is for example the case for ornamental plants evaluated at GEVES in substitution of the UK as a result of Brexit.

The modernisation of facilities and the development of activities are also aimed at making GEVES's missions more sustainable, in line with its strong commitment to the agricultural and ecological transition of its experimental fields.

Greenhouse gases are the main cause of global warming observed in recent decades. GEVES has real challenges in reducing its emissions of such gases due to the size of its built-up areas and experimental locations, and the potential impact of its activities. The balance sheet drawn up at GEVES in 2020 shows a favourable evolution. It sheds light on the priorities for actions to be carried out over the next few years.

Clotilde POLDERMAN-ROUSSILLE, Head of the National Seed Testing Station (SNES)

"The laboratory renovation project? It is above all a project to modernise the premises and improve the working spaces of our staff. With a real focus on the continuous optimisation of health and safety aspects.

This project is also about staff getting involved and participating in the design of prototypes for new equipment which is adapted to their job or the coordination of their work. On a daily basis, the teams ensure the continuity of our activities and missions in strict compliance with the quality systems in force. Well done to all!"

Modernisation of GEVES's facilities: extension of the pathology laboratory

GEVES has started construction works to modernise its facilites to meet the changing needs of the regulations and the seed industry, and comply with health and safety regulations. The first stage of construction concerned the pathology laboratory of the National Seed Testing Station (SNES) with an expansion of the laboratory and the construction of a new greenhouse.

The expansion of more than 200 m2 extends the laboratory's quarantine growth chambers. It has extended the rooms intended for variety resistance testing of nematodes (beet, potato, fodder crucifers) and built a new handling room serving 6 climatic modules equipped with LEDs, following the findings from the Patholed workshop held in 2019. Airlocks have been placed at each end of the area, in line with quarantine conditions.

A new greenhouse section has also been built. With a surface area of 157 m2 and a containment level of Ns2, it can be used to work with quarantine pests and thus meet the growing needs for variety registration. From 2021, this new greenhouse will enable the laboratory to set up resistance tests on forage crops against *Meloidogyne chitwoodi* and *fallax*.

The laboratory's activities have been maintained throughout the construction period in order to meet the needs of the seed sector.

Agroecology on GEVES's experimental stations

For several years now, the five main GEVES experimental stations have been moving towards agroecology while maintaining the high quality of the studies conducted there. Concrete actions have already been implemented:

- reducing the use of plant protection products, by using more mechanical hoeing, using mulches, planting rotation crops that require less plant protection products or by mechanically destroying plant cover,
- preserving the soil by systematically planting plant cover during intercropping, using organic fertilisers and reducing or eliminating ploughing,
- promoting biodiversity by planting hedges and ecological corridors, postponing the mowing of grassy and/or flowery strips at the end of the summer, improving the management of hedge pruning, and installing perches and nesting boxes for raptors and bats.

To encourage and support this change, the teams have participated in several training days dedicated to agroecology and innovative cultivation techniques. Cross-unit working groups and indicators for monitoring practices, particularly in terms of the use of phytosanitary products, have been set up.

Commitment to sustainable practices & modernising facilities

It's not just plants that grow at GEVES...

In 2020, GEVES largely continued to diversify the range of species studied in DUS by continuing to develop the activity for ornamental, perfume, aromatic and medicinal plants, with 300 varieties evaluated across 43 different genera, including 15 new genera at GEVES.

With this growing activity, new facililties are being built and will be operational for the 2021 season at the Brion and Cavaillon-Carpentras stations.

At **Brion**, in order to complete and improve the existing infrastructures, a new greenhouse is being built (3000 m²) as well as an outdoor testing platform (1500 m²). The greenhouse will house the national Chrysanthemum reference collection in the form of mother plants in pots in a dedicated insect-proof sector. It will also house the Hydrangea plants during winter and will allow all the activities of cutting and breeding of young plants in optimal conditions. The outdoor platform will host all DUS trials conducted in pots for many species. In addition, 9 hectares have been added to the unit's agricultural areas to accommodate trials on vegetable species and some agricultural species.

The **Cavaillon-Carpentras** unit will benefit from 2 shadehouses and an additional above-ground platform for ornamental and medicinal species, as well as a greenhouse for the production of vegetable plants (600 m²), an observation room (300 m²) dedicated to technical examinations on vegetable species, thus making it possible to optimise the flow of fruit of all the vegetable species studied, and a warehouse (450 m²) in order to better manage the storage, preparation and effluents of plant protection products, and to protect delicate agricultural tools. These developments are being carried out in parallel with the acquisition of 6 additional hectares in order to increase the capacity for field trials on soya and sunflower.

GEVES reduced its greenhouse gas emissions by 12% between 2016 and 2019!

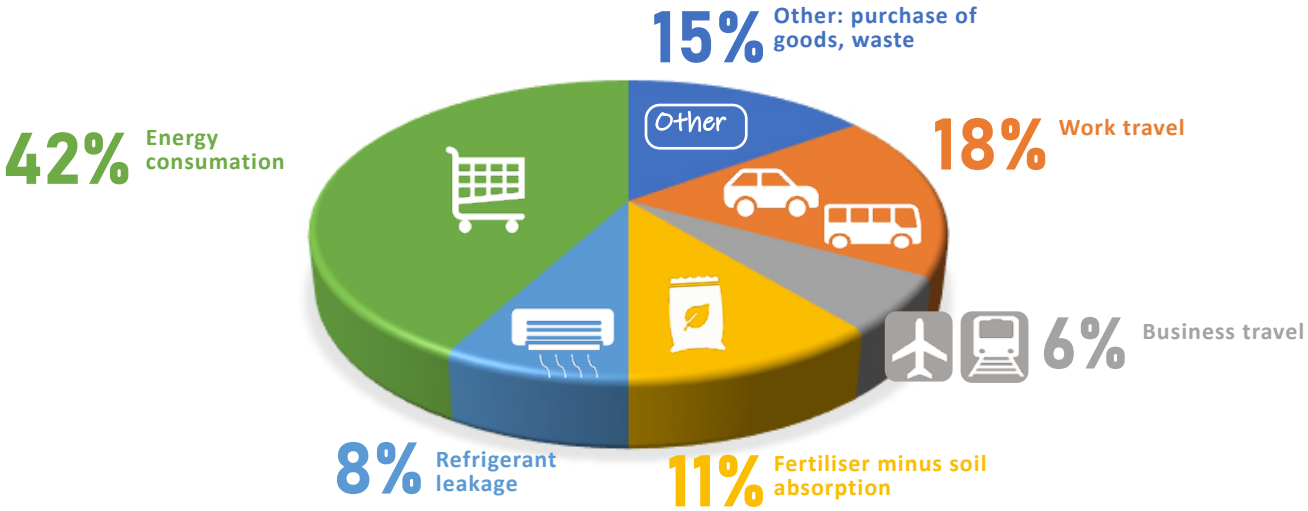
The 2010 law on France's commitment to the environment requires certain companies to carry out a greenhouse gas emissions assessment. This assessment must identify the annual carbon emissions, and the possibilities for the company to reduce them.

The GEVES drew up its first two assessments in 2011 and 2016, and in 2020 the assessment will be based on 2019 data for all GEVES sites.

Emissions from various sources were evaluated: energy consumed (fuels, combustibles, electricity), CFC gas losses from refrigeration facilities, and nitrogen fertilisation. With a total of 964 tonnes of CO2 emitted in 2019, these emissions have been reduced by 12% compared to 2016, in particular by changing the heating method at the Beaucouzé site (Maine et Loire).

Emissions which are not required to be assessed under regulations were also studied, related to purchases, waste and travel (office and working from home). They amount to 876 tonnes of CO2 emitted in 2019, of which more than 300 tonnes are due to commuting, i.e. 17% of the total emissions of GEVES.

This assessment and its comparison with previous assessments are the basis for defining the action plan for reducing greenhouse gas emissions at GEVES, one of the priority objectives of the GEVES Ambition 2030 strategy.



Jean-Claude STÉPHAN, Head of sustainable development

*"What struck me most in the results of our greenhouse gas emissions assessment was the scale of emissions linked to transport to work (17% of total emissions). If we take our car, we each emit about **1 ton of CO2 equivalent per year.** This is a figure that makes us think about how each of us can act at a personal level to help the planet every day. "*

GEVES: A unique & official organisation in France

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

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

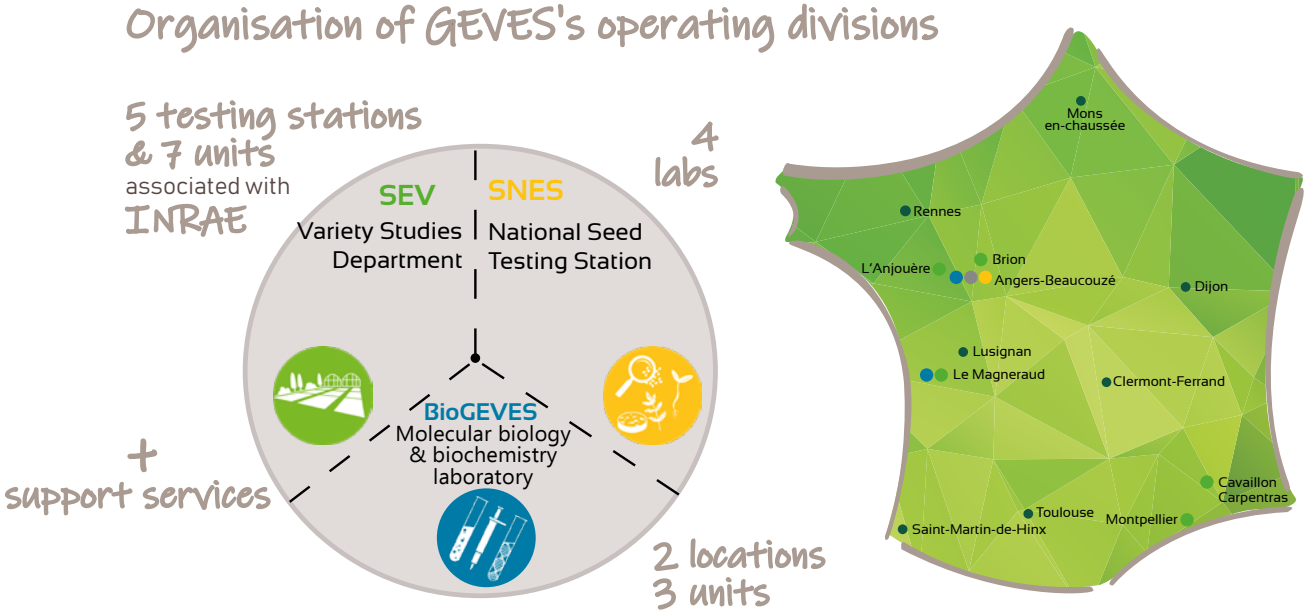
2 representatives from GNIS

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's operating divisions



GEVES's missions

GEVES has official, regulatory missions and carries out testing activities and methodological development which is necessary 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 2015
- quality testing of seeds and propagating material by Decree of 1 March 2017
- in the field of 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 customers.

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

FOCUS

Quality, Recognition & Accreditation

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 2020 Annexes

Variety testing activities

1 - New applications

Year	National listing	National protection	DUS applications from abroad	CPVO	Total applications
2016	1 186	90	1 019	566	2 295
2017	1 137	145	1 061	580	2 343
2018	1 179	85	953	562	2 217
2019	1 108	107	1 186	695	2 402
2020	**1 158**	**89**	**1 117**	**644**	**2 364**

DEE: Applications from abroad = requests for DUS tests & take-over reports

Number of new DUS applications by species group

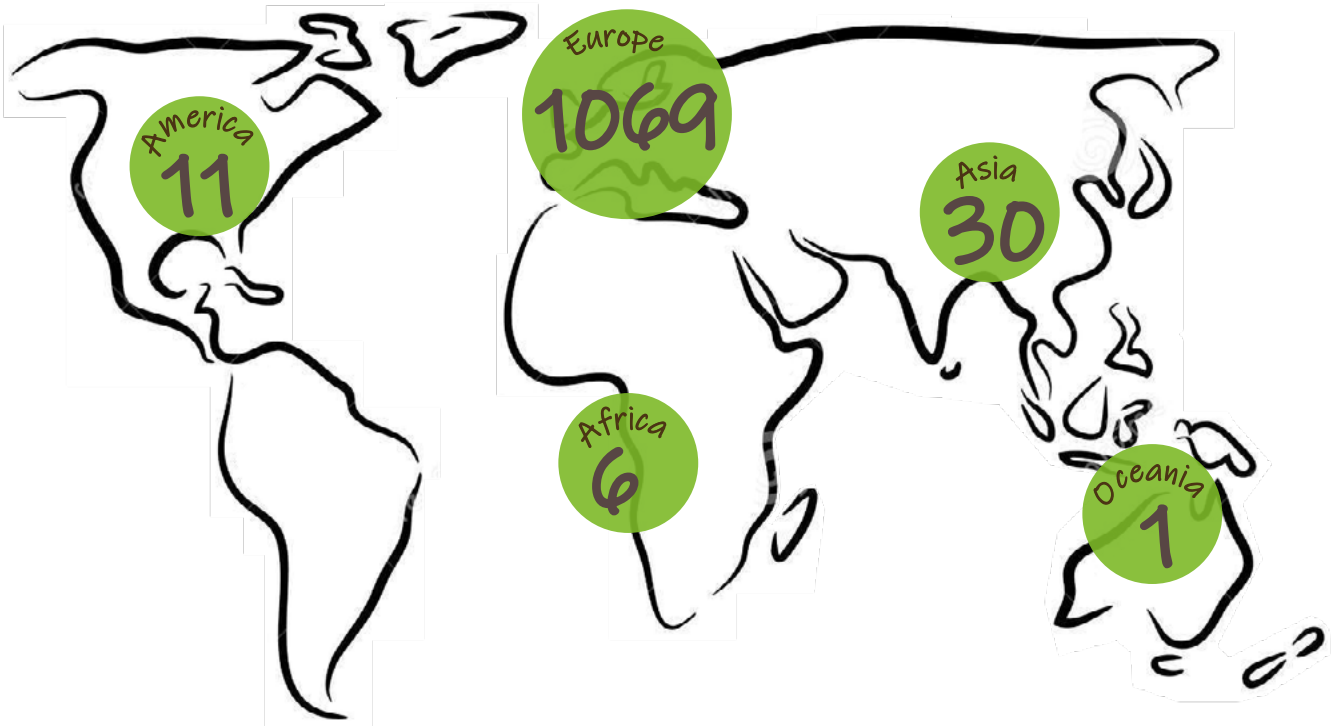
Species group	National listing 2020	APV 2020	National protection 2020	DUS from abroad 2020	CPVO 2020
Forest trees	-	-	-	3	3
Fruit species	89	-	22	74	56
Vegetable species	196	168	1	218	131
Ornamental species	-	-	-	162	161
Beet & industrial chicory	99	-	-	20	-
Cereals	246	-	-	158	74
Rape & other crucifers	88	31	5	84	46
Flax & hemp	17	3	-	18	10
Maize & sorghum	224	30	37	250	101
Fodder & grass plants	102	4	3	25	5
Protein plants	32	-	-	17	9
Potatoes	13	-	-	-	
Sunflower & soybean	40	8	21	87	48
Grapevine	12	-	-	-	-
TOTAUX 2020	1 158	244	89	1127	644

The total number of applications for national listing (CTPS) increased slightly: increase in maize, forage plants and turf grasses but slight decreases in beet and vegetable. The significant increase in fruit is linked to List 2 applications: no DUS studies were set up, only recognitions of variety descriptions were issued. Activity for national protection has slightly decreased. Applications from abroad decreased slightly in 2020, but activity remains stable nonetheless.

APV: Provisional sales authorisation in France

Variety testing activities

DUS applications from abroad



70% of applications from abroad are take-over reports.

30% are requests for new DUS studies. The main clients for new testing are:

- CPVO: 258 applications with a significant increase explained by the increase in GEVES's ornamentals activity,
- Germany: 24 applications,
- UK: 11 applications,
- Switzerland: 10 applications,
- Netherlands: 9 applications,
- Denmark: 8 applications,
- Belgium: 7 applications.

2 - Variety Denomination tests

The overall number of tests increased (+13%): increase in pre-tests carried out for subscribers (+7%), and in official denominations processed for CTPS or INOV applications (+17%).

	2019	2020
member tests	722	772
INOV gazette tests	926	1084
TOTAL TESTS	1648	1856
No. of members	24	17

Variety testing activities

3 - DUS Studies

Volume of DUS studies

Species groups	Studies conducted by GEVES	Studies delegated to INRAE (or other French organisations)	Studies subcontracted abroad	Total studies
Forest trees		12		12
Fruit species	5	267	2	274
Vegetable species	450	6		456
Ornamental species	300	5		305
Beet & industrial chicory	18	164		182
Cereals	421	6	15	442
Rape & other crucifers	310		7	317
Flax & hemp	27			27
Maize & sorghum	806			806
Fodder & grass plants	89		228	317
Protein plants	60			60
Potatoes			8	8
Sunflower & soybean	236			236
Grapevine		74		74
TOTAL 2020	2 722	534	260	3 516
Total 2019	2 647	553	259	3 462

Overall DUS activity has increased very slightly: the increase is notable in ornamentals and maize. This is balanced by decreases in vegetables and rapeseed. The number of species studied in DUS rose from 123 in 2018, to 145 in 2019, and to 151 in 2020.

DUS reference collections

Total no. varieties in collection	2020
Beet & industrial chicory	1 672
Cereals	5 301
Rape & other crucifers	2 485
Flax & hemp	202
Maize & sorghum	9 759
Fodder & grass plants	2 182
Protein plants	1 226
Sunflower & soybean	3 167
Total agricultural species	25 994
Vegetable species	27 669
Ornamental species maintained in vivo at GEVES	3 788
TOTAL GENERAL	**57 451**

Biomolecular analysis at BIOGEVES

(reduction in field planting, hybrid formulae, identity checks):
1700 samples including 60% maize, 10% sunflower, 5% barley, sorghum, peas, wheat and 2% for fruit trees (Malus and Prunus).

Resistance tests at SNES laboratory

: 1794 tests, including 1598 for 39 pests of vegetable species and 195 for 4 pests of agricultural species.

Variety testing activities

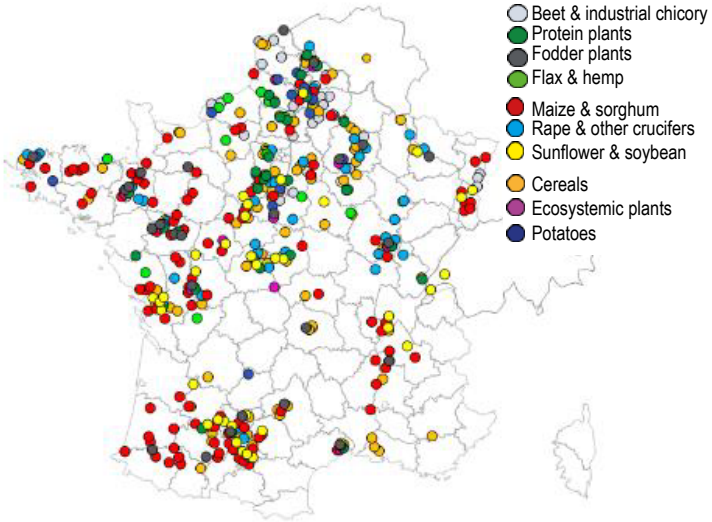
4 - VCUS studies

Volume of VCUS studies

Species group	No. of VCUS studies				Total	% total
	1st year	2nd year	3rd year	4th year		
Beet & industrial chicory	96	63	0	0	159	12%
Cereals	236	115	1	0	352	27%
Rape & other crucifers	84	30	3	0	117	9%
Flax & hemp	14	9	0	0	23	2%
Maize & sorghum	186	69	0	0	255	20%
Fodder & grass plants	89	85	89	0	263	20%
Protein plants	29	18	0	0	47	4%
Potatoes	8	4	0	0	12	1%
Sunflower & soybean	24	17	1	0	42	3%
Ecosystemic plants	7	9	0	0	16	1%
TOTAL 2020	**773**	**419**	**94**	**0**	**1 286**	**100%**
Total in 2019	**765**	**475**	**76**	**0**	**1 316**	

The overall VCUS activity is comparable to 2019 activity and is within the average of the last 5 years.

VCUS trial networks



Field and grass plants

European grass network

1 835 VCUS trials including:
1 458 trials for overall value assessment
336 trials for the study of specific characteristics (behaviour in relation to pests, lodging, cold, earliness, etc.)
41 tests upon request of the breeder to verify one or more varietal characteristics (pest tolerance, particular quality profiles, behaviour under certain types of cultivation, etc.). This concerns almost 10% of candidate varieties.

Variety testing activities

VCUS laboratory tests

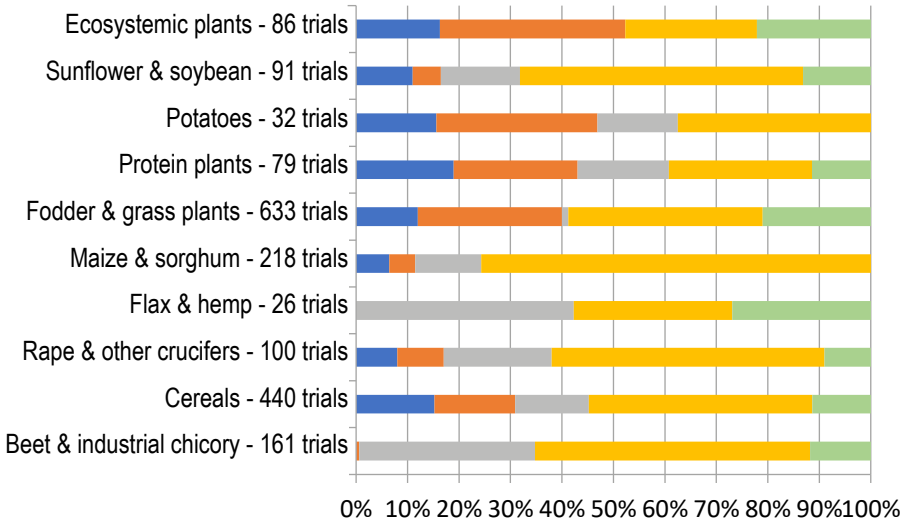
Species group	Bio GEVES	Partner labs	SNES	Total no. tests	Main types of tests
Beetroot & industrial chicory	110	12 861	550	13 521	**Sugar beet:** sugar content, alpha-amino nitrogen content, potassium content, sodium content. Nematodes. HS1pro1 gene. Varietal control (monogermia, ploidy). **Fodder beet:** soluble dry matter content. **Chicory:** soluble dry matter and asparagine.
Cereals	418	11 607	166	12191	**Barley & wheat diseases:** Elisa mosaic tests. **Triticale & wheat diseases:** Fusarium and Microdochium identification. **Oat:** TSW, protein, colour, almond fineness. **Durum wheat:** protein, Grain specific weight, TKW, LMW, grain hardness, mitadinage, yellow rate, speckle, sedimentation test (SDS). **Wheat:** protein, Grain specific weight, Hagberg, wet gluten et gluten index, grain hardness, Chopin alveograph, French bread-baking test, improver wheat test, cookie baking test, the EC machinability test for bread-making wheat. **Barley:** Grain specific weight, protein, calibration, dormancy, micromalting. **Triticale:** protein, Grain specific weight, viscosity. **Rice:** machining yield analysis (whole and milled), grain biometry (length and width).
Rape & other crucifers	1 885	588	1 441	3 914	Oil, glucosinolates, proteins and fatty acids content. Clubroot resistance (rape).
Flax & hemp		1 503		1503	Oil, proteins, omega 3, fibre quality.
Maize & sorghum	114	2 628	120	2 862	Fodder food value, fat (oil-rich varieties), tannin content. ;
Fodder & grass plants		2 879	62	2 941	**Alfalfa**: feed value (Protein and fiber content), nematodes, Verticillium, Colletotrichum **Vetch (Vicia), forage pea:** Protein content. **Grasses:** feed value (Protein, fibre and sugar content). **Ryegrass Italian and hybrid, Brome-grass, Festulolium:** Xanthomonas.
Protein plants	654	20		674	Protein content, trypsin inhibitor activity, fat content, vicine and convicine content
Potatoes		12	115	127	Cooking quality, colour changes from frying. Nematodes.
Sunflower & soybean	1 653		189	1 842	Oil, oleic acid, protein Mildew
Ecosystemic plants		465		479	Protein content, carbon-nitrogen ratio, nematodes (crucifers).
TOTAL 2020	**4 834**	**32 563**	**2 643**	**40 040**	
Total in 2019	**6 474**	**39 817**	**2 601**	**48 992**	

Variety testing activities

VCUS networks: multi-partner networks

- GEVES
- INRAE
- ITA
- Obtenteurs
- Autres

ITA: Agricultural Technical Institutes
Others: professional organisations, agricultural schools and colleges, cooperatives and traders, foreign counterparts.



5 - Variety controls

Variety controls are carried out mainly for the SOC to verify variety identity and purity for seed lot certification. The significant decrease is related to the Covid-19 context as the SOC decided that variety testing activities were not a priority during lockdown. As an alternative to field studies, 137 sunflower hybrids (with 71 reference samples) were analysed using molecular biology for varietal identity.

For maize, controls are carried out by INRAE and FNPSMS; and for cereals, by Arvalis. GEVES's role is to provide the corresponding reference sample: 850 lots in 2020.

127 controls were also carried out for other customers.

Species group	No. of SOC lots tested
	2020
Beet & industrial chicory	0
Cereals (rye & buckwheat)	19
Rape & other crucifers	648
Flax & hemp	10
Sorghum	63
Fodder & grass plants	584
Vegetable species	130
Shallots	107
Protein plants	91
Sunflower & soybean	660
Total 2020	**2 312**
Total in 2019	**3 789**

Varieties registered in the Official French Catalogue in 2020

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, on 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 VARIETIES	A	B	P	TOTAL
Beet & Industrial Chicory	**46**	**10**		**56**
Fodder beet	4			4
Sugar beet	39	10		49
Industrial chicory	3			3
Cereals	**68**	**28**	**2**	**98**
Spring oat	2			2
Winter oat	4			4
Spring naked oat	2			2
Winter naked oat	6			6
Soft winter wheat	22	14	2	38
2-row spring barley	7	2		9
2-row winter barley	7	3		10
6-row winter barley	15	7		22
Rice	1			1
Triticale	2	2		4
Rape & Other Crucifers	**23**	**17**		**40**
Cabbage - turnip - Rutabaga	1			1
Oilseed rape	20	17		37
Fodder radish	2			2
Flax & Hemp	**6**			**6**
Hemp	1			1
Spring flax	2			2
Spring linseed	2			2
Winter linseed	1			1
Maize & Sorghum	**53**	**29**		**82**
Maize	48	28		76
Fodder sorghum	2			2
Sorghum	3	1		4
Fodder & Grass Plants	**47**	**5**		**52**
Grazing brome	1			1
Cocksfoot	1	1		2
Meadow fescue	2			2
Fodder tall fescue	2			2
Tall fescue	2			2
Chewings fescue	3			3
Timothy	1			1
Lucerne	6			6
California bluebell	1			1
Fodder perennial ryegrass	11	1		12
Turfgrass perennial ryegrass	5			5
Italian ryegrass (annual type)	1	1		2
Italian ryegrass	3	1		4
Hybrid ryegrass	2	1		3
Bermseem/egyptian clover	1			1
Balansa Clover	1			1
Crimson clover	1			1
Squarrose clover	1			1
Red clover	1			1
Common vetch	1			1
Protein Plants	**32**			**32**
Field bean	5			5
Lentil	3			3
White lupin	1			1
Spring protein pea	7			7
Winter protein pea	4			4
Chickpea	12			12
Potato	**11**			**11**
Potatoes	11			11
Sunflower & Soybean	**9**	**8**		**17**
Soybean	6	4		10
Sunflower	3	4		7
Total Agricultural Varieties	**295**	**97**	**2**	**394**

Varieties registered in the Official French Catalogue in 2020

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
Asparagus	2			2
Aubergine	2			2
Carrot	2			2
Celery	1			1
Leaf chicory, (Italian type, Witloof)	2			2
Endive	8			8
Broccoli	5			5
White cabbage	2			2
Cauliflower	12			12
Cucumber/gherkin	1			1
Courgette	26		1	27
Fennel	4			4
French bean	7			7
Lagenaria siceraria	1			1
Lettuce	46			46
Corn salad/lamb's lettuce	3			3
Sweet or pop corn	8			8
Melon	41	4		45
Watermelon	18			18
Onion			1	1
Parsley	1			1
Pepper	20			20
Pea	3			3
Rootstock (Eggplant)	1			1
Gourd	2			2
Radish	1			1
Black radish	2			2
Tomato	21		1	22
Total Vegetable Varieties	**243**	**4**	**3**	**250**

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)

FRUIT SPECIES	1	2	TOTAL
Abricot	1		1
Peach	3		3
Apple	3		3
Rootstock Prunus	1		1
Total Fruit Varieties	**8**		**8**

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

GRAPEVINE SPECIES	A
Total Grapevine Varieties	**12**

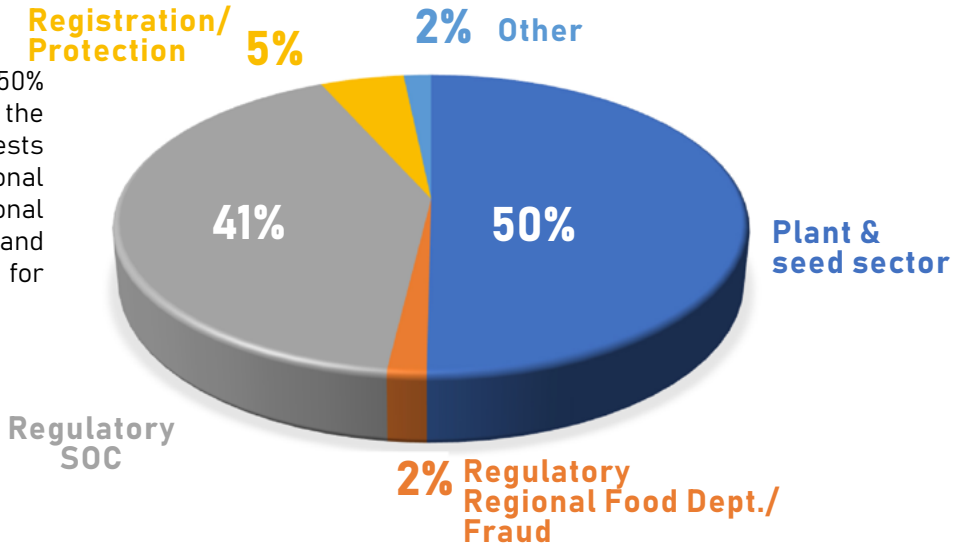
TOTAL varieties registered in the French Catalogue in 2020 :

Agricultural + vegetable + fruit + vine varieties = **664**

Laboratory activities: seed quality testing & resistance tests

In 2020, 85,000 tests were carried out.

Regulatory analyses represent 50% of 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 : tests for private operators in the context of R&D, production or national/international trade (OIC, phytosanitary certificate tests, etc.)

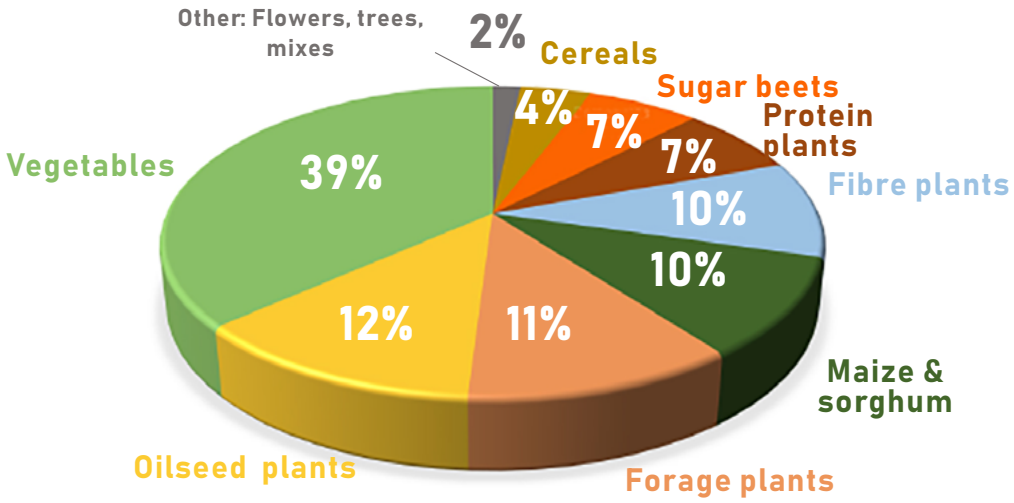
Regulatory – Regional Food Dept./Fraud: tests for public authorities such as the Regional Food Service and the Regional Directorate for Food, Agriculture and Forestry.

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.

Registration - 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.

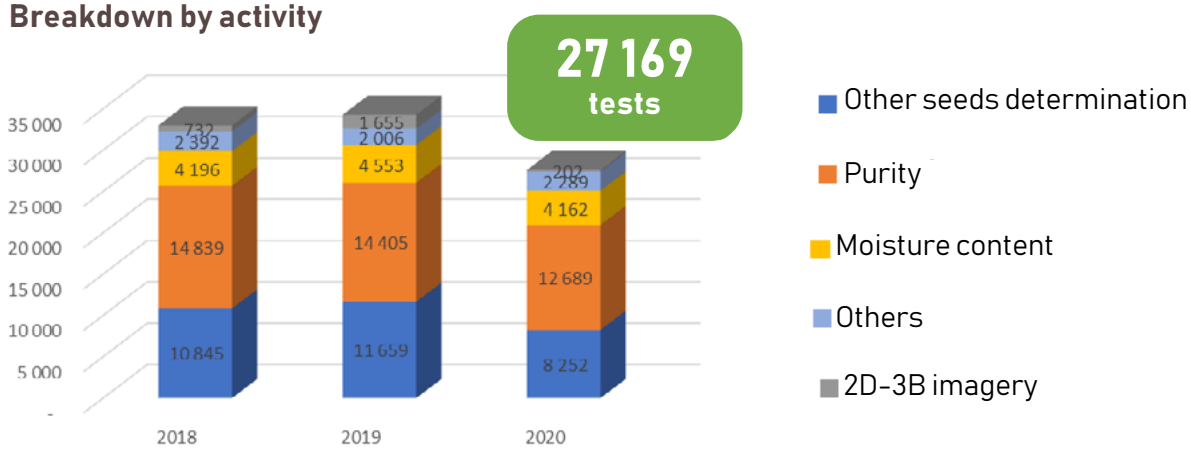
Breakdown of tests performed in 2020 by species group



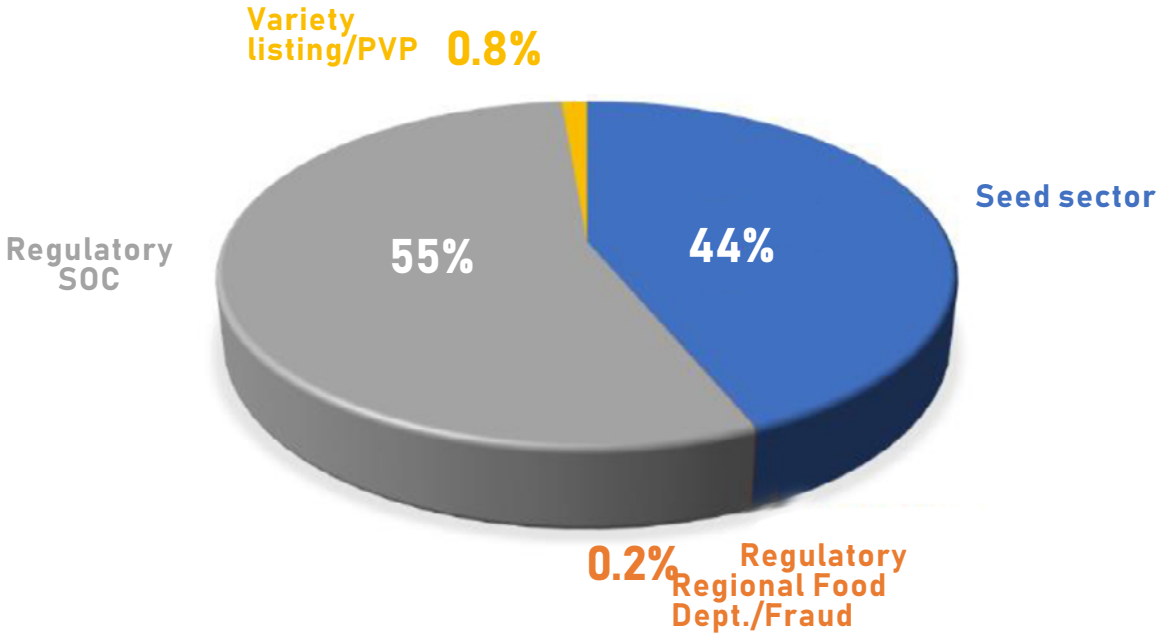
Activities by laboratory

Seed physical quality tests

Breakdown by activity

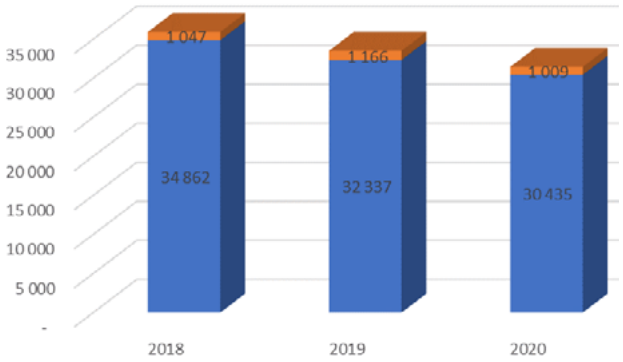


Breakdown by requester/client



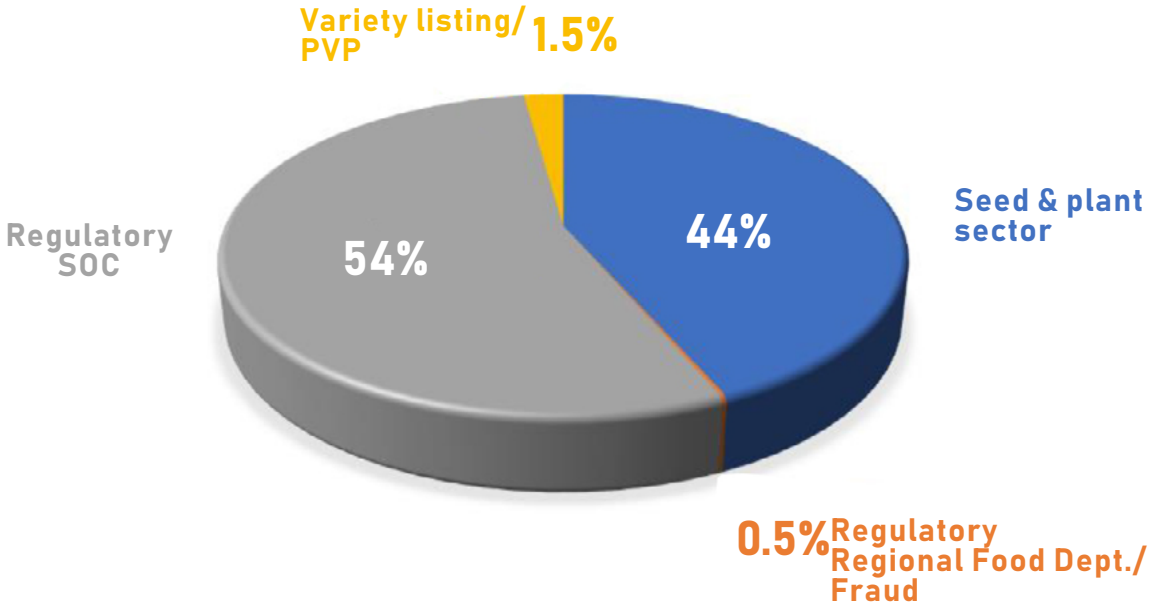
Seed germination tests

Breakdown by activity



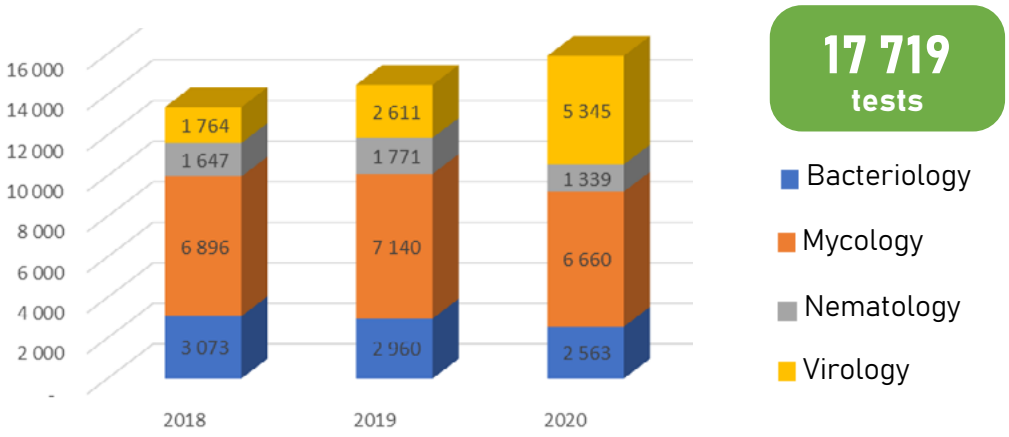
31 191 tests

Breakdown by client

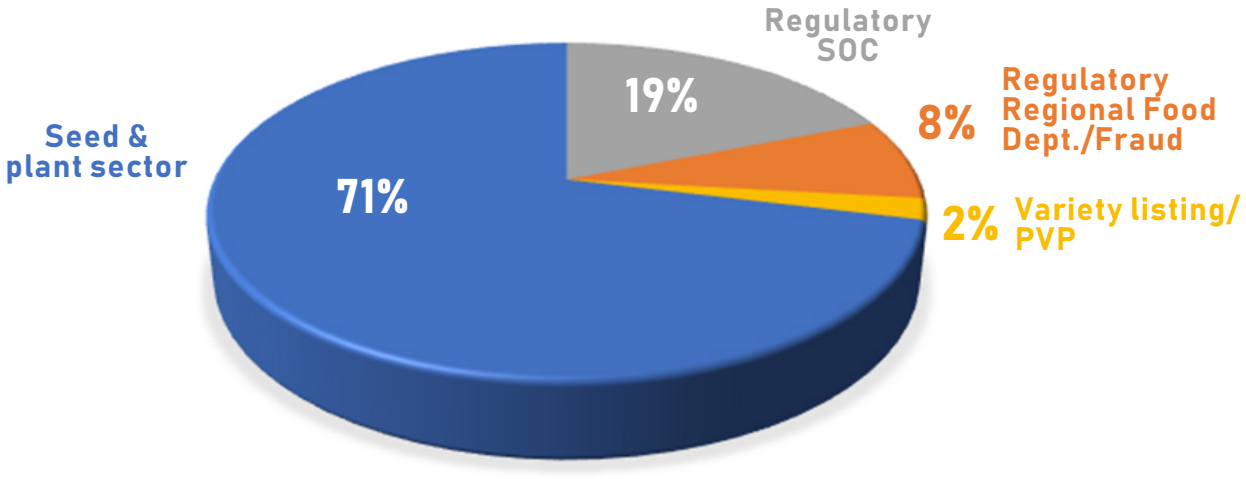


Seed health tests

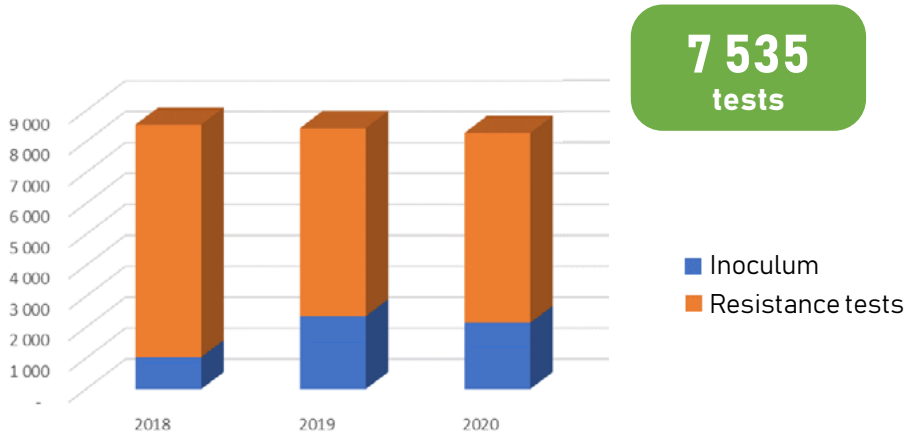
Breakdown by activity



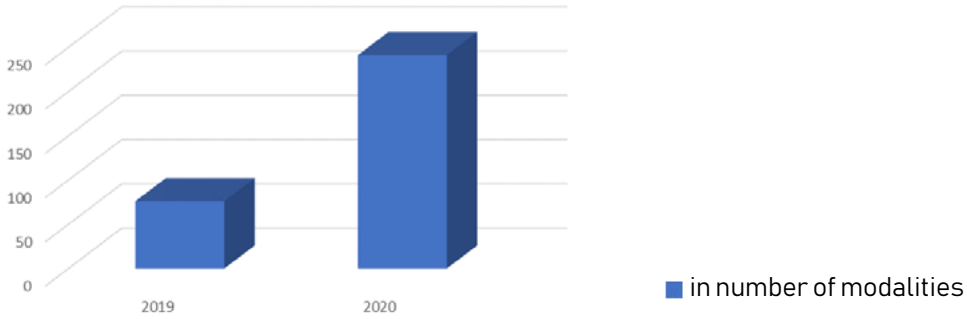
Breakdown by requester/client



Varietal resistance evaluation activity under controlled conditions

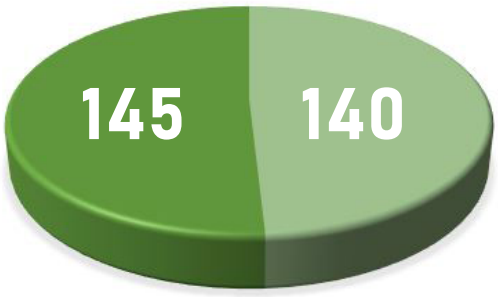


Evaluation of the effect of treatments (biocontrol, biostimulation, alternative treatments, etc.) on seeds and seedlings under controlled conditions



Human Resources 2020

Natural persons



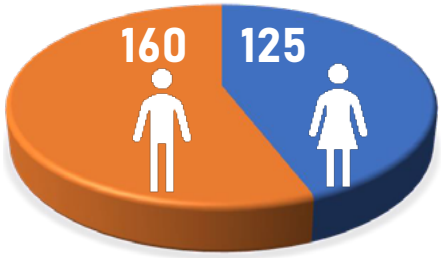
INRAE

Permanent GIP staff

Full Time Equivalent

WYE 01/01/2020 - 31/12/2020		
CDI GIP	⇨	132.7
CDD GIP	⇨	75.15
INRAE	⇨	140

Male - Female



Egalpro 2020 Index:

84 / 100

GIP staff average age: 43

INRAe staff average age: 48

65 staff over 55 ans

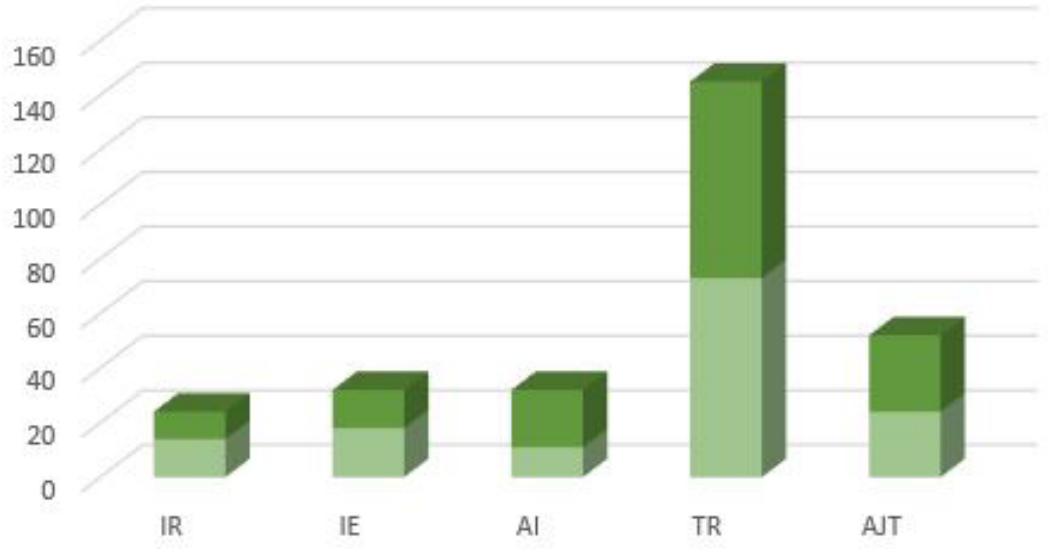
17 staff over 60 ans

Traineeship	= 3
Internship	= 1

Permanent	GIP	INRAE	TOTAL
New staff	12	7	19

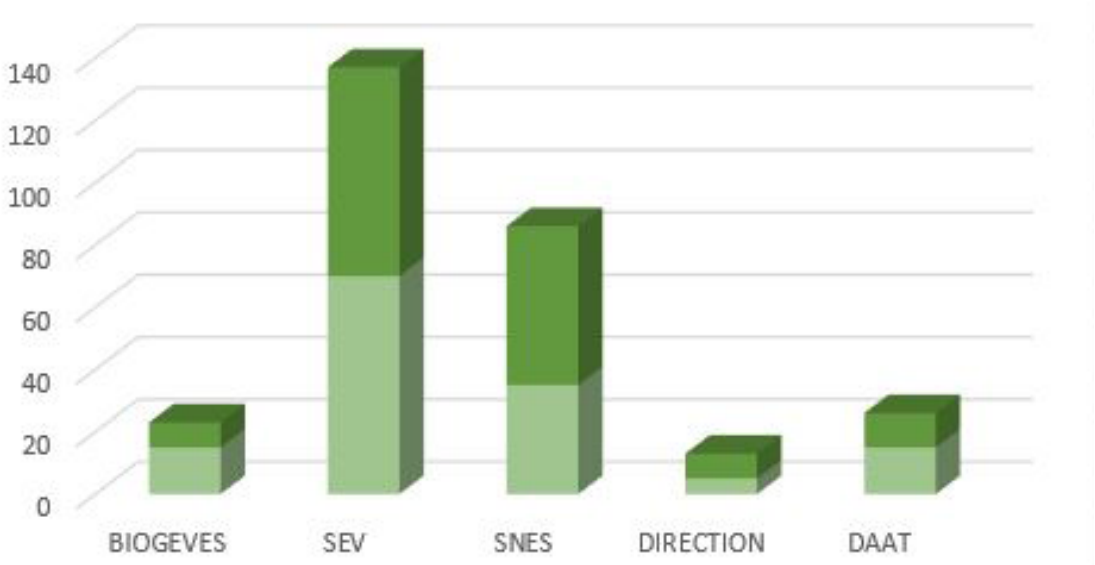
Breakdown by grade and status

CDI GIP INRAE

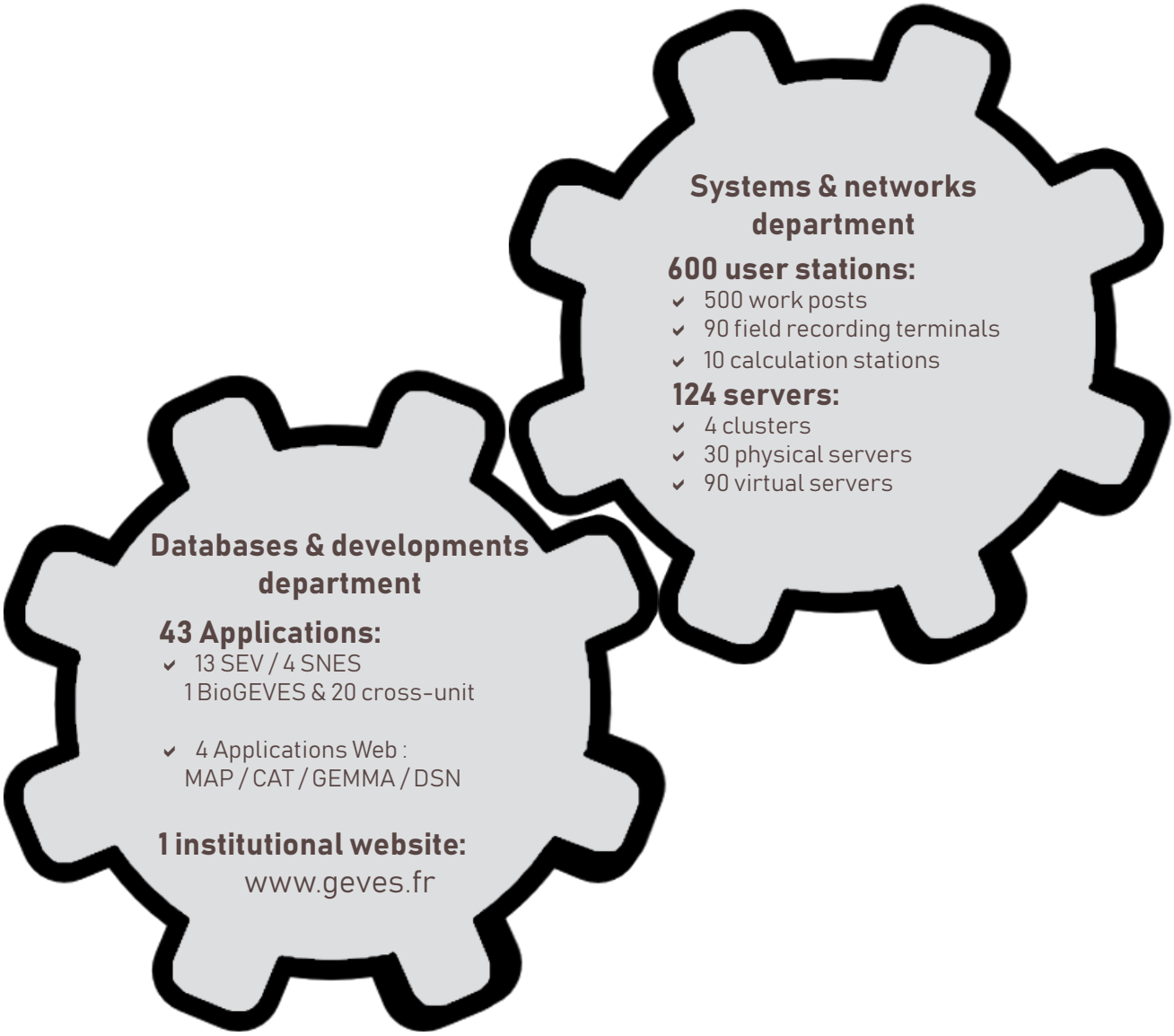


Breakdown by sector and status

CDI GIP INRAE



IT systems: figures on data & applications



GEVES's Resources

Laboratories & experimental fields

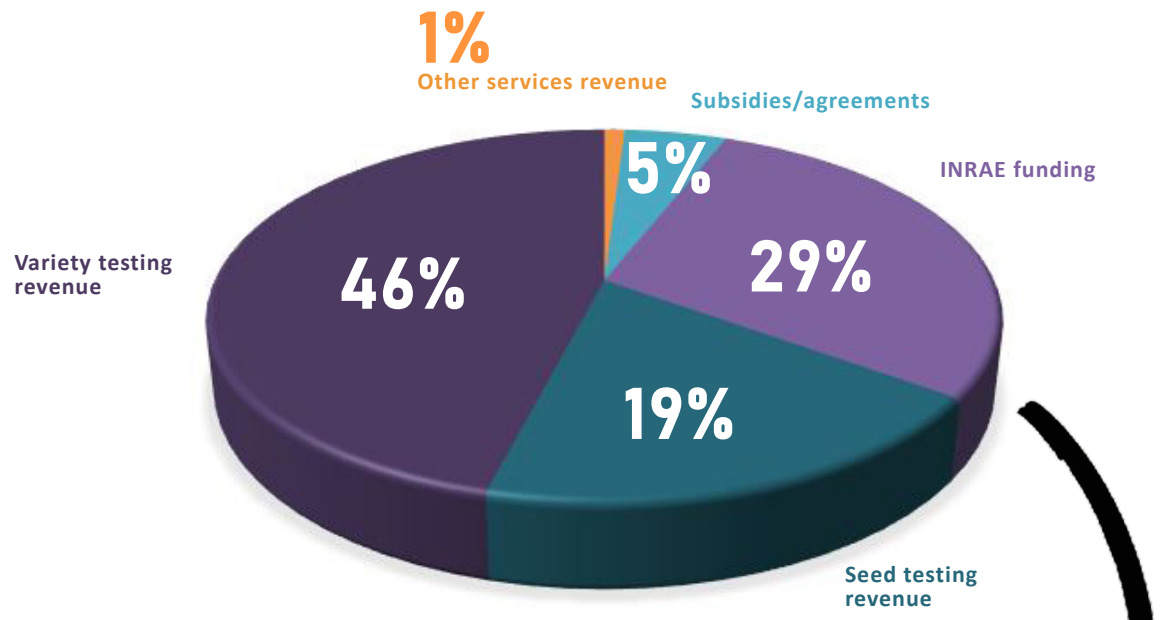
Location	Lab surface area (m²)	Surface area of cold rooms, growing rooms (m²)	Greenhouse surface area (m²)	Field surface area (ha)	Rented surface area (ha)
Beaucouzé	2 360	980	430		
Anjouère			933	175.1	18
Brion		100	3 870	35.2	2.4
Le Magneraud	365	590		73.9	59
Montpellier				39.6	3
Cavaillon Carpentras		146	7 655	57.5	-
TOTAL	2 725	1 816	12 888	379.8	82.4

Experimental surface areas

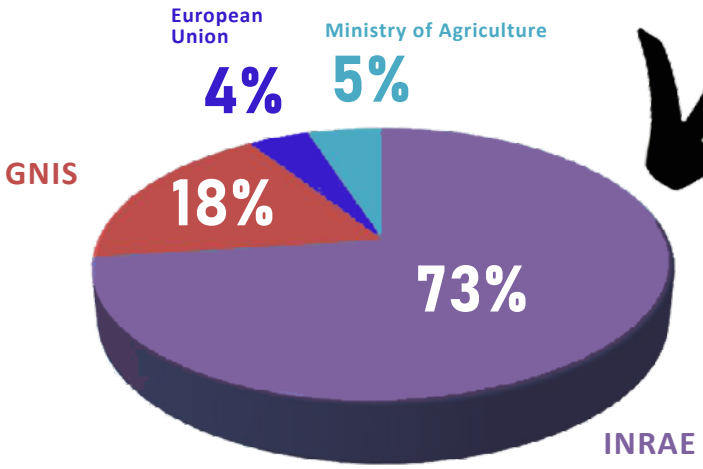
Location	Trials surface area		% DUS & CV trials surface area	% VCU trials surface area	% Other trials surface area	Number of species tested
	Field (ha)	Sheltered (m²)				
Anjouère	30.13	360	70	29	1	64
Brion	5.51	2 330	98	-	2	53
Le Magneraud	20.48		81	18	1	29
Montpellier	8.87		59	37	4	30
Cavaillon Carpentras	8.71	8 477	97	-	3	43
TOTAL	73.70	11 167	77	21	2	160

Budget 2020

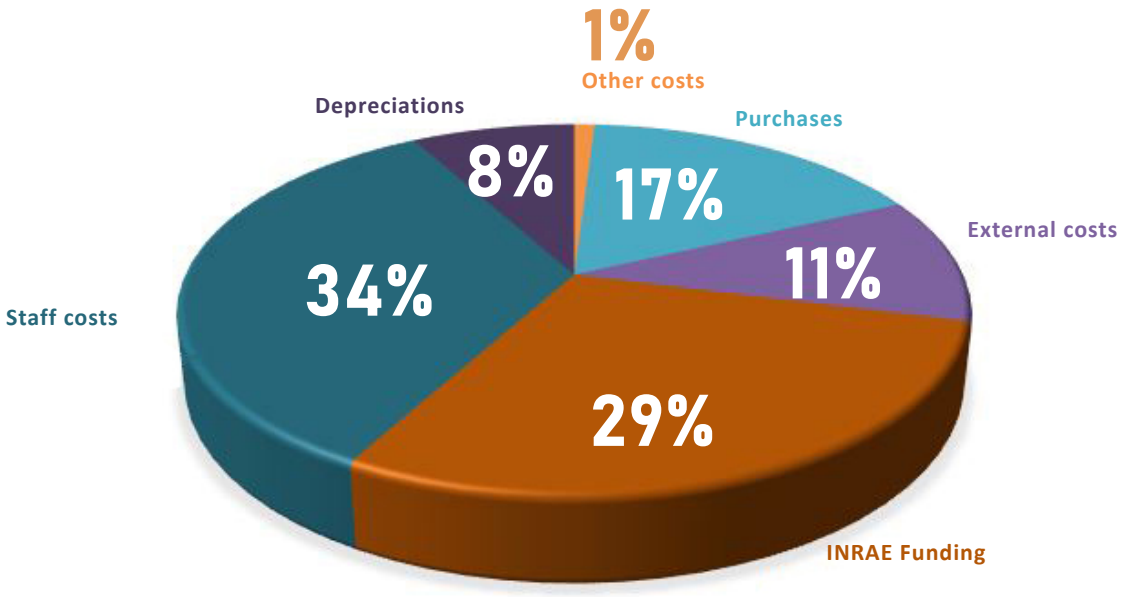
Operating income: €29 190 K



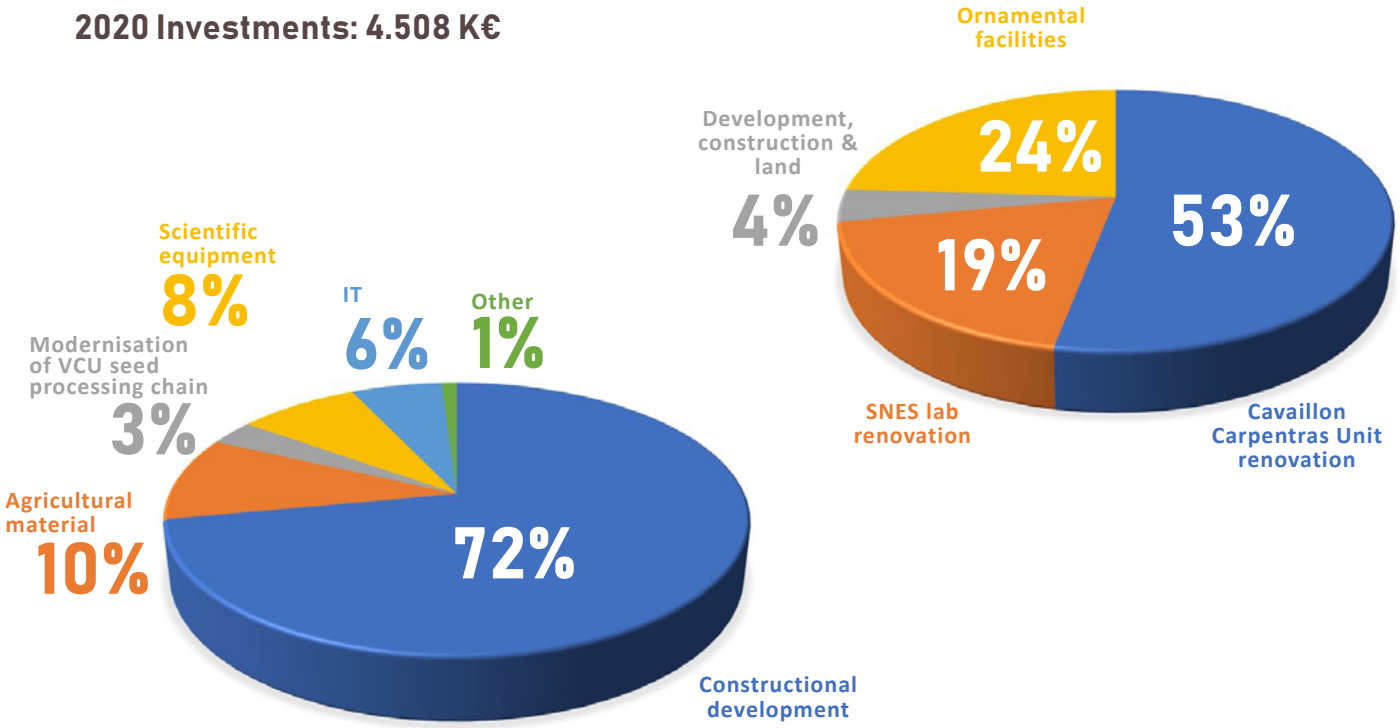
Including contributions from founding members of GEVES and other bodies



Operating costs: 29 403 K€



2020 Investments: 4.508 K€



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
GNIS: French Interprofessional Organisation for Seeds and Plants

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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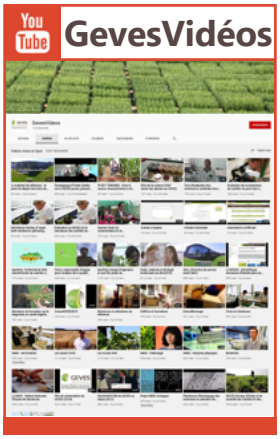

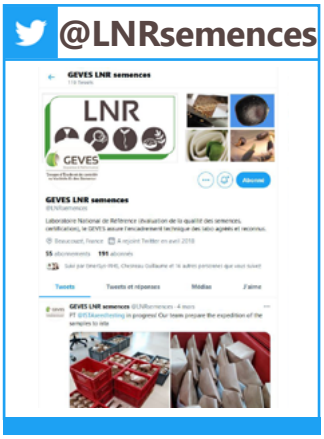

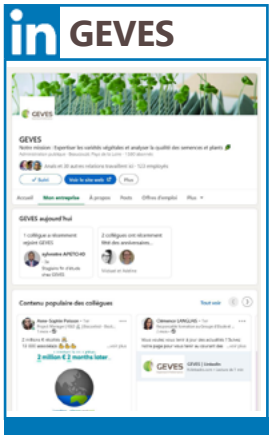

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