

Technical Working Party for Agricultural Crops**TWA/49/3****Forty-Ninth Session
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REPORTS ON DEVELOPMENTS IN PLANT VARIETY PROTECTION FROM MEMBERS AND OBSERVERS*Document prepared by the Office of the Union**Disclaimer: this document does not represent UPOV policies or guidance*

1. The Technical Committee (TC), at its forty-seventh session held in Geneva, from April 4 to 6, 2011, agreed to request the Office of the Union to invite experts to submit written reports to the Office of the Union in advance of the Technical Working Party (TWP) sessions in order that a document containing those reports could be prepared by the Office of the Union. The TC noted that TWP experts would be invited to make a brief oral summary of their written report at the session and would also be encouraged to make reports under the agenda item "Experiences with new types and species", as appropriate. The TC also noted that TWP experts would have an opportunity to raise questions concerning matters of interest (see document TC/47/26 "Report on the Conclusions", paragraphs 9 and 10).

2. Written reports were invited by the Office of the Union in Circular E-20/044 of May 6, 2020. The following reports were received (in alphabetical order):

- Members of the Union: Annexes I to VIII: Argentina, Brazil, China, European Union, France, Japan, Netherlands and the United Kingdom

[Annexes follow]

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ANNEX I

ARGENTINA

During the year 2019 there were 94 PVP titles granted, considering that in 2018 there were 98 titles granted.

Applications, regarding agricultural crops, is normal as every year, there have been only two new species to consider (*Plantago lanceolata* and *Cannabis sativa*) and a small increase in wheat cultivars is observed.

Related to other modalities, it ended with the laboratory phase in the genotyping of Cotton and Rice cultivars and it is in the phase of the choice of the most polymorphic markers for both: law enforcement and as an aid for the DUS Test through the GAIA.

In another order of things, we start to study the possible use tools derived from the use of: artificial intelligence, big data and neuronal networks (ZoomAgri).

[Annex II follows]

BRAZIL

1. The National Plant Variety Protection Service (SNPC) on the Ministry of Agriculture, Livestock and Food Supply (MAPA), is the national authority for the examination of applications and for granting Plant Breeder's Rights in Brazil.
2. Since the end of 2018, the SNPC fully implemented the electronic PVP application and currently the office is running paperless.
3. In 2019, SNPC received 286 applications: agricultural crops (141), ornamentals (60), vegetables (24), fruit crops (24), forest trees (24) and forage crops (13). Comparing to the previous year, the number of applications for agricultural crops decreased almost 25%.
4. Those 141 applications of agricultural crops were for the following: *Glycine max* (79), *Triticum aestivum* (12), *Zea mays* (11), *Solanum tuberosum* (07), *Phaseolus vulgaris* (06), *Oryza sativa* (05), *Sorghum* (05), *Hordeum vulgare* (04), *Gossypium hirsutum* (03), *Saccharum* (03), *Avena sativa* (02), *Coffea canephora* (01), *Manihot esculenta* (01), *Ricinus communis* (01), *Sesamum indicum* (01).
5. Applications were filed from nationals of: Brazil (101), United States of America (19), Argentina (10), France (05), Netherlands (03), Germany, Israel and Switzerland (01).
6. In 2019, SNPC granted 122 titles: agricultural crops (82), vegetables (14), forest trees (09), ornamentals (08), fruit crops (05) and forage crops (04).
7. Those 82 applications of agricultural crops were for the following: *Glycine max* (46), *Triticum aestivum* (08), *Solanum tuberosum* (05), *Oryza sativa* (04), *Sorghum* (04), *Zea mays* (04), *Hordeum vulgare* (03), *Saccharum* (03), *Avena sativa* (02), *Manihot esculenta* (01), *Phaseolus vulgaris* (01) and *Sesamum indicum* (01).
8. Those titles were granted to applicants from: Brazil (58), Argentina (10), United States of America (09), Netherlands (03), Germany (01) and Switzerland (01)
9. Up to May 15th, 2020, SNPC received 91 applications, 46 of them for agricultural crops; and granted 12 titles, all of them to agricultural crops.

[Annex III follows]

CHINA

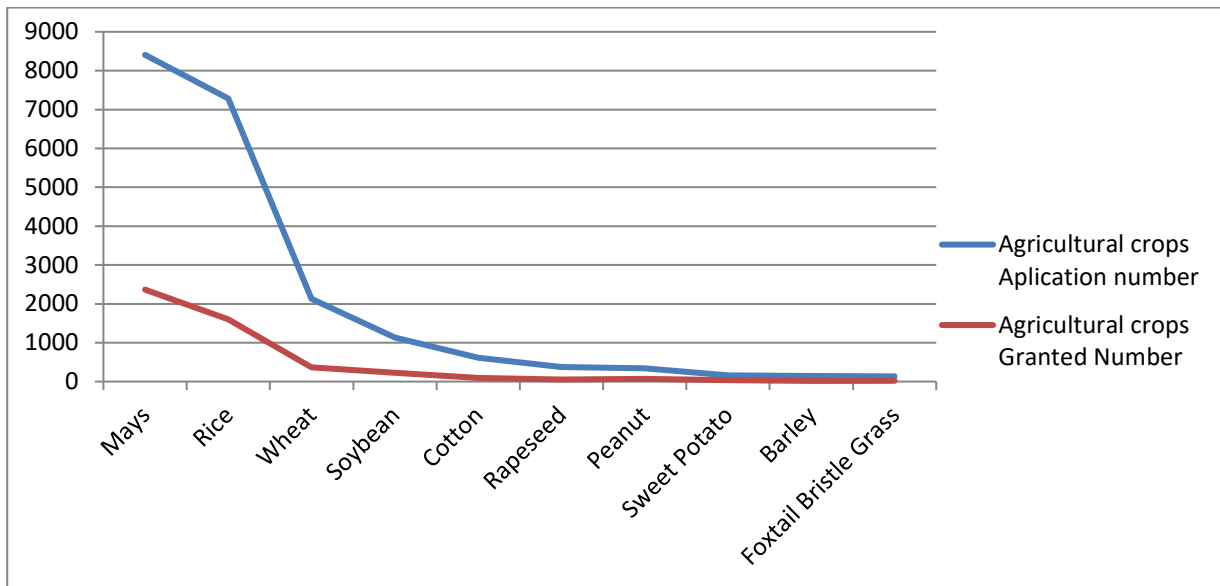
The Chinese government attaches great importance to the protection of intellectual property rights and provides an institutional guarantee for promoting the innovative development of the protection of new varieties of plants. China has made great progress in protection of new variety of plants since 1999, including policies, regulations, technical support, law enforcement and international cooperation. The Ministry of Agriculture and Rural Affairs commended 50 advanced collectives and 100 advanced individuals for protection of new varieties of plants at the national level in 2019. It will encourage the initiative and creativity of the agricultural system in the protection of new varieties of plants, and creates a good atmosphere for respecting and protecting intellectual property rights. The following is a short report on the development of PVP of agricultural plants in China in 2019.

Firstly, expanding the list of protection of new varieties of plants

On February 2, 2019, the Ministry of Agriculture and Rural Affairs published the 11th batch of the list of protected 53 genera or species, with a total of 191 genera or species. It contributes to the structural adjustment and high-quality development of agriculture. Among the 11th batch list, agricultural crops have 12 genera or species that are *Beta vulgaris* L., *Panicum miliaceum* L., *Hibiscus cannabinus* L., *Theobroma cacao* L., *Amaranthus* L., *Cynodon* Rich., *Dactylis glomerata* L., *Trifolium pratense* L., *Lolium* L., *Festuca* L., *Pennisetum* Rich. and *Trifolium repens* L.

Secondly, the application, acceptance and examination of plant variety rights are progressing smoothly

As of December 31, 2019, 33,803 applications were accepted and 13,959 cases were authorized. There were 7,032 applications in 2019, up to 44.9 % by year-on-year, and 2,288 cases were authorized, up to 14.9 % by year-on-year. Among them, 26,159 applications belong to agriculture crops, including 25 genera or species, such as rice, corn and wheat, which accounted for 77% of the total number of applications, and it was authorized 11,520, accounted for 82.5% of the total number of applications. The top 10 genera or species of agriculture crops applied for are shown below.



Thirdly, strengthening law enforcement in protection of varieties of plants

It is "Zero Tolerance" for counterfeiting and infringement to plant varieties rights. It is continuous reform and innovation, the use of molecular identification technology, and constantly improves the level of law enforcement. The publication of ten typical cases provides guidance and reference for the law enforcement of plant varieties rights.

Fourthly, speeding up the information construction of protection of new varieties of plants

The information system of protection of new varieties of plants was integrated into the construction of seed industry big data platform, which realized information sharing among protection, VCU and registration of varieties. It has improved efficiency and quality of examination since new information systems of On-line application and examination for plant variety rights were applied from 1 January 2019.

Fifthly, fruitful in international cooperation

On April 23, 2019, the 20th anniversary of China's accession to the International Union for the Protection of New Varieties of Plants (UPOV), China hosted a series of international seminars on the protection of new varieties of plants, including meetings of celebration the 20th anniversary of UPOV, the IP key cooperation project between China and the European Union, East Asian Plant Variety Protection Forum, and so on.

Otherwise, training course for protection of new varieties of plants and seed industry development on the Second Belt and Road National was held successfully in Yang Ling in September.

A technical working group meeting of TWC and BMT of UPOV were held in Hangzhou in October.

In November, Dr. Cui Yehan was elected vice-president of the council of UPOV for a three-year term, who is director of division of the protection of new varieties plants, the Development Centre of Science and technology, the Ministry of Agriculture and Rural affairs.

[Annex IV follows]

EUROPEAN UNION

CPVO statistics and figures

Statistics for 2019

In 2019, the CPVO received 3 525 applications for Community plant variety rights (CPVRs), 683 applicants filed applications for CPVRs. In 2019, the distribution between crop sectors was as follows:

- Agricultural, 1005 applications (28.5%)
- Ornamental, 1592 applications (45.2%)
- Vegetable, 682 applications (19.3%) very similar to last year (19.4%)
- Fruit 246 applications (6.9%).

In 2019, the Office granted 3188 titles for Community protection; 28 228 titles were in force by the end of the year. National authorities from all over the world regularly base their decisions on applications for CPVRs on technical examinations carried out on behalf of the CPVO (international cooperation, takeover of reports). By the end of 2019 the CPVO had provided 7 231 technical reports to 60 countries. During 2019, the five countries from which most requests emanated were Colombia, Morocco, Ecuador, Brazil and Canada.

Administrative Council (AC)

The AC met twice in 2019: in Angers (France) on 19-20 March and in Brussels (Belgium) on 19 September. The members of the AC adopted particularly the following:

- The amendment of the fees regulation with a diminution of the online application fee to 450 € and an increase to 800 € for paper applications, this way putting an incentive for online applications, and the move to close to 100 % of recovery of the real examination costs with no change in the annual fee.
- A decision process to be applied by the CPVO when attributing candidate varieties to Examination Offices
- The proposal that DUS examinations would be organized at the Mexican Office – SNICS – for an ongoing CPVO application as well as for future applications for the species *Psidium guajava*. They also agreed that the CPVO would be entering into an arrangement for 5 years with SNICS under which the CPVO could both take over DUS reports and initiate DUS tests for the species in question.
- The proposal to enter into an agreement with the Costa Rican Office – ONS– to take over the DUS report for the genetically modified *Ananas comosus* (L.) Merr variety 'Rose'.

International affairs

The CPVO organised a Seminar in Estonia dedicated to Farm-Saved-Seed (FSS) and in particular the functioning of the FSS system in Estonia and the neighboring countries. Such seminar aims to clarify the FSS concept throughout the EU and to encourage cooperation between farmers and breeders on the implementation of the right for information with the view to exercise compliance with the FSS mechanism.

The CPVO participated in several international events:

- Visit of the African Intellectual Property Organisation (Yaoundé, Cameroon) to analyze the method used to process applications. In September and October, the CPVO contributed to three seminars in Togo, Burkina Faso and Mali and received experts from OAPI at its premises. All activities were conducted in closed cooperation with the other project partners UPOV, GEVES, Naktuinbouw and GNIS.
- IP Key China, Latin America (LA), South-east Asia (SEA)

Agricultural sector

Administrative Council decisions on agricultural TPs, 2019 – May 2020

<i>Sorghum bicolor</i> (L.) Moench., <i>Sorghum xdrummondii</i> (Steud.) Millsp. & Chase	CPVO-TP/122/1
<i>Triticum aestivum</i> L.	CPVO-TP/003/5
<i>Vicia faba</i> L. var. <i>equina</i> St.-Amans; <i>Vicia faba</i> L. var. <i>minuta</i> (hort. ex Alef.) Mansf.	CPVO-TP/008/1
<i>Lolium perenne</i> L., <i>Lolium multiflorum</i> Lam., <i>Lolium boucheanum</i> Kunth, <i>Lolium rigidum</i> Gaudin	CPVO-TP/0042/2
<i>Hordeum vulgare</i> L. sensu lato	CPVO-TP/019/5
<i>Brassica napus</i> L. emend. Metzg.	CPVO-TP/036/3
<i>Pisum sativum</i> L.	CPVO-TP/007/2-Rev.3
<i>Avena sativa</i> L., <i>Avena nuda</i> L.	CPVO-TP/020/3

Statistics

The table hereunder shows the 10 most important agricultural crops over the last 5 years. In the long term, the order of the species is essentially unchanged. The increase in oilseed rape may be explained by the higher number of hybrids in this species and by the fact that parent lines are also subject to applications for CPVR.

Species	2015	2016	2017	2018	2019	Total (1995-2019)
<i>Zea mays</i> L.	299	201	177	262	229	5010
<i>Triticum aestivum</i> L. emend. Fiori et Paol.	113	153	124	152	150	2174
<i>Brassica napus</i> L. emend. Metzg.	127	126	94	103	120	1680
<i>Hordeum vulgare</i> L. sensu lato	78	69	72	93	100	1466
<i>Solanum tuberosum</i> L.	59	79	71	84	68	1733
<i>Helianthus annuus</i> L.	61	86	53	59	40	1109
<i>Beta vulgaris</i> L. ssp. <i>vulgaris</i> var. <i>altissima</i> Döll	18	14	20	19	46	404
<i>Lolium perenne</i> L.	17	21	9	19	46	364
<i>Pisum sativum</i> L.	8	12	11	13	21	282
<i>Triticum turgidum</i> L. subsp. <i>durum</i> (Desf.) Husn.	7	26	16	22	13	352
Total	787	787	647	813	766	

In the agricultural sector, rights were granted based upon a technical examinations are in some 25% of all application; in some 75% of the cases reports were taken over from other authorities.

The agricultural expert meeting

The CPVO held its annual meeting with EU agricultural in Angers in October 2019. The meeting was attended by experts from eighteen examinations offices as well as a representative of Euroseeds and ECO-PB. Next to the DUS technical examination related topics, and technical protocol discussions (see list above), True Potatoes Seeds were on the agenda. At the occasion of providing an update on the R&D projects, experts were invited to think about potential future projects to be presented to the expert group IMODDUS (Integration of MOlecular Data into DUS testing). The new timelines for R&D proposals, requiring submission before mid-March in order to have approval for the following calendar year have been highlighted. It was furthermore

agreed to hold a Technical workshop for maize experts in Poland in 2020, hosted by COBORU, in conjunction with the annual meeting of agricultural experts.

R&D projects:

Ongoing projects

‘Developing a strategy to apply SNP molecular markers in the framework of winter oil seed rape DUS testing’

Based on a first project called “Test of the potential use of SNPs markers on oilseed rape varieties”, this follow-up project was approved in March 2019 for a duration of 24 months. In the first project, GEVES (FR) and NIAB (GB) selected and tested on different matrices a set of 500 SNPs to design reliable KASPar assays and confirmed the possibility to reliably use bulk samples of seeds in rapeseed. In this project, they continue the work to produce large and consistent molecular data sets on a wide number of WOSR varieties in order to reach an optimized SNP set. In collaboration with Germany, existing UPOV models and newly developed ones will be tested to use these markers for DUS. The approaches will be tested on the two different testing systems GAIA in France and COY in Germany. The final results will be presented and discussed with experts from all entrusted examination offices which were also partners to the pre-project. If the results are successful, a second follow up project would extend the genotyping to the whole collection and aim to validate and to apply the model chosen in the field. That implementation phase would include all entrusted EOs.

‘Integration of molecular data into DUS testing in Durum wheat’

This project started in 2018. The objective is to combine genotypic and phenotypic data to optimise the reference collection management by investigating the use of SNP markers of a commercial DNA chip.

The coordinator is the Austrian examination office AGES. Project partners are INIA (ES); GEVES (FR); CREA-SCS (IT) and NEBIH (HU). A first meeting took place in June 2018 in Vienna and a second meeting in June 2019 at the Italian testing station. Promising results were obtained demonstrating the applicability of the method. The final report is expected in 2020.

Project proposals evaluated and accepted in 2019 and starting as from 2020

‘Development of a SNP marker set in Cannabis to support DUS testing’

Naktuinbouw as project coordinator submitted this project. CPVO applications for *Cannabis sativa* L. varieties are increasing steadily, particularly those bred for pharmaceutical use. It is particularly demanding both in terms of time and money to import plant material for DUS testing of pharmaceutical varieties, which creates reluctance of titleholders to submit reference varieties. This project aims at continuing research work already undertaken by Naktuinbouw by identifying a SNP marker set for Cannabis. With the information and knowledge gathered in this project, a database could be setup in a follow up project to deploy a UPOV “French Bean” approach for the choice of the reference varieties to put in the DUS trials. Molecularly similar varieties will be included into the growing trial for a side by side comparison carried out on the phenotype. The planned duration of the project is 24 months.

[Annex V follows]

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ANNEX V

FRANCE

GEVES new website was launched in 2017 and can be consulted here www.geves.fr
Varieties description can be found on the website for the varieties listed on the French catalogue.
<https://www.geves.fr/catalogue-france/>

The activity in the framework of national listing and the activity in the framework of DUS bilateral agreements is quite stable in 2019, with a great increase in ornamental species.

In total, GEVES studies each year more than 1400 new varieties,

- around 1000 new candidate varieties, a year, in the agricultural sector.
Main species tested are maize, wheat, barley, oilseed rape, sunflower, soybean.
- around 250 new candidate varieties, a year, in the vegetable sector.
Main species are tomato, melon, lettuce.
- around 100 new candidate varieties, a year, in the fruit sector.
Main species tested are apple, pear, peach, cherry, apricot, Japanese plum, vine.
- around 240 new candidate varieties, a year, in the ornamental sector.
Main species are Hydrangea, Salvia, Chrysanthemum, Lavandula.

GEVES activity is entrusted by the CPVO. GEVES, as an examination office on behalf of CPVO, receives around 700 requests of results each year including about 60% of take over reports related to field and vegetable crops tested first for national listing. GEVES also sends each year about 500 reports to other examination offices (about 100 examinations and 400 take-overs) and buy about 120 reports from them in the framework of bilateral agreements.

The International System of Cooperation is active and efficient. For more information, the international cooperation service of GEVES can be contacted here: Camille.zitter@geves.fr (new!).

In addition to that, the French National Office for PBR (INOV) has received 107 applications in 2019, out of which 95% were tested for DUS by GEVES.

INOV is involved in UPOV PRISMA for all genera and species.

In 2018 and 2019, GEVES has significantly developed its activity on ornamental species. The volume of activity for ornamental DUS testing has doubled in 2019.

The ornamental scope of GEVES now includes 79 genera (290 species) : Coreopsis, Salvia, Penstemon, Spirea, Hibiscus, Leucanthemum, Echinacea, Escallonia, Atractantia, Ipomea, Iberis, Scabiosa, ...

GEVES is now also entrusted by CPVO on Chrysanthemum natural season: 24 applications are under test in 2019.

GEVES has been highly involved for the last few years in the following topics:

- the use of molecular markers in the DUS tests for the management of reference collections, for the identification and characterization of varieties, for checking of hybrid conformity. It is routinely used in maize, barley, sorghum, and fruit species
- continuous improvement of our methods and protocols, in line with CPVO TPs and CPVO requirements and UPOV guidance
- use and development of disease resistance characteristics, processed in bio tests, for DUS results, mainly for vegetable DUS testing

Regarding the use of molecular markers, GEVES is using in 2019 in routine molecular markers for the management of reference collection according to UPOV guidance, for maize, sorghum, spring barley.

A project is currently being led on Oilseed rape.

GEVES is working on the revision of UPOV document INF17 and TGP/15.

GEVES presented the revision of the example of parental lines in maize included in TGP/15. An additional threshold has now been implemented in France in the model used for parental lines in maize. The revision of the example included in document TGP/15 has been presented by GEVES during the 2019 BMT.

For more information, please contact: GEVES BIOGEVES rene.mathis@geves.fr.

Regarding the use of disease resistance characteristics, GEVES has been involved in the CPVO project Harmores 3 with 7 other EOs and breeders. It has produced 6 new harmonized protocols.

GEVES uses in routine genetic disease resistance characteristics, processed in bio tests, for DUS results. It provides also services, facilities, protocols, identified standards and strains for such activities to Examination Offices and seed companies, all over the world.

For more information, please contact: GEVES SNES valerie.grimault@geves.fr.

Regarding agricultural crops, the following highlights can be mentioned:

- New species: wheat X spelt, annual clovers (michelianum, squarrosus, vesiculosus), sainfoin, buckhorn plantain, foxtail restharrow
- New varietal type: CMS hybrids in wheat
- Work on GAIA parameters for several species: maize, lucerne, cereals...
- Alternative test research for phenol characteristics as it is a dangerous product (CMR, germ cell mutagenicity)

[Annex VI follows]

JAPAN

1. Number of applications in 2019

Year	Number	(2019/2018)	Agricultural crops	(2019/2018)
1978 to 2019	34,443	-	2,522	-
2018	883		87	
2019	822	(93%)	67	(78%)

Top 5 of application for Agricultural crops in 2019

Rice 32, Potato 9, Barley 5, Sweet Potato 5, Soya bean 2, Tea 2, Oats 2

2. Number of granted in 2019

Year	Number	(2019/2018)	Agricultural crops	(2019/2018)
1978 to 2019	27,574	-	2,137	-
2018	758		44	
2019	591	(78%)	53	(121%)

Top 5 of granted for Agricultural crops in 2019

Rice 21, Potato 6, Barley 5, Italian ryegrass 4, Buckwheat 3

3. National test guidelines harmonized with UPOV TGs in 2019

Genera and Species (2)
Olive, Urochloa

4. National test guidelines developed for new genera and species in 2019

Genera and Species (8)
Ampelopsis glandulosa (Wall.) Momiy., Dischidia ruscifolia Warb ex K.Schum. & Lauterb., Ficus natalensis Hochst., Ficus pumila L., Olea europaea L., Sedum japonicum Sieb. Ex Miq., Senna corymbosa (Lam.) H. S. Irwin & Barneby, Urochloa P Beauv.

Web-site: http://www.hinshu2.maff.go.jp/info/sinsakijun/botanical_taxon_e.html

5. Other reports

- ✓ Japan continuously provides other UPOV members with examination reports at no charge under the Memorandum of Cooperation (MOC). We have agreed the MOC with 15 members at April 2020.
- ✓ Japan launched MAFF electric application system (national electric application system) in March 26th, 2018 for convenience of applicants and for improving effective PVP proceedings in Japan. Total number of electric applications, by the end of 2019, is 459 (30.0 percent share of total applications). This system allows users to send application form by electric system. Users are requested to send a Request Form by postal mail to PVPO for obtaining user ID and password in advance. The system accepts Japanese language only. The PVPO accepts paper application. We started the more information is available at MAFF's website. "<http://www.hinshu2.maff.go.jp/>"
- ✓ Currently, the Diet is deliberating on amendments to the law to strengthen the Plant Variety Protection.
- ✓ Since establishment of the East Asia Plant Variety Protection Forum in 2008, Japan continuously support Forum member's activities and will enhance support to establish effective PVP system consistent with the

UPOV Convention by strengthening national PVP system and by contributing to facilitate harmonization of application and examination procedures and to enhance efficient PVP cooperation under the 10-Year Strategic Plan of the Forum. Especially, Japan, Vietnam and other partners are working together on the pilot project to develop “PVP Platform under the EAPVP Forum” which would provide applicants with a single online platform for submitting application data to PVP Offices of participating countries, and would enhance DUS cooperation among participating countries.

- ✓ Since 2016, based on the Memorandum of Understanding, NCSS and Naktuinbouw have established Calibration Manuals, which describe important points of observation in DUS tests. In 2019, Manuals of Tomato and Gerbera were finalized, and they are published on the website. Hereafter, the manuals for Chrysanthemum and Tulip will be developed.
- ✓ On December 2019, MAFF and NCSS participated in a kick-off meeting for a project “International harmonization and validation of a SNP set for the management of tomato reference collection”, which is led by Naktuinbouw. NCSS has signed a project partner agreement for the project, in March 2020.

[Annex VII follows]

NETHERLANDS

Naktuinbouw Variety Testing developments

- In 2019 and the beginning of 2020 the DUS team was enlarged with 7 more DUS colleagues. One colleague retired. The team now consists of 39 employees, 2 of them are managers. The department Variety Testing includes also a support team, a trial management team and a project team. In total there are 67 employees.
- An renewed agreement between The Dutch ministry, The Dutch Board for Plant Varieties and Naktuinbouw has been signed; the so called Tripartite-agreement. Naktuinbouw will do the DUS research for Listing and Plant Breeders' Rights for the Board for plant Varieties for another ten years.
- The responsibility for the external crop experts in relation to ornamental species has been changed from the Board for Plant varieties to Naktuinbouw.
- The new EU Plant Health regulations have been implemented at Naktuinbouw; plant material for DUS trials needs to be accompanied by a plant passport.
- European regulations for environment and hygiene demand action for Naktuinbouw as well as for the applicants. From 2020 it is forbidden to use Thiram treated seeds. Thiram is a fungicide.
- The entrustment of Naktuinbouw by CPVO has been renewed in 2020 after an audit in 2019.
- The Variety Testing Department yearly offers a number of courses around Plant Breeders' Rights and/or Listing.
- Despite the COVID-19 crises, the employees of the Variety Testing department try to do their very best to do the DUS work as good and as much as possible and also be flexible to the applicants.
- Applicants more and more use the online systems of UPOV and CPVO for filing their applications for listing and/or plant breeders rights. Nowadays it is possible to apply for all species through UPOV PRISMA. Also it is possible now to apply for listing in the Netherlands through UPOV PRISMA. Up till now we received a limited amount of online applications for the Netherlands through UPOV PRISMA. At this moment it is possible to apply for listing/plant breeders rights in the Netherlands for 50 species through the CPVO online system. In 2019 we received 395 applications for listing/plant breeders rights in the Netherlands through the CPVO online system.
In 2019 25% of the National applications were filed by electronic means mainly due to a reduced application fee. For 2020 the planning is to increase this number to 50%.

Number of applications received

In 2019, 2794 applications were received for testing for the first year for National listing, and for National or European Plant Breeders' Rights. Applications of the same variety for Listing as well PBR, in vegetables and in agricultural crops are split in this table.

2019	NL listing	NL PBR	EU PBR	TOTAL
<i>Agriculture</i>	332	84	57	
<i>Vegetable</i>	801	510	94	
<i>Ornamental (incl. trees)</i>		175	765	
TOTAL	1133	767	916	2816

DUS projects

Below a selection of the DUS projects at Naktuinbouw.

- EU cooperation: Database Melon, Harmorescoll and INVITE
An EU database for melon varieties is developed by cooperation between France, Spain, Portugal, Slovakia and the Netherlands. The development is funded by CPVO. In 2021 the project will be finished.
The harmorescoll project has just started and will last for 3 years. In this project the reference material for obligatory disease resistance tests will be harmonized.
The EU project on the improvement on DUS and VCU testing has started. Naktuinbouw is one of the partners in this program.
- International cooperation. Calibration manuals. Naktuinbouw cooperates since 2016 with NCSS Japan on the harmonisation of Dutch Calibration Books and Japanese Testing Manuals in a 5 years working plan. In 2019, Tomato and Gerbera were discussed. This year 2020 tulip and chrysanthemum are being discussed.

Development of DNA databases

- Database Lettuce and marker for LMV resistance
All new applications in lettuce are being tested, besides the bio-tests, with a DNA marker for LMV resistance. We now have sufficient experience with this marker and propose to use it as an additional method in the near future (TGP/15). IBEB (a group of Dutch and French lettuce breeders) supports the use of the DNA marker. With the collected DNA also the development of a new DNA-database for lettuce is started. The DNA of varieties of common knowledge (included in the DUS-trials) will also be included in this database. First, a useful set of SNP markers has to be developed. We are looking for cooperation partners.
- SNP database Onion
In 2014 a project started in which a number of onion and shallot varieties were analyzed using 93 SNP markers in order to confirm the morphological types used to group the variety collection. The markers confirmed the distinct morphological types. However, this analysis was quite general and the wish was to be able to analyze within the groups the distinctness between varieties. This will be subject in a follow up, while the search for the best distinctive SNP's continues.
- DNA database Tomato
In 2019 this IMODDUS-project has been started in by a kick-off meeting. The main goal is to find and select and international accepted SNP. The project will be followed by testing varieties in common knowledge with this set of DNA markers and storing the data in a database. After that it can be used for management of the reference collection.
- DNA database Cannabis
In 2019 a project started to develop a SNP marker set and a suitable genotyping method. It will give the possibility to manage the reference collection efficiently and minimizes the risk of wrong Distinctness decisions. The number of Cannabis applications for medical use is high and transport of seeds or plants of applications and reference varieties is a burden due to phytosanitary and opium regulations.
- SNP-markers in Perennial Ryegrass (PRG)
Naktuinbouw started a special project on the use of SNP markers in PRG based on a previous pilot project. PRG is a cross pollinating crop causing additional complexity. The results of the project are promising. SNP markers could be used to replace electrophoresis as additional characteristic in DUS testing. A presentation is foreseen this year in the framework of the CPVO Agricultural Expert Meeting
- Disease resistance testing Projects are carried out in biotesting of nematodes in pepper, *Fulvia fulva* in tomato (biotests & DNA markers), biotest of *Fusarium* Lettuce, virus tests in vegetative propagated pepper.
- Other projects: Resistance tests under LED light, Phenotyping, Hydroponics in lettuce
A project to test the preferred type of LED light and to validate each resistance test which is performed in climate chambers. In order to obtain an idea about the possibilities of phenotyping in DUS testing Naktuinbouw performs a pilot this year in *Phalaenopsis*. In Lettuce a student is testing at Naktuinbouw how to test for DUS with a hydroponic growing system.

International cooperation

- 29 projects were carried out with the focus on PVP. 17 of these activities were financed by PVP Development Program (Toolbox) (1). In 2019 there was attention to countries in Latin America, middle East, Asia and Africa.
- In cooperation with CPVO, Naktuinbouw also joined IPKey-projects and contributed to the promotion of the PVP system in the OAPI countries.
- Colleagues from Iran, Jordan, Ecuador and China did an internship at Naktuinbouw.
- Delegations from Kazakhstan and Nigeria visited the Netherlands to exchange knowledge and experiences.
- Participation in seminars and training on DUS and administrative matters in the Dominican Republic, Mexico, Togo, Jordan, United Republic of Tanzania and Benin.
- Participation in an inception mission to Rwanda, Uganda, Burundi.
- In 2019, 37 participants coming from 19 different countries attended the Plant Breeders Rights for Food security and Economic Development training course (2). This course is organized by Naktuinbouw in collaboration with the University of Wageningen. Most of participants were decision makers and Key staff for PBR in their countries.

PVP Development Program (Toolbox)

- This is a tool to help countries to develop their Plant Breeders' Rights system. The Dutch Ministry makes funds available for the implementation of this program. Naktuinbouw is charged to manage the program where they cooperate with the Dutch Agricultural Counsellors and their staff. They can propose projects aimed at the creation or development of a Plant Breeders' Right system in the territory they work for.
- For more information about this program of possible cooperation please contact: PVPToolbox@naktuinbouw.nl

Plant Breeders Rights for Food security and Economic Development training course.

- More information
<https://www.wur.nl/en/show/Plant-Breeders-Rights-for-Food-Security-and-Economic-Development.htm>
or contact: l.pinan.gonzalez@naktuinbouw.nl

[Annex VIII follows]

UNITED KINGDOM

Report on the activity of the United Kingdom Plant Varieties and Seeds Office in Cambridge and the examination centers of NIAB, SASA and AFBI. The Plant Varieties and Seeds Office is part of the Service Delivery Directorate of the Animal and Plant Health Agency (APHA), an executive agency of the Department for Environment, Food and Rural Affairs (Defra). Contact details and phone numbers are available on Gov.UK website where all Government departments now have their website details. www.gov.uk

Across all the United Kingdom trial stations, approximately 1500 candidate varieties were under test for Listing and/or PVR in the past year, including 320 winter oilseed rape, 291 cereals and the remainder herbage and fodder, ornamentals, vegetables, field peas, potatoes, field beans, sugar beet and fodder kale. Applications in the agricultural sector for the coming season remain stable.

Agricultural DUS testing in the United Kingdom is conducted at NIAB in Cambridge (wheat, oilseed rape, sugar beet, barley, field bean, oats and fodder kale), at SASA, Edinburgh (potato, field pea and swede) and at AFBI in Crossnacreevy (perennial, Italian and hybrid ryegrasses, festulolium and white clover). The United Kingdom has incorporated the option to use protein electrophoresis as an additional characteristic for the testing of perennial ryegrasses following the inclusion in the CPVO test protocol.

During the COVID-19 pandemic, DUS trials are being done under Government health and safety guidance in a step by step approach to ensure the safety and well-being of staff. With suitable adaptation, it has so far been possible to continue almost all trials.

On the international front, Variety Testing staff at the different examination centers continue to be fully committed to working with our colleagues in Europe and within UPOV. We continue to be involved in the CPVO projects for developing a strategy to apply SNP molecular markers in the framework of winter oilseed rape DUS testing, which is now in its second phase and 'Harmorescoll' which aims to facilitate access to reference material for performing disease resistance tests within DUS examinations of vegetable species. There is also involvement in two EU Horizon 2020 funded projects with NIAB, SASA and BioSS contributing to the INVITE project, and APHA and AFBI to INNOVAR.

The United Kingdom continues to support the UPOV online courses by providing tutors and with technical and administrative staff throughout the United Kingdom taking the distance learning opportunities through DL205 and DL305.

[End of Annex VIII and of document]