

Technical Working Party on Testing Methods and Techniques**TWM/1/3****First Session****Virtual meeting, September 19 to 23, 2022****Original:** English**Date:** September 26, 2022

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-22/109 of August 4, 2022. The following reports were received (in alphabetical order):

- Members of the Union: Annexes I to IV: the Netherlands, Republic of Korea, Ukraine and the United Kingdom

[Annexes follow]

NETHERLANDS

Naktuinbouw Variety Testing developments

- As from April 2021 the DUS team 4 junior DUS examiners joined the team to replace colleagues who retired or changed jobs. The DUS team now consists of 40 employees, including 2 managers and 4 in disease resistance. The Department of Variety Testing includes also a support team, a trial management team and a project team. In total there are 70 employees.
- The Variety Testing Department yearly offers a number of courses around Plant Breeders' Rights and/or Listing. Last year almost all courses have been provided as online-sessions (Zoom/Teams).
- During the COVID-19 crisis, the daily business of the employees of the Variety Testing department has not been disturbed. They succeeded to do the DUS work at the normal quality level and are also flexible in the contacts with 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 Plant Breeders' Rights for all species through UPOV PRISMA as well as for Listing in the Netherlands. In 2021 35,2% of the National applications were filed by electronic means of the CPVO system, mainly due to a reduced application fee (in 2020 34%). Up to now we received a limited number of online applications through UPOV PRISMA.

Number of applications received

In 2021, 2655 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.

2021	NL listing	NL PBR	EU PBR	TOTAL
<i>Agriculture</i>	230	95	103	
<i>Vegetable</i>	662	529	74	
<i>Ornamental (incl. trees)</i>		213	749	
TOTAL	892	837	926	2655

DUS projects

- Digitisation
 - Naktuinbouw continues to work on the expansion of the Naktuinbouw Academy: a digital training platform.
 - Databases: Naktuinbouw develops SNP-databases in French bean, rose, lettuce, onion, hemp, tomato and perennial ryegrass. Some databases are developed nationally, others in international projects (e.g. IMODDUS). The projects are funded by amongst others the Dutch board for plant varieties and CPVO.

EU projects: Database Melon, Harmorescoll and INVITE + Hemp

- 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 has been finished and continuation in cooperation is agreed.
- Harmorescoll: in this project the reference material for obligatory disease resistance tests will be harmonized.
- The EU project INVITE on the improvement on DUS and VCU. Naktuinbouw is one of the partners in this program.
- Starting a project on setting up resistance tests to ToBRFV for tomato and pepper and improvement of resistance test melon/*Aphis gossypii*

- International projects
 - Calibration manuals. Naktuinbouw cooperates since 2016 with NCSS Japan on the harmonisation of Dutch Calibration Books and Japanese Testing Manuals.
- Other projects
 - Study on minimum distances in tulip 2021-2023.
 - Studies on DUS and VCU testing in True Potato Seeds
 - Automatic morphological descriptions of ornamental crops through machine learning.
<https://www.wur.nl/nl/Onderzoek-Resultaten/Onderzoeksinstituten/plant-research/biometris/show-biometris/MODOMA-Deep-Learning-in-sierteelt.htm>

International cooperation

- In 2021 online activities were carried out with Egypt, APSA, Mexico and Ethiopia.
- In cooperation with CPVO, Naktuinbouw joined the IPKey-project China. Training was organised digitally with direct translation.
- In 2021 a 4-year project is started by the Wageningen university on the Nigerian Seed sector. The Nigerian government and Naktuinbouw are involved on the topics of Plant Breeders rights and variety registration.

PVP Development Program (Toolbox)

- This is a tool to help countries to develop, improve and implement their Plant Breeders' Rights system. The first 5 years period has been finalized successfully. The Dutch Ministry has made another 5 years of funds available (2022-2027) for the implementation of this program.

More info: PVP Development Program - PVP Toolbox | Naktuinbouw or contact: PVPToolbox@naktuinbouw.nl

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

- In 2021, the course was presented in an online format. In 2022, the course will also be held online from Oct 3 – Dec 2.

More information: <https://www.naktuinbouw.com/bulb/training-course/plant-breeders%E2%80%99-rights-food-security-and-economic-development> or contact: l.pinan.gonzalez@naktuinbouw.nl

[Annex II follows]

REPUBLIC OF KOREA

1. STATISTICS

571 varieties were candidate in 2021.

- Vegetable, 214 applications (37%)
- Ornamental, 180 applications (32%)
- Agricultural, 91 applications (16%)
- Fruit, 49 applications (9%)
- others, 37 applications (6%)

| [Korea Seed & Variety Service \(KSVS\)](#) granted 427 titles for variety protection in 2021.

174 varieties were rejected or cancelled in 2021.

2. DEVELOPMENT OF IMAGE ANALYSIS PROGRAM FOR DUS TEST

Since 2020, KSVS has been developing image analysis program for three purposes to be used in DUS test.

First, the measurement characteristics image analysis program began development in 2020 and completed the program in 2021 and is currently being used in DUS test for variety protection right.

Second, the development of the color image analysis program began in March 2021 and was completed in October of the same year.

Third, the shape image analysis program is being developed in 2022 and will be completed in 2023.

3. ESTABLISHMENT OF EXAMINING STANDARDS ON FUNCTIONAL INGREDIENTS FOR DUS TEST

KSVS has been reviewing the needs of breeders and value of use according to demand surveys such as breeding trends, and has been preparing criteria for four functional ingredients of sweet potato starch, soybean lipooxygenase, sesame sesamin, and lettuce lactucin in the DUS test for variety protection right.

These characteristics will be added to TG of KSVS and use in DUS test after the examining standards of four functional ingredients are completed.

[Annex III follows]

INFORMATION AND DATABASES IN UKRAINIAN INSTITUTE FOR PLANT VARIETY EXAMINATION

The currently used hardware platform of the Ukrainian Institute for Plant Variety Examination information system includes:

- Servers - HP, Supermicro SYS-6029P-WTR;
- Routing is provided with routers - Cisco-3900 and Mikrotik CCR1072;

The currently used software:

- the data base management system - Microsoft SQL Server 2014 Standard;
- the software applications, which are developed based on the ASP.NET Web and Microsoft Access, provide the data input and processing of DUS examination and laboratory tests results;
- the software environment for statistical computing R and interactive Web-applications based on the Shiny framework (user interface) are used for statistical analysis and analytical data processing of DUS test results;
- the personal account of applicant is available for applications traceability, variety testing results, a fee notification creation and testing documents download on the website of the Ukrainian Institute for Plant Variety Examination (<https://sops.gov.ua/en/>).

The developing directions:

- the adaptation of the software algorithms of GAIA software is being conducted considering national features of plant variety examination and developing of statistical analysis system is being carried out based on software environment R which will be applied for building a database with molecular marker information for the management of variety collections combining with variety description databases;
- the software applications and the data base structure are permanently updated and harmonized according to requirements and updates plant variety testing in countries – UPOV members.

THE USE OF MOLECULAR MARKERS IN THE EXAMINATION OF DISTINCTNESS, UNIFORMITY AND STABILITY (DUS) IN UKRAINE

The currently used technics includes:

- the electrophoresis of storage proteins when required for variety identification or finding of distinctness of testing variety;
- SSR markers for maize and sunflower (ISO documents) when required for variety identification, check hybrid formula or finding of distinctness of testing variety;
- DNA markers for C and S types of maize types cytoplasmic male sterility identification. The method has been included in the national guideline of maize DUS test;
- SSR markers for potato when required for variety identification or finding of distinctness of testing variety;
- SSR markers for soybeans when required for variety identification or finding of distinctness of testing variety.

There are under developing techniques and activities:

- SSR markers for rapeseed for variety identification, check hybrid formula or finding of distinctness of testing variety;
- KASP markers for maize for using in DUS test in order to manage of variety collection;
- the creation and content of molecular marker information database.

[Annex IV follows]

ANNEX IV

UNITED KINGDOM

Report on the activity of the United Kingdom (UK) Plant Varieties and Seeds Office and the DUS examination centres of NIAB, SASA and AFBI. The Plant Varieties and Seeds Office is part of the Animal and Plant Health Agency (APHA), an executive agency of the Department for Environment, Food and Rural Affairs (Defra) and its remit is to coordinate the delivery of variety registration and Plant Breeders Rights (PBR) in the United Kingdom. Contact details are available on the Gov.UK website

United Kingdom Variety Listing and PBR.

It was our pleasure to host the 51st meeting of the UPOV TWA, in Cambridge.

In 2021 the United Kingdom received some 1400 applications covering Plant Breeders rights and National Listing. The applications were made up of 400 agricultural, 300 fruit, 525 ornamental and 175 vegetables. Around 500 of these applications required DUS testing in the United Kingdom with the remainder having DUS reports purchased from other countries.

As of January 2021, the United Kingdom is now processing all National List and PBR applications through UPOV PRISMA. Since its implementation, the United Kingdom has benefitted from UPOV PRISMA to process applications and has been working constructively with the UPOV PRISMA team to make further improvements. The United Kingdom are grateful to the UPOV PRISMA team for providing training workshops.

To demonstrate experience and competence in performing DUS testing at its three DUS test centres (NIAB, Cambridge; SASA, Edinburgh; and Agri-Food and Biosciences Institute (AFBI), Crossnacreevy), the United Kingdom has implemented a DUS Quality System based on internationally harmonised criteria.

Ornamental DUS testing in the United Kingdom is conducted at NIAB (www.niab.com). NIAB (formerly the National Institute of Agricultural Botany) carry out the testing of Chrysanthemum and a wide range of herbaceous perennials and species of trees and shrubs, this is on behalf of the United Kingdom and under bilateral agreements. All work is carried out at the trial facility in Cambridge.

An industry stakeholder event was organised early March 2022 in conjunction with Defra, APHA, United Kingdom DUS examination centres and the British Society for Plant Breeders (BSPB). This well-attended and well-received webinar provided guidance and information on applying for Variety Listing and Plant Breeders' Rights in the United Kingdom as well an opportunity to engage, collaborate and receive feedback from national and international stakeholders.

The United Kingdom continues to support the UPOV online courses by providing tutors. Technical and administrative staff throughout the United Kingdom take advantage of the distance learning opportunities through DL205 and DL305. Colleagues across the United Kingdom have also benefitted from attending the two UPOV seminars arranged in 2021 and the UPOV Technical Working Parties Preparatory Webinars.

The United Kingdom are actively driving the implementation of new techniques to DUS testing through a number of collaborative or internal projects:

AFBI are coordinators of the 4.5-year Horizon 2020 (SFS-29-2018) InnoVar project (www.h2020innovar.eu). InnoVar aims to augment and improve the efficacy and accuracy of European crop variety testing and decision-making, using an integrated approach incorporating genomics, phenomics and machine learning. Data from our European-wide trial series will form the basis of a new, purpose built, variety recommendation tools. The project focuses on bread and durum wheat initially before applying the InnoVar approach to other crops. The project's consortium includes 21 partners across Europe, including United Kingdom partners ADAS, AHDB and APHA.

NIAB, SASA and BioSS (Biomathematics and Statistics Scotland) are active partners in the 5-year H2020 INVITE (Innovations in plant Variety Testing in Europe – www.h2020-invite.eu). INVITE aims to improve both efficiency of variety testing and the information available to stakeholders on variety performance under a range of production conditions and biotic and abiotic stresses. This will be exemplified on ten selected species (apple, fodder grass, sunflower, soybean, wheat, maize, potato, tomato, oilseed rape, and lucerne) representing the

main features of propagation, food and feed uses, and having an important breeding activity at EU level. There are 28 partners across Europe involved.

There is collaboration between InnoVar and INVITE. There is also liaison between INVITE and the recently established Australian INVITA project.

There are several projects within the United Kingdom investigating potential improvements to the testing system. For example, NIAB is using the wide range of expertise within the company to explore the use of club root resistance characteristics in oilseed rape DUS testing; UAV (Unmanned Aerial Vehicles) for data collection; molecular markers for reference collection management and trait analysis.

[End of Annex IV and of document]