

Technical Working Party on Testing Methods and Techniques

TWM/2/21

Second Session**Virtual meeting, April 8 to 11, 2024****Original:** English**Date:** April 11, 2024**REPORT**

Adopted by the Technical Working Party on Testing Methods and Techniques

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Opening of the session

1. The Technical Working Party on Testing Methods and Techniques (TWM) held its second session, organized by electronic means, from April 8 to 11, 2024. The list of participants is reproduced in Annex to this report.
2. The session was opened by Ms. Nuria Urquía (European Union), Chairperson of the TWM, who welcomed the participants.
3. The TWM was welcomed by Ms. Yolanda Huerta, Vice Secretary-General, via video message.

Adoption of the agenda

4. The TWM adopted the agenda as reproduced in document TWM/2/1 Rev.2

Guidance and information materials

5. The TWM noted the information provided in document TWP/8/1.

Technical Committee subgroup on Test Guidelines

6. The TWM received an oral report from Ms. Margaret Wallace (United Kingdom).
7. The TWM noted progress on the individual consultations with subgroup members and the preliminary findings on the extent of use of Test Guidelines in printed format and digital versions. The TWM noted that the subgroup findings would be discussed at the TWPs in 2024 and reported to the TC, at its sixtieth session.

Variety description databases including databases containing molecular data*Implementation of Purdy's notation for pedigrees in UPOV PRISMA*

8. The TWM received a presentation from Mr. Emerson Limberger, International Seed Federation (ISF), on "Implementation of Purdy's notation for pedigrees in UPOV PRISMA", a copy of which is reproduced in document TWP/8/3.
9. The TWM agreed that it would be useful to have a guided interface to help users providing information and checking the correctness of information submitted using the Purdy's notation (a "wizard").
10. The TWM noted that UPOV members could have different requirements on providing parentage information in breeders' rights application forms.
11. The TWM noted that the possibility to use Purdy's notation in online application forms available in UPOV PRISMA would be useful for applicants due to the reduction of the number of data fields required to provide parentage information for authorities requesting that information.

12. The TWM agreed to invite the Office of the Union to provide information on any implications of utilizing the Purdy's notation in the online application forms available in UPOV PRISMA or UPOV guidance.

13. The TWM noted that the same presentation would be made for the other TWPs, at their sessions in 2024, and reported to the Technical Committee (TC).

Software and statistical analysis methods for DUS examination

(a) Statistical tools and methods for DUS examination

- (i) The Combined-Over-Years Uniformity Criterion (COYU)
- (ii) Development of software for the improved COYU method (splines)
- (iii) Extrapolation in relation to COYU

14. The TWM considered document TWM/2/3 and received a presentation from Mr. Adrian Roberts (United Kingdom) on "The Combined-Over-Years Uniformity Criterion (COYU)", a copy of which was provided in document TWM/2/3 Add.

15. The TWM noted that the DUSTNT software had been improved to facilitate the introduction of the new COYU module with splines. The TWM noted that the new version of DUSTNT would be made available for UPOV members evaluation from May 2024, before its launch in May 2025. The TWM agreed to invite UPOV members to participate in the test campaign for the new DUSTNT software and to report outcomes to the expert from the United Kingdom.

16. The TWM agreed to invite the United Kingdom to report developments on the evaluation exercise for the new DUSTNT software, including the new COYU module, and the draft guidance on extrapolation at its third session.

- (iv) Comparison of results obtained for COYD and COYU procedures using different software Extrapolation in relation to COYU

17. The TWM received a presentation from Mr. Frédéric Lafayette (France) on "Comparison of software for COYD", a copy of which is reproduced in document TWM/2/20. ^ك

18. The TWM noted that the software compared produced the same results for COYD analysis. The TWM noted that the software comparison would continue and that the results of comparison for COYU would be presented to the TWM at its third session.

19. The TWM noted the invitation from China for the comparison exercise to be extended to other methods, such as the Fisher's Exact Test.

- (v) Development of Big Data platform for DUS examination

20. No documents were received for this agenda item. The TWM agreed to invite China to report developments at its third session.

(b) Exchange and use of software and equipment

- (i) Statistical Analysis Software used for DUS testing of Plant Variety (DUSCEL4.0)

21. The TWM received a presentation from Mr. Kun Yang (China) on "Statistical Analysis Software used for DUS testing of Plant Variety (DUSCEL4.0)", a copy of the presentation is provided in document TWM/2/11.

22. The TWM noted that DUSCEL was used in China for the examination of chrysanthemum, gerbera, lily, maize, rice and wheat varieties.

23. The TWM noted that, in response to Circular E-24/006¹, China had proposed the inclusion of the DUSCEL software in document UPOV/INF/16 "Exchangeable Software", under section (d) DUS trial design and data analysis. The TWM noted the availability of a user's manual and software interface in English.

¹ Circular E-24/006, issued on March 25, 2024, invited members of the Union to propose software for inclusion and information on use of software in document UPOV/INF/16 "Exchangeable Software".

24. The TWM agreed to recommend to the TC, at its sixtieth session, the inclusion of the DUSCEL software in document UPOV/INF/16.

Phenotyping and image analysis

(a) Assessment of color characteristics using image analysis

(i) A method for calibration of size and color used in image analysis

25. The TWM received a presentation from Mr. Kun Yang (China) on “A method for calibration of size and color used in image analysis”, a copy of the presentation is provided in document TWM/2/10.

26. The TWM noted the research on color calibration using different light sources, beyond the standard provided in Test Guidelines (CIE Standard of Preferred Daylight D 6500).

(b) Application of Imaging Analysis on DUS Testing

(i) UAV-based field phenotyping in the United Kingdom agricultural DUS testing

27. The TWM received a presentation from Mr. Alex Talibudeen (United Kingdom) on “UAV-based field phenotyping in the United Kingdom agricultural DUS testing”, a copy of the presentation is provided in document TWM/2/8.

28. The TWM noted developments on the introduction of UAV-based field phenotyping in the United Kingdom and that a compared analysis using image analysis and manual observations was being conducted.

29. The TWM noted new types of characteristics assessed using image analysis, such as growth profiles and vegetative index.

30. The TWM noted that assessments using image analysis could provide in some cases higher precision levels than manual assessments. The TWM agreed that the consequences of increased precision levels on DUS examination should be further considered as characteristic assessments using image analysis were introduced in routine procedures.

(ii) Application of Imaging Analysis on DUS Test

31. The TWM received a presentation from Ms. Yanfang Liu (China) on “Application of Imaging Analysis on DUS Test”, a copy of the presentation is provided in document TWM/2/13.

32. The TWM noted the use of image analysis for the automation of assessments for several characteristics in Maize and the use of image analysis to assess additional characteristics, such as seed vigor.

Developments in molecular techniques and bioinformatics

(a) Latest developments in molecular techniques and bioinformatics

(i) WIPO Standard ST.26 - WIPO Sequence

33. The TWM received a presentation from Ms. Emma Francis, World Intellectual Property Organization (WIPO) on “WIPO Standard ST.26 - WIPO Sequence”, a copy of the presentation is provided in document TWM/2/15.

34. The TWM noted that search algorithms could be developed for databases containing nucleotide or amino acid information using the WIPO Standard ST.26 data format, including plant variety data.

(b) *Cooperation between international organizations*

(i) OECD

35. The TWM received a presentation from Mr. Csaba Gaspar, Organisation for Economic Co-operation and Development (OECD), on “Latest developments in the application of BMT under the OECD Seed Schemes”, a copy of the presentation is provided in document TWM/2/19.

36. The TWM noted the use of molecular techniques in the OECD Seed Schemes as a supplementary procedure for variety identification in field trials.

37. The TWM noted that OECD was considering the assessment of characteristics using image analysis and that the use of artificial intelligence algorithms was anticipated to be considered in the future.

(ii) ISTA

38. The TWM received a presentation from Ms. Ana Laura Vicario, International Seed Testing Association (ISTA), on “ISTA report on the use of molecular techniques”, a copy of the presentation is provided in document TWM/2/18.

39. The TWM noted the invitation for interested experts to join the activities of the ISTA Variety Committee.

40. The TWM thanked OECD and ISTA for reporting developments on the use of molecular techniques in their respective organizations.

41. The TWM noted the invitation from UPOV for the joint organization of an OECD, ISTA and UPOV workshop in the future to discuss the use of molecular techniques in each organization and explore further collaboration in this area.

(c) *Report of work on molecular techniques in relation to DUS examination*

(i) Reference collection management using molecular markers: a new approach based on genomic prediction

42. The TWM considered document TWM/2/4 and received a presentation from Mr. Adrian Roberts (United Kingdom) on “Genomic prediction for reference collection management”, a copy of which is reproduced in document TWM/2/4 Add..

43. The TWM noted that the genomic prediction method was aimed at establishing links between molecular markers and phenotypic expression of characteristics in ryegrass varieties, and that it might potentially assist in the management of variety collections.

44. The TWM noted that the genomic prediction method had been developed using data from a single trial location and would be further evaluated on other crops where data was available from different locations.

(ii) Uniformity assessment using molecular markers

45. The TWM considered document TWM/2/5 and received a presentation from Mr. Adrian Roberts (United Kingdom) on “Uniformity assessment using molecular markers”, a copy of which is reproduced in document TWM/2/5 Add..

46. The TWM noted that the research had been conducted assessing the genetic variability of a cross pollinated crop (ryegrass) with measured characteristics and not tested on pseudo-qualitative characteristics.

47. The TWM noted that next steps of the research could investigate measurement error associated with the sequencing methodology through independent runs with the same pooled sample.

(iii) Molecular approaches to support DUS testing

48. The TWM considered document TWM/2/6 and received a presentation from Ms. Vanessa McMillan (United Kingdom) on “Molecular approaches to support DUS testing”, a copy of which is reproduced in document TWM/2/6 Add..

49. The TWM noted that up to 75% of marker-trait correlation had been achieved in barley varieties, although not in relation to DUS characteristics. The TWM noted the intention to publish the molecular markers identified in the project, which could also be used for authenticating new seedstock of varieties. The TWM agreed to invite the expert from the United Kingdom to report on progress at its third session.

(iv) CPVO R&D activities

50. The TWM received a presentation from Ms. Cécile Collonnier (European Union) on “CPVO R&D activities”, a copy of the presentation is provided in document TWM/2/12.

51. The TWM noted the contributions of the various projects presented, in particular the INVITE project, which would end in 2024.

(v) Maize6H-60K: A genome-wide single nucleotide polymorphism array and its application

52. The TWM received a presentation from Ms. Hongli Tian (China) on “Maize6H-60K: A genome-wide single nucleotide polymorphism array and its application”, a copy of the presentation is provided in document TWM/2/16.

53. The TWM noted that 21% of SNPs in the array were located in coding regions of the genome although their link with the expression of characteristics had not yet been identified.

(vi) Guidelines for the validation of a new characteristic-specific molecular marker protocol for DUS studies as an alternative method for observation

54. The TWM received a presentation from Ms. Amandine LeVan (France) on “Guidelines for the validation of a new characteristic-specific molecular marker protocol for DUS studies as an alternative method for observation”, a copy of the presentation is provided in document TWM/2/17.

55. The TWM noted that the proposal would be considered by the TWV and reported to the TC, at their sessions in 2024.

(d) *Methods for analysis of molecular data, management of databases and exchange of data and material*

56. No documents were received for this agenda item.

(e) *Confidentiality, ownership and access to molecular data, including model agreement template*

(i) Confidentiality of molecular information

57. The TWM received a presentation on “Confidentiality of Molecular Information” from Mr. Marcel Bruins, CropLife International, on behalf of the African Seed Trade Association (AFSTA), the Asia and Pacific Seed Association (APSA), the International Community of Breeders of Asexually Reproduced Horticultural Plants (CIOFORA), CropLife International, Euroseeds, the International Seed Federation (ISF) and the Seed Association of the Americas (SAA) (“breeders’ organizations”). A copy of the presentation is provided in document TWM/2/7.

58. The TWM noted the request from breeders’ organizations for the development of guidance in UPOV on confidentiality of molecular data and the offer to propose a draft model agreement template, to be presented at its third session.

(ii) Examples of policies on confidentiality and access to molecular information data

59. No documents were received for this agenda item.

60. The TWM noted that the European Union was expected to adopt a policy on access to plant variety samples, including DNA samples, which would be reported at the TWPs in 2024.

61. The TWM agreed to invite UPOV members to report on existing policies on confidentiality of molecular information at its third session.

(f) *The use of molecular techniques in examining essential derivation*

62. No documents were received for this agenda item.

(g) *The use of molecular techniques in variety identification*

(i) Use of Artificial Intelligence-based Markers for Variety Traceability

63. The TWM received a presentation from Ms. Ana Laura Vicario (Argentina) on “Use of Artificial Intelligence-based Markers for Variety Traceability”, a copy of the presentation is provided in document TWM/2/9.

64. The TWM noted that the technology was used in routine procedures for market control and traceability of barley and wheat varieties in Argentina. The TWM noted that the technology was being developed for soybean varieties.

65. The TWM noted that the algorithm used established unique patterns for each variety based on seed morphology. The TWM noted that the thresholds for decision making and accepted error could be adjusted to enable the analysis of variety purity.

(ii) LociScan, a tool for screening genetic marker combinations for plant variety discrimination

66. The TWM received a presentation from Mr. Yang Yang (China) on “LociScan, a tool for screening genetic marker combinations for plant variety discrimination”, a copy of the presentation is provided in document TWM/2/14.

67. The TWM noted that the software tool LociScan identified marker set combinations to optimize the number of markers required to discriminate varieties. The TWM noted that the time of analysis required by the tool would be influenced by the number of samples processed and not by the number of markers used.

68. The TWM noted that the software tool LociScan was available for testing and agreed to invite interested experts to test the tool and report results to the expert from China.

(h) *The use of molecular techniques for enforcement*

69. No documents were received for this agenda item.

Matters for information

Reports on developments in plant variety protection from members and observers

70. The TWM noted that the United Kingdom submitted a report and that further reports submitted until April 11, 2024, would be included in document TWM/2/2 “Reports from members and observers”.

Reports on developments in UPOV

71. The TWM received a presentation from the Office of the Union on developments in UPOV, a copy of which is provided in document TWP/8/2.

Date and place of the next session

72. The TWM agreed to hold its third session from April 7 to 10, 2025, by virtual means.

73. The TWM noted that no invitation to host the third session of the TWM had been received. The TWM noted the preference of holding a hybrid meeting at its future sessions. The TWM invited members to contact the Office of the Union to obtain information on the requirements for hosting a TWM session.

Future program

74. The TWM agreed that documents for its third session should be submitted to the Office of the Union by February 21, 2025. The TWM noted that items would be deleted from the agenda if the planned documents did not reach the Office of the Union by the agreed deadline.

75. The TWM proposed to discuss the following items at its third session:
1. Opening of the Session
 2. Adoption of the agenda
 3. Matters for discussion
 - 3.1 Guidance and information materials (document to be prepared by the Office of the Union)
 - 3.2 Technical Committee subgroup on Test Guidelines (document to be prepared by the United Kingdom)
 - 3.3 Variety description databases including databases containing molecular data (papers invited)
 - 3.4 Software and statistical analysis methods for DUS examination
 - (a) Statistical tools and methods for DUS examination (papers invited)
 - (i) The Combined-Over-Years Uniformity Criterion (COYU) (document to be prepared by the United Kingdom and papers invited)
 - (ii) Comparison of results obtained for COYD and COYU procedures using different software (document to be prepared by France)
 - (iii) Development of Big Data platform for DUS examination (document to be prepared by China)
 - (b) Exchange and use of software and equipment (papers invited)
 - 3.5 Phenotyping and image analysis (papers invited)
 - 3.6 Developments in molecular techniques and bioinformatics (papers invited)
 - (a) Latest developments in molecular techniques and bioinformatics (papers invited)
 - (b) Cooperation between international organizations (papers invited)
 - (c) Report of work on molecular techniques in relation to DUS examination (papers invited)
 - (d) Methods for analysis of molecular data, management of databases and exchange of data and material (papers invited)
 - (e) Confidentiality, ownership and access to molecular data, including model agreement template (papers invited)
 - Examples of policies on confidentiality and access to molecular information data (papers invited)
 - (f) The use of molecular techniques in examining essential derivation (papers invited)
 - (g) The use of molecular techniques in variety identification (papers invited)
 - (h) The use of molecular techniques for enforcement (papers invited)
 4. Matters for information
 - (a) Reports from members and observers (written reports to be prepared by members and observers)
 - (b) Report on developments in UPOV (general developments, including variety denominations, information databases, exchange and use of software and equipment)
 5. Date and place of the next session
 6. Future program
 7. Adoption of the Report on the session (if time permits)
 8. Closing of the session

76. *The TWM adopted this report at the end of the session.*

[Annex follows]

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