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**WORK ON MOLECULAR TECHNIQUES IN RELATION TO DUS EXAMINATION IN UKRAINE AND
SHORT REPORT OF SOFTWARE AND STATISTICAL ANALYSIS METHODS FOR DUS EXAMINATION***Document prepared by an expert from Ukraine**Disclaimer: this document does not represent UPOV policies or guidance*

The annex to this document contains a copy of a presentation “Work on molecular techniques in relation to DUS examination in Ukraine and short report of Software and statistical analysis methods for DUS examination”, to be made by an expert from Ukraine, at the fourth session of the TWM.

[Annex follows]



UKRAINIAN INSTITUTE FOR
PLANT VARIETY EXAMINATION
UIPVE

WORK ON MOLECULAR TECHNIQUES IN RELATION TO DUS
EXAMINATION IN UKRAINE AND SHORT REPORT OF SOFTWARE
AND STATISTICAL ANALYSIS METHODS FOR DUS EXAMINATION

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TWM/4
June 02-05, 2026

1



LEGISLATION IN UKRAINE ON PVP IN RELATION TO MOLECULAR TECHNIQUES

Legislation Convention Notifications UPOV Convention Genera and Species Notifications Full Text Search

Ukraine

Law of Ukraine No. 2763-IX of November 16, 2022

Date of current version: 2023
Dates: Entry into force: June 10, 2023
Promulgated: November 16, 2022

Available Texts
English Law of Ukraine No. 2763-IX of November 16, 2022

WIPO Lex No. UA213

- Current version: Revision on April 19, 2025
<https://zakon.rada.gov.ua/laws/show/en/3116-12?lang=uk#Text>
- Order of the Ministry of Agrarian Policy and Food of Ukraine "On Approval of the Procedure for Conducting the Qualification Examination of a Variety" dated 05 July 2023 No. 1344
<https://zakon.rada.gov.ua/laws/show/en/z1244-23?lang=uk#Text>
 - All DUS test guidelines are approved by the National authority – the Ministry of economics, environment and agriculture of Ukraine
- There are no established provisions** specifying when and under what conditions biochemical and molecular methods may be applied.
- There are no defined procedures** for the use of official variety collection samples in the application of biochemical and molecular methods.
- Section II, paragraph 11:**
For the purpose of establishing DUS, the Examination Office may apply additional biochemical and molecular methods of identification, **subject to the agreement of the applicant.**
- Only one DUS test guideline contained the procedure which includes molecular methods – identification CMS (Cytoplasmic male sterility) in maize

2

2



R&D Projects of Ukrainian Institute for Plant Variety Examination (UIPVE) on Molecular Marker Techniques

- Development of a System for Evaluating Quality Indicators of Cereal and Oilseed Crop Varieties (2025-2029)
- Development and Software Implementation of a System for the Evaluation of Plant Varieties Using SSR Markers within the Framework of DUS Testing (2020-2024)
- Improvement of the DNA Typing System for Agricultural Crop Varieties Based on Molecular Genetic Markers (2017-2018)
- Development of a Genotyping and Variety Passporting (Identification) System for Soybean (*Glycine max* (L.) Merr.) Based on Molecular Genetic Markers Using PCR Methods (2010)
- Development of a Database for Agricultural Crops Based on Molecular Genetic Markers and Technological Traits, Using Self-Pollinated and Cross-Pollinated Crops as Case Studies (2008)
- Development and introduction of DNA - technologies for the differentiation and identification of plant varieties (2005-2007)

3

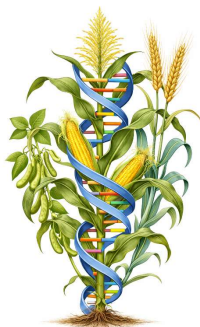
3

THE UTILIZATION OF MOLECULAR TECHNIQUES IN UKRAINE FOR DUS TESTS



- The molecular marker technique is used **on occasional basis**

Crop	Method	Purpose of use
<input type="checkbox"/> Maize	<input type="checkbox"/> DNA markers for CMS type identification	<input type="checkbox"/> Distinctness
<input type="checkbox"/> Maize	<input type="checkbox"/> Electrophoresis of storage proteins	<input type="checkbox"/> Identity, purity
<input type="checkbox"/> Wheat	<input type="checkbox"/> Electrophoresis of storage proteins	<input type="checkbox"/> Identity, purity
<input type="checkbox"/> Soybean	<input type="checkbox"/> SSR markers	<input type="checkbox"/> Identity



4

4

OTHER APPLICATIONS OF MOLECULAR TECHNIQUES IN UKRAINE



For variety identification

Crops:

- Maize (electrophoresis of storage proteins)
- Sunflower (electrophoresis of storage proteins)
- Barley (electrophoresis of storage proteins)
- Wheat (electrophoresis of storage proteins)
- Soybean (SSR markers)

For enforcement

Crops:

- Maize (SSR markers)
- Sunflower (SSR markers)

- to requests from the police and the prosecutor's office

5

5

SOFTWARE FOR DUS EXAMINATION AND DATA PROCESSING



The software system of UIPVE integrates a data analytics platform based on the R and Shiny ecosystem and includes the following modules:

- Seed Supply module
- Official Sample Storage (long-term storage) module
- Data Collection and Processing module for DUS examination at testing sites
- Post-control module

Analysis of candidate varieties for distinctness

Рік: 2018 ID культури: 009 Показати морф. ознаки

Номер заявки	Назва	Кодова форма	KF	Тип
16009035	П8537	000033051115215110000800750099050000503507	1	сортібрид
18009027	П8537	000033051115215110000800750099050000503507	1	сортібрид
17009067	П8723	0000340414332343550006770887067258006405404	2	сортібрид
16009022	П8723	0000340414332343550006770887067258006405404	2	сортібрид
16909034	ПХ269Г	12123116333333615511555703535230000203505	3	сортібрид
18909035	ПХ269Г	12123116333333615511555703535230000203505	3	сортібрид

Allele conversion and calculation of molecular distances (ROG)

Розрахунок по алелях

	A	B	C	D	E	F	G	H
1 пале	KSL-37	KSL-173	KSL-26	KSL-32	KSL-92	KSL-119	KSL-271	
2 Зоряпад	191	204	223	199	287	244	185	
3 Малаїт	193	204	219	194	239	244	174	
4 Дубльський	193	204	217	175	311	252	250	
5 Крутиський	191	252	219	217	306	250	293	
6 Смульня	193	341	260	217	304	252	293	
7 Снарб	198	151	226	219	253	285	282	
8 Потонич	193	349	223	222	193	268	200	

Розрахунок по кодах

	A	B	C	D	E	F	G
1 пале	KSL-37.191	KSL-37.193	KSL-37.198	KSL-173.151	KSL-173.204	KSL-173.252	
2 Зоряпад	1	0	0	0	1	0	
3 Малаїт	0	1	0	0	0	1	
4 Дубльський	0	1	0	0	0	1	
5 Крутиський	1	0	0	0	0	0	1
6 Смульня	0	1	0	0	0	0	0
7 Снарб	0	0	1	1	1	0	0
8 Потонич	0	1	0	0	0	0	0

Файли з вихідними даними мають бути формату xlsx, xls з поданим макетом:

6

6

SOFTWARE APPLICATION OF DUS DEPARTMENT



The software application developed on the ASP.NET Core platform. This application provides the following functions:

- Registration and management of application documents and UPOV requests
- Preparation of work programs and notifications for the import of samples
- Analysis and management of results from testing sites
- Maintenance of examination reference data
- Generation of printed DUS document templates
- Preparation of DUS reports

7

SEED SUPPLY MODULE

OFFICIAL SAMPLE STORAGE MODULE



- The module ensures the registration of incoming experimental seed samples at the a designated affiliate of UIPVE, the distribution (packaging) of samples, and the generation of accompanying labels for dispatch to the storage facility or testing site, including a generated barcode.

- The module automates the movement and updating of official seed samples stored in the long-term storage facility of UIPVE. For each sample, a label is generated. The label includes a barcode containing the identifier of the seed sample, enabling quick access to the variety record.

8

DATA COLLECTION MODULE FOR DUS EXAMINATION AT TESTING SITES



The module ensures the online transmission of results from DUS examination from testing sites:

- Statistical processing of quantitative characteristics;
- Sample updates;
- Results for DUS characteristics;
- Accounting of planting material (collections of perennial crops)

#	Опис	Mean	Var	Sd	SEMean	CoeffVar	SECoeffVar	N
14	Волость: кількість первинних білихих гілочок	7,65	1,4	1,18	0,26	15,45	2,44	20
21	Волость: головна вісь за довжиною (від нижньої білої гілочки до верхівки)	42,65	4,13	2,03	0,45	4,77	0,75	20
22	Волость: головна вісь за довжиною (від верхньої білої гілочки до верхівки)	33,15	4,66	2,16	0,48	6,51	1,03	20
23	Волость: біла гілочка за довжиною	22,55	3,74	1,93	0,31	8,58	0,96	40
24	Рослина: за довжиною	215,75	28,91	5,38	0,85	3,49	0,28	40
25	Рослина: висота прикріплення верхнього качана	82,3	6,96	2,64	0,59	3,21	0,51	20
26	Листок: пластинка за шириною	11,43	0,26	0,51	0,11	4,48	0,71	20
27	Качан: ніжка за довжиною	15	7,26	2,7	0,6	17,97	2,84	20
28	Качан: за довжиною	23,05	0,58	0,76	0,17	3,29	0,52	20
29	Качан: діаметр (посередині)	4,3	0,03	0,17	0,04	3,96	0,63	20
31	Качан: кількість зернових рядків	15,2	1,01	1,01	0,22	6,61	1,05	20

№	Дані	Ступінь зриву	Код	Дата	Відхилення	Промінь	Норматив
1	Головочка: вищадане заборачення	налево	9	20.05.2024	+	0	0
2	Головочка: зменшеність вищаданого заборачення	сильше	3	20.05.2024	+	0	0
3	Листок: розрив	середній	5	10.07.2024	+	0	0
4	Листок: інтенсивність зеленого забарвлення	сильше	7	10.07.2024	+	0	0
5	Листок: пухлякість	сильше	3	10.07.2024	+	0	0
6	Листок: згуби	номірні	5	10.07.2024	+	0	0
7	Листок: форма поперечного перерізу	сильше випукла	4	10.07.2024	+	0	0
8	Листок: форма верхівки	трикутний/дв. ланцюговий/мал. ланцюговий	4	10.07.2024	+	0	0
9	Листок: вушка	малі	3	10.07.2024	+	0	0
10	Листок: крила	сильше вирівняні	2	10.07.2024	+	0	0

MAIN CHALLENGES AND ONGOING PROJECTS



USING MOLECULAR TECHNIQUES

- Increase trust in the use of molecular markers in Ukraine by ensuring transparent and secure procedures for breeders
- Revise the fee structure for DUS technical examination to incorporate the costs associated with the application of biochemical and molecular methods
- Establish clear regulatory provisions governing the use of biochemical and molecular methods in DUS testing



ONGOING PROJECTS

The electronic system of registers in the field of crop production, e-Crop Production is being tested.

The system includes a Variety Database, which consists of interconnected electronic registers: Register of Applications; State Register of Plant Varieties Suitable for Dissemination in Ukraine; State Register of Plant Variety Patents; Register of Seed Production and Nursery Operators; Register of Certification Auditors (Agronomist-Inspectors); Register of Certificates for Seeds and/or Planting Material; Register of Conformity Assessment Bodies

THANK YOU FOR ATTENTION!



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