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**INTERNATIONAL UNION FOR THE PROTECTION OF NEW VARIETIES OF PLANTS**

Geneva

**TECHNICAL WORKING PARTY FOR VEGETABLES****Forty-Eighth Session  
Paestum, Italy, from June 23 to 27, 2014**

## MOLECULAR TECHNIQUES

*Document prepared by the Office of the Union**Disclaimer: this document does not represent UPOV policies or guidance*

1. The purpose of this document is to report on developments concerning the:
  - (a) use of biochemical and molecular markers in the examination of Distinctness, Uniformity and Stability (DUS);
  - (b) Working Group on Biochemical and Molecular Techniques, and DNA-Profiling in Particular (BMT); and
  - (c) presentation of information on the situation in UPOV with regard to the use of molecular techniques to a wider audience, including breeders and the public in general.
2. The following abbreviations are used in this document:  

BMT:	Working Group on Biochemical and Molecular Techniques, and DNA-Profiling in Particular
CAJ:	Administrative and Legal Committee
TC:	Technical Committee
TC-EDC:	The Enlarged Editorial Committee

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

3. The Council, at its forty-seventh ordinary session, held in Geneva on October 24, 2013, adopted document TGP/15/1 "Guidance on the Use of Biochemical and Molecular Markers in the Examination of Distinctness, Uniformity and Stability (DUS)" (see document C/47/19 "Report on the decisions", paragraph 23).
4. On September 23 and 24, 2013, a Joint Workshop on DUS Testing and Molecular Techniques (Workshop) was held in Beijing, China, organized by the State Forestry Administration, China, in cooperation with the Ministry of Agriculture, China, and the Office of the Union. A copy of the program is attached as Annex I to this document.
5. At the Workshop, experts from China and the Republic of Korea reported on their use of molecular techniques to supplement the selection of varieties to be included in the DUS field trial on the basis of descriptions based on morphological characteristics.

6. The TC, at its fiftieth session, held in Geneva on April 7 to 9, 2014 and the CAJ, at its sixty-ninth session, held in Geneva on April 10, 2014, encouraged the experts from China, the Republic of Korea and other members of the Union to make presentations at the fourteenth session of the BMT, to be held in Seoul, from November 10 to 13, 2014, on the use of molecular techniques to supplement the selection of similar varieties for inclusion in the growing trial.

#### WORKING GROUP ON BIOCHEMICAL AND MOLECULAR TECHNIQUES, AND DNA-PROFILING IN PARTICULAR (BMT)

7. The fourteenth session of the BMT will be held in Seoul, the Republic of Korea, from November 10 to 13, 2014.

8. The TC agreed to the amended program of the fourteenth session of the BMT as set out in Annex II to this document (see document TC/50/36 "Report on the Conclusions", paragraph 20).

9. The TC agreed to the plan for the fourteenth session of the BMT to be held in conjunction with a joint workshop with International Seed Testing Association (ISTA) and Organisation for Economic Co-operation and Development (OECD) (Joint Workshop), to be held on November 12, 2014 (see document TC/50/36 "Report on the Conclusions", paragraph 80).

10. The TC agreed that the progress of work of the BMT and the outcomes of the Joint Workshop with ISTA and OECD should be reported to the TC at its fifty-first session (see document TC/50/36 "Report on the Conclusions", paragraph 81).

11. The workplan of the fourteenth session of the BMT, its preparatory workshop and the Joint Workshop is attached as Annex III to this document.

#### PRESENTATION OF INFORMATION ON THE SITUATION IN UPOV WITH REGARD TO THE USE OF MOLECULAR TECHNIQUES TO A WIDER AUDIENCE, INCLUDING BREEDERS AND THE PUBLIC IN GENERAL

12. The TC, at its forty-ninth session, held in Geneva from March 18 to 20, 2013, agreed that there was a need to provide suitable information on the situation in UPOV with regard to the use of molecular techniques to a wider audience, including breeders and the public in general. That information should explain the potential advantages and disadvantages of the techniques, and the relationship between genotype and phenotype, which lay behind the situation in UPOV (see document TC/49/41 "Report on the Conclusions", paragraph 136).

13. The Consultative Committee, at its eighty-sixth session, held in Geneva on October 23 and 24, 2013, considered a series of answers to frequently asked questions. One of the questions included was "does UPOV allow molecular techniques (DNA profiles) in the DUS examination?" In that regard the Consultative Committee agreed that the answer should be developed via the Technical Committee.

14. The TC, at its fiftieth session, held in Geneva on April 7 to 9, 2014 and the CAJ, at its sixty-ninth session, held in Geneva on April 10, 2014, agreed the proposed explanation of the situation in UPOV with regard to the use of molecular techniques, as set out below:

Question: Does UPOV allow molecular techniques (DNA profiles) in the DUS examination?

Answer: "It is important to note that, in some cases, varieties may have a different DNA profile but be phenotypically identical, whilst, in other cases, varieties which have a large phenotypic difference may have the same DNA profile for a particular set of molecular markers (e.g. some mutations).

"In relation to the use of molecular markers that are not related to phenotypic differences, the concern is that it might be possible to use a limitless number of markers to find differences between varieties at the genetic level that are not reflected in phenotypic characteristics.

“On the above basis, UPOV has agreed the following uses of molecular markers in relation to DUS examination:

“(a) Molecular markers can be used as a method of examining DUS characteristics that satisfy the criteria for characteristics set out in the General Introduction if there is a reliable link between the marker and the characteristic.

“(b) A combination of phenotypic differences and molecular distances can be used to improve the selection of varieties to be compared in the growing trial if the molecular distances are sufficiently related to phenotypic differences and the method does not create an increased risk of not selecting a variety in the variety collection which should be compared to candidate varieties in the DUS growing trial.

“The situation in UPOV is explained in documents TGP/15 ‘Guidance on the Use of Biochemical and Molecular Markers in the Examination of Distinctness, Uniformity and Stability (DUS)’ and UPOV/INF/18 ‘Possible use of Molecular Markers in the Examination of Distinctness, Uniformity and Stability (DUS)’”.

15. With regard to a wider audience, the TC agreed that the question was not framed in an appropriate way and, therefore, it would not be appropriate to seek to develop an answer to that question. The TC agreed that the question should be rephrased after clarification of the issues of interest to a wider audience.

16. The Council, at its thirty-first extraordinary session, held in Geneva, April 12, 2014, adopted the answers to the frequently asked questions (see document C(Extr.)/31/5 “Report on the Decisions”, paragraph 15 and C(Extr.)/31/3, Annex).

17. The answers to Frequently Asked Questions are published on the website at <http://www.upov.int/about/en/fac/>

18. *The TWV is invited to note the report on developments concerning the:*

*(a) use of biochemical and molecular markers in the examination of Distinctness, Uniformity and Stability (DUS);*

*(b) Working Group on Biochemical and Molecular Techniques, and DNA-Profiling in Particular(BMT); and*

*(c) presentation of information on the situation in UPOV with regard to the use of molecular techniques to a wider audience, including breeders and the public in general.*

[Annexes follow]

Joint Workshop on DUS Testing and Molecular Techniques

September 23 and 24, 2013, Beijing, China

PROGRAM

**September 23, 2013**

9:00-10:00 Opening ceremony

*Chair: Hu Zhangcui, Director General, Science and Technology Development Center (PVP Office), the State Forestry Administration (SFA)*

Opening remarks by:

- 1) *Jiang Zehui, Managing Vice President, Committee of Science and Technology, SFA; President, China Flower Association, China*
- 2) *Peter Button, Vice Secretary-General, UPOV*
- 3) *Liu Jian, Deputy Director General, Department of International Cooperation, State Intellectual Property Office (SIPO), China*
- 4) *Zhang Yanqiu, Director General, Bureau of Seed Management, Ministry of Agriculture (MOA), China*

10:00-10:15 Tea break

Theme 1: The latest progress in protection of new plant varieties

*Chair: Lǚ Bo, Division Director, PVP Office, MOA*

10:15-10:30 Recent developments in UPOV

*Fuminori Aihara, Counsellor, UPOV*

10:30-10:45 Status of PVP in Forestry sector in China

*Hu Zhangcui, Director General, Science and Technology Development Center (PVP Office), SFA*

10:45-11:00 Status of PVP in Agriculture sector in China

*Lǚ Bo, Division Director, PVP Office, MOA*

11:00-11:15 Regional cooperation of PVP in EU

*Kees Van Ettekoven, Head of Variety Testing Department, the Netherlands*

11:15-11:30 Current status of PVP in Korea

*Chan Woong Park, Researcher, Variety Testing Division, Korea Seed and Variety Service (KSVS), the Republic of Korea*

11:30-11:45 Current status of PVP in Japan

*Masao Okawa, Head of Team for Foreign Plant Genetic Resources, National Center for Seeds and Seedlings (NCSS), Japan*

11:30-11:45 Enhance variety innovation and promote the development of China's modern flower industry  
*Liu Hong, Secretary General, China Flower Association, China*

12:00-12:15 Questions and Answers

12:15-13:30 Lunch

### Theme 2: BMT applications in PVP

*Chair: Peter Button, Vice Secretary-General, UPOV*

13:30-13:45 Progress in studies on DNA profiling of Rose varieties  
*Zheng Yongqi, Research Professor, Lab of Molecular Identification of Plant Varieties, SFA*

13:45-14:00 Application of DNA fingerprinting in variety identification and DUS testing  
*Li Ruyu, Jinan DUS Testing Center, MOA*

14:00-14:15 Application of molecular techniques in DUS testing in the European Union  
*Kees van Ettehoven, Naktuinbouw, the Netherlands*

14:15-14:30 Application of molecular techniques in PVP in Korea  
*Chan Woong Park, Researcher, Variety Testing Division, KSVS, the Republic of Korea*

14:30-14:45 Application of molecular techniques in DUS testing in Japan  
*Masao Okawa, Head of Team for Foreign Plant Genetic Resources, NCSS, Japan*

14:45-15:00 Application of molecular techniques in bamboo breeding  
*Gao Zhimin, International Center for Bamboo and Rattan, China*

15:00-15:15 Questions and Answers

15:15-15:30 Break

### Theme 3: Growing trials for DUS tests

*Chair: Fei Benhua, Executive Deputy Director General, International Center for Bamboo and Rattan, China*

15:30-15:45 DUS testing of new varieties of rose  
*Wang Junyun, Rose DUS Testing Station, SFA*

15:45-16:00 DUS testing for new varieties of tree peony  
*Huang Jinfeng, Peony DUS Testing Station, SFA*

16:00-16:15 DUS testing for new varieties of rice  
*Sun Lianfa, Harbin DUS Testing Center, MOA*

16:15-16:30 DUS tests for new varieties of maize  
*Li Yuyu, Jinan DUS Testing Center, MOA*

16:30-16:45 DUS testing for ornamental plants [and forest trees] in the European Union  
*Kees van Ettehoven, Naktuinbouw, the Netherlands*

16:45-17:00 DUS Testing for ornamental plants in Korea  
*Chan Woong Park, Researcher, Variety Testing Division, KSVS, the Republic of Korea*

17:00-17:15 DUS Testing for ornamental plants and forest trees  
*Masao Okawa, Head of Team for Foreign Plant Genetic Resources, NCSS, Japan*

17:15-17:30 DUS testing for Poinsettia  
*Wang Yan, DUS Testing Station for Poinsettia (Shanghai), SFA*

17:30-17:45 DUS testing for Phalaenopsis  
*Xu Zhenjiang, Guangzhou DUS Testing Station, MOA*

17:45-18:00 Questions and Answers

18:00-18:10 Break

#### Workshop Summary

18:10-18:20 Summary remarks  
*Peter Button, UPOV*

18:20-18:30 Conclusion remarks  
*Hu Zhangcui, Director General, Science and Technology Development Center (PVP Office), SFA*

#### **September 24, 2013**

Technical visits to:

- Laboratory of Molecular Identification of Plant Varieties, SFA;
- Institute of Forestry, Chinese Academy of Forestry (CAF); and
- International Center for Bamboo and Rattan (ICBR)

9:00 Arrive at the West Room of the Convention Hall, CAF

9:00-9:10 Introduction to guests  
*Dr. ZHENG Yongqi, Laboratory of Molecular Identification of Plant Varieties*

9:10-9:20 Welcome address  
*Dr. JIANG Zeping, Deputy Director, CAF*

9:20-9:50 Presentation on the Laboratory of Molecular Identification of Plant Varieties  
*Dr. ZHANG Chuanhong, Laboratory of Molecular Identification of Plant Varieties*

9:50-10:20 Presentation on application of molecular techniques in plant variety identification  
*YU Xuedan, Laboratory of Molecular Identification of Plant Varieties*

10:20-10:50 Discussion

10:50-11:20  
Visit to greenhouses  
Visit to Laboratory of Forest Genetics and Breeding  
Visit to Laboratory of Molecular Identification of Plant Varieties

14:00-14:30 Visit to the exhibition room of ICBR

14:30-15:30 Visit to the laboratory of ICBR

[Annex II follows]

PROGRAM OF THE FOURTEENTH SESSION OF THE BMT

to be held in Seoul, Republic of Korea, on November 10 to 13, 2014

1. Opening of the session
2. Adoption of the agenda
3. Reports on developments in UPOV concerning biochemical and molecular techniques
4. Short presentations on new developments in biochemical and molecular techniques by DUS experts, biochemical and molecular specialists, plant breeders and relevant international organizations
5. Report of work on molecular techniques on a crop-by-crop basis:
  - (a) vegetatively propagated crops
  - (b) self-pollinated crops
  - (c) cross-pollinated crops
6. International guidelines on molecular methodologies
7. Variety description databases
8. Methods for analysis of molecular data
9. The use of molecular techniques in examining essential derivation
10. The use of molecular techniques in variety identification
11. Date and place of next session
12. Future program
13. Report of the session (if time permits)
14. Closing of the session

[Annex III follows]

**WORKING GROUP ON BIOCHEMICAL AND MOLECULAR TECHNIQUES,  
AND DNA-PROFILING IN PARTICULAR (BMT)**

Fourteenth Session, Seoul, Republic of Korea, November 10 to 13, 2014 / Preparatory Workshop, November 9, 2014 / Joint Workshop, November 12, 2014

	Sunday, Nov. 9	Monday, Nov. 10	Tuesday, Nov. 11	Wednesday, Nov. 12	Thursday, Nov. 13
09.00	X	<b>BMT MEETING</b> <u>Item 1: Opening of the session</u> <u>Item 2: Adoption of the agenda</u> <u>Item 3: Reports on developments in UPOV</u> <u>Item 4: Short presentations by participants</u>	<i>[Breeders' Day]</i>  <u>Item 10: Variety identification</u>	<b>OECD, UPOV, ISTA JOINT WORKSHOP ON MOLECULAR TECHNIQUES</b>  9:00 <u>Item 1: Welcome and opening</u> 9:10 <u>Item 2: Introduction to the OECD Seed Schemes and the situation with regard to molecular techniques</u> 9:50 <u>Item 3: Introduction to UPOV and the situation with regard to molecular techniques</u>  * <i>Item 2-4: 30min presentation + 10min Q&amp;A session</i> * <i>Item 5: 30min presentation + 20min Q&amp;A session</i>	<u>Item 5: Report of work on molecular techniques on a crop-by-crop basis (ctnd.)</u>  <u>Item 6: International Guidelines</u>  <u>Item 11: Date/Place of next session</u> <u>Item 12: Future program</u>
10.30		COFFEE	COFFEE	COFFEE	COFFEE
11.00		<u>Item 5: Report of work on molecular techniques on a crop-by-crop basis</u> (a) <u>vegetatively propagated crops</u> (b) <u>self-pollinated crops</u> (c) <u>cross-pollinated crops</u>	<u>Item 10: Variety identification (ctnd.)</u>	11:00 <u>Item 4: Introduction to ISTA and the situation with regard to molecular techniques</u> 11:40 <u>Item 5: Existing areas of cooperation between OECD, UPOV and ISTA</u>	<u>Item 13: Report of the session</u> <u>Item 14: Closing of the session</u>
12.30		LUNCH	LUNCH	LUNCH	SESSIONS END
14.00		<b>PREPARATORY WORKSHOP</b>	<u>Item 5: Report of work on molecular techniques on a crop-by-crop basis (ctnd.)</u>	<u>Item 10: Variety identification (ctnd.)</u>  <u>Item 9: Examining essential derivation</u>	14:00 <u>Item 6: Opportunities for cooperation between OECD, UPOV and ISTA with regard to molecular techniques (Discussion)</u> 14:25 <u>Item 7: Closing</u>  <u>Item 7: Variety description databases</u>
14.30			<u>Item 7: Variety description databases</u>		
15.30	COFFEE	COFFEE	COFFEE		
16.00		<u>(ctnd.)</u>	<u>Item 9: Examining essential derivation (ctnd.)</u> <u>Item 8: Methods for analysis of molecular data</u>	<u>Item 5: Report of work on molecular techniques on a crop-by-crop basis (ctnd.)</u>	
18.00					