



TC/50/13

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INTERNATIONAL UNION FOR THE PROTECTION OF NEW VARIETIES OF PLANTS

Geneva

TECHNICAL COMMITTEE

**Fiftieth Session
Geneva, April 7 to 9, 2014**

MOLECULAR TECHNIQUES

Document prepared by the Office of the Union

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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 may wish to invite 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.

7. The TC is invited to encourage experts from China, the Republic of Korea and other members of the Union to make presentations at the fourteenth session of the BMT, on the use of molecular techniques to supplement the selection of similar varieties for inclusion in the growing trial, as set out in paragraph 6 to this document.

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

Background

8. The role of the BMT is reproduced in Annex II to this document.

9. The BMT, at its thirteenth session, held in Brasilia, from November 22 to 24, 2011, planned to discuss the following items during its fourteenth session (see document BMT/13/36 "Report", paragraph 72):

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

10. The TC, at its forty-eighth session, held from March 26 to 28, 2012, approved the program for the fourteenth session of the BMT to be held in 2013, including the dedication of a particular date (“Breeders’ Day”), for the items on the use of molecular techniques in the consideration essential derivation and in variety identification, as set out in paragraphs 32 and 33 of document TC/48/7 (see document TC/48/23 “Report”, paragraph 222).

11. The TC further agreed that it would be appropriate for the Office of the Union to investigate the possibility of a coordinated meeting of the BMT and the Working Group on DNA Methods of the Variety Committee of ISTA, for the fourteenth session of the BMT (see document TC/48/23 “Report”, paragraph 221).

12. The CAJ, at its sixty-fifth session, held in Geneva on March 29, 2012, noted the following conclusions of the TC at its forty-eighth session, held in Geneva from March 26 to 28, 2012 (see document CAJ/65/13 “Report”, paragraph 78):

(a) The TC agreed that it would be appropriate for the Office of the Union to investigate the possibility of a coordinated meeting of the BMT and the Working Group on DNA Methods of the Variety Committee of the International Seed Testing Association (ISTA), for the fourteenth session of the BMT;

(b) The TC approved the program for the fourteenth session of the BMT, including the dedication of a particular date (“Breeders’ Day”), for the items on the use of molecular techniques in the consideration of essential derivation and in variety identification, as set out in paragraphs 32 and 33 of document TC/48/7.

13. The TC, at its forty-ninth session, held in Geneva, from March 18 to 20, 2013, received the following presentations from relevant international organizations (see document TC/49/41 “Report on the conclusions”, paragraphs 131 to 133), copies of which are posted on the UPOV website at http://upov.int/meetings/en/details.jsp?meeting_id=28343:

Situation with regard to the use of molecular techniques in relation to seeds in the International Organization for Standardization (ISO)	Presented by Mr. Paul Zankowski (United States of America) (Prepared by Mr. Michael Sussman (ISO))
Situation with regard to the use of molecular techniques in the International Seed Testing Association (ISTA)	Ms. Rita Zecchinelli (ISTA)
Situation with regard to the use of molecular techniques in the Organization for Economic Co-operation and Development (OECD)	Mr. Michael Ryan (OECD)

14. The TC, at its forty-ninth session, recalled that the BMT is a group open to DUS experts, biochemical and molecular specialists and plant breeders, whose role is as reproduced in Annex II to this document. In that regard, it endorsed the initiative for a joint meeting with ISO, ISTA and OECD and including breeders, as a means of supporting the role of the BMT in relation to (i), (ii), (iv), (vi) and particularly (viii) of the role of the BMT (see document TC/49/41 “Report on the Conclusions”, paragraphs 134 and 135, and the Annex III to this document).

15. The TC, at its forty-ninth session, agreed to propose to hold a coordinated meeting of the fourteenth session of the BMT with meetings of other relevant international organizations in 2014, as set out in document TC/49/7 “Molecular techniques”. It also agreed that, if it was not possible to organize a joint meeting with other organizations in 2014, a meeting of the BMT should be organized in the meantime (see document TC/49/41 “Report on the Conclusions”, paragraph 126).

Developments in 2013

16. On May 3, 2013, the Office of the Union issued a letter to Mr. Michael Sussman, Chairperson of TC/34/SC16, ISO, Mr. Heinz Schmid, Secretary General *ad interim*, ISTA, and Mr. Michael Ryan, Head of Unit, Agricultural Codes and Schemes, OECD, respectively, requesting their consideration of the possibility to hold a coordinated meeting in conjunction with the fourteenth session of the BMT. In reply to the letter, the Office of the Union received a positive response from ISTA and OECD. Mr. Michael Sussman (ISO) reported that ISO had formal requirements to establish liaisons and a framework with other international organizations with respect to its work, and that it might not be possible to establish such liaisons and a

framework between the ISO TC 34/SC 16 and UPOV before the planned date of the coordinated meeting. Mr. Sussman expressed his willingness to continue the current practice in which he or his colleagues would attend the BMT upon invitation to provide presentations on their work.

17. After consultation with the Republic of Korea, ISTA and OECD, it was proposed that the fourteenth session of the BMT be held from November 11 to 14, 2014, in Seoul, Republic of Korea, with its preparatory workshop on November 10, 2014. In consultation with ISTA and OECD, and as appropriate, the fourteenth session of the BMT will be coordinated with meetings of those international organizations.

18. The Council, at its forty-seventh ordinary session, held in Geneva, on October 24, 2013, approved the calendar of meetings in 2014, as set out in document C/47/8 "Calendar of meetings in 2014", with the following change (see document C/47/19 "Report on the decisions", paragraph 52):

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

BMT/14 November ~~11 to 14~~ 10 to 13, Seoul, Republic of Korea
(Preparatory workshop on November ~~10-9~~)"

19. With regard to the program of the fourteenth session of the BMT, it is recalled that:

a) the TC, at its forty-eighth session, held in Geneva, from March 26 to 28, 2012, agreed to discontinue separate meetings of the Ad-hoc Crop Subgroups and to include the discussions within the BMT sessions, as set out in paragraph 26 of document TC/48/7 (see document TC/48/23 "Report", paragraph 219); and

b) the BMT, at its thirteenth session, held in Brasilia, from November 22 to 24, 2011, requested the TC to consider the possibility to arrange the order of the agenda items to reflect the organization of the meeting, in particular, the items for the 'Breeders' Day' to be placed after agenda item 5 (see document BMT/13/36 "Report", paragraph 73).

20. In that regard, it is proposed to delete agenda items 4 "Reports on the work of the Ad Hoc Crop Subgroups on molecular techniques (Crop Subgroups)" and 12 "Recommendations on the establishment of new crop specific subgroups" from the program, as follows:

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

21. With regard to the organization of the coordinated meeting with ISTA and OECD, it is proposed to hold a joint workshop with ISTA and OECD on the morning and early afternoon of November 12, 2014. The proposed title for this event is planned for, "OECD, UPOV, ISTA Joint Workshop on Molecular Techniques" (the Joint Workshop). The proposed program for the Joint Workshop is as follows:

1. Welcome and opening
2. Introduction to the OECD Seed Schemes and the situation with regard to molecular techniques
3. Introduction to UPOV and the situation with regard to molecular techniques
4. Introduction to ISTA and the situation with regard to molecular techniques
5. Existing areas of cooperation between OECD, UPOV and ISTA
6. Opportunities for cooperation between OECD, UPOV and ISTA with regard to molecular techniques (Discussion)
7. Closing

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

23. *The TC is invited to:*

(a) note that the fourteenth session of the BMT will be held in Seoul, the Republic of Korea, from November 10 to 13, 2014;

(b) agree to the proposed amendment of the program of the fourteenth session of the BMT, as set out in paragraph 20 of this document; and

(c) agree to the proposed plan that the fourteenth session of the BMT will be coincided with the Joint Workshop with ISTA and OECD to be held on November 12, 2014, as set out in paragraph 21 of 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

Background

24. 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).

25. 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. The Consultative Committee agreed to consider draft answers to this and other frequently asked questions at its eighty-seventh session, to be held in Geneva on April 11, 2014.

Proposal

26. The TC-EDC, at its meeting held in Geneva on January 8 and 9, 2014, considered document TC-EDC/Jan14/24 "Molecular Techniques" and proposed the following text to provide information on the situation in UPOV with regard to the use of molecular techniques (highlighted text indicates the text taken from 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)"):

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 morphologically 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. In particular, differences could be found at the genetic level that are not reflected in morphological 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)'".

27. The TC is invited to consider the proposed explanation of the situation in UPOV with regard to the use of molecular techniques, as set out in paragraph 26 of this document.

[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 Ettehoven, 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]

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

*(as agreed by the Technical Committee at its thirty-eighth session, held in Geneva,
from April 15 to 17, 2002 (see document TC/38/16, paragraph 204))*

The BMT is a group open to DUS experts, biochemical and molecular specialists and plant breeders, whose role is to:

- (i) Review general developments in biochemical and molecular techniques;
- (ii) Maintain an awareness of relevant applications of biochemical and molecular techniques in plant breeding;
- (iii) Consider the possible application of biochemical and molecular techniques in DUS testing and report its considerations to the TC;
- (iv) If appropriate, establish guidelines for biochemical and molecular methodologies and their harmonization and, in particular, contribute to the preparation of document TGP/15, "New Types of Characteristics." These guidelines to be developed in conjunction with the Technical Working Parties;
- (v) Consider initiatives from TWPs, for the establishment of crop specific subgroups, taking into account available information and the need for biochemical and molecular methods;
- (vi) Develop guidelines regarding the management and harmonization of databases of biochemical and molecular information, in conjunction with the TWC;
- (vii) Receive reports from Crop Subgroups and the BMT Review Group;
- (viii) Provide a forum for discussion on the use of biochemical and molecular techniques in the consideration of essential derivation and variety identification.

[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	BMT MEETING <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>	[Breeders' Day] <u>Item 10: Variety identification</u>	OECD, UPOV, ISTA JOINT WORKSHOP ON MOLECULAR TECHNIQUES 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&A session</i> * <i>Item 5: 30min presentation + 20min Q&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		X	<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	COFFEE		COFFEE	COFFEE	
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					