

**Working Group on Biochemical and Molecular Techniques  
and DNA-Profiling in Particular**
**BMT/18/4**
**Eighteenth Session  
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**COOPERATION BETWEEN INTERNATIONAL ORGANIZATIONS**
*Document prepared by the Office of the Union*
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**EXECUTIVE SUMMARY**

1. The purpose of this document is to report developments concerning cooperation between international organizations on molecular methodologies.

2. The BMT is invited to:

(a) consider whether relevant elements from the World Seed Partnership and the FAQ on the use of molecular techniques in the examination of DUS, as presented in the Annexes I and II to this document, respectively, could be a good basis for the Office of the Union to develop a draft of a joint document explaining the principal features of the systems of OECD, UPOV and ISTA, in consultation with the OECD;

(b) consider the elements for an inventory on the use of molecular marker techniques, by crop, proposed by the Office of the Union, as set out in paragraph 24 of this document;

(c) note that, on the basis of the comments received from the TWPs and BMT, proposed elements for the inventory on the use of molecular marker techniques will be presented for consideration by the TC, at its fifty-fifth session, as set out in paragraph 25 of this document;

(d) note that, subject to agreement by the TC, at its fifty-fifth session, and in coordination with the OECD, a circular will be issued to request members of the Union to complete a survey as a basis to develop an inventory on the use of molecular marker techniques, by crop, as set out in paragraph 26 of this document; and

(f) develop lists of possible joint initiatives with OECD and ISTA in relation to molecular techniques for consideration by the TC at its fifty-fifth session.

3. The following abbreviations are used in this document:

|       |  |
|-------|--|
| BMT:  | Working Group on Biochemical and Molecular Techniques, and DNA-Profiling in Particular |
| TC:   | Technical Committee  |
| TWA:  | Technical Working Party for Agricultural Crops   |
| TWC:  | Technical Working Party on Automation and Computer Programs                            |
| TWF:  | Technical Working Party for Fruit Crops  |
| TWO:  | Technical Working Party for Ornamental Plants and Forest Trees                         |
| TWPs: | Technical Working Parties  |
| TWV:  | Technical Working Party for Vegetables   |
| OECD: | Organization for Economic Co-operation and Development                                 |
| ISO:  | International Organization for Standardization   |
| ISTA: | International Seed Testing Association   |

4. The structure of this document is as follows:

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## BACKGROUND

### Developments at the BMT

5. The Working Group on Biochemical and Molecular Techniques, and DNA-Profiling in Particular (BMT), at its seventeenth session, held in Montevideo, Uruguay, from September 10 to 13, 2018, considered document BMT/17/3 “Cooperation between International Organizations” (see document BMT/17/25 “Report”, paragraphs 54 and 55).

6. The BMT noted that International Seed Testing Association (ISTA) was not in a position to agree to the proposed joint activities with UPOV and the Organisation for Economic Co-operation and Development (OECD) at that time and agreed to propose to the Technical Committee (TC) that UPOV and OECD should make progress on the matters previously agreed by the TC, namely:

(a) to develop a joint document explaining the principal features of the systems of the OECD, UPOV and ISTA;

(b) to develop an inventory on the use of molecular marker techniques, by crop, with a view to developing a joint OECD/UPOV/ISTA document containing that information, in a similar format to UPOV document UPOV/INF/16 “Exchangeable Software”, subject to the approval of the Council and in coordination with OECD and ISTA; and

(c) the proposal for the BMT, at its fifteenth session, to develop lists of possible joint initiatives with OECD and ISTA in relation to molecular techniques for consideration by the TC.

7. The BMT agreed that ISTA should be welcomed to join the above initiatives as and when it was in a position to do so.

### Developments at the fifty-fourth session of the Technical Committee

8. The TC, at its fifty-fourth session, held in Geneva, on October 29 and 30, 2018, agreed that UPOV and OECD should make progress on the matters previously agreed by the TC (see document TC/54/31 Corr. “Report”, paragraph 268), namely:

(a) to develop a joint document explaining the principal features of the systems of the OECD, UPOV and ISTA;

(b) to develop an inventory on the use of molecular marker techniques, by crop, with a view to developing a joint OECD/UPOV/ISTA document containing that information, in a similar format to UPOV document UPOV/INF/16 “Exchangeable Software”, subject to the approval of the Council and in coordination with OECD and ISTA; and

(c) the BMT to develop lists of possible joint initiatives with OECD and ISTA in relation to molecular techniques for consideration by the TC.

9. The TC agreed to invite the BMT and the Technical Working Parties (TWPs) to develop an inventory on the use of molecular marker techniques, by crop, with a view to developing a joint OECD/UPOV/ISTA document containing that information, in a similar format to document UPOV/INF/16 “Exchangeable Software” (see document TC/54/31 Corr. “Report”, paragraph 269).
10. The TC agreed to request the BMT to develop a joint document explaining the principal features of the systems of the OECD, UPOV and ISTA (see document TC/54/31 Corr. “Report”, paragraph 270).
11. The TC, agreed to invite ISTA to join the initiatives when in position to do so (see document TC/54/31 Corr. “Report”, paragraph 267).
12. Developments concerning these matters are presented in the following sections.

#### JOINT DOCUMENT EXPLAINING THE PRINCIPAL FEATURES OF THE SYSTEMS OF OECD, UPOV AND ISTA

##### Proposal

13. The BMT may wish to consider whether relevant elements from the World Seed Partnership and the FAQ on the use of molecular techniques in the examination of DUS, as presented in Annexes I and II to this document, respectively, could be a basis for the Office of the Union to develop a draft of a joint document explaining the principal features of the systems of OECD, UPOV and ISTA, in consultation with OECD.

*14. The BMT is invited to consider whether relevant elements from the World Seed Partnership and the FAQ on the use of molecular techniques in the examination of DUS, as presented in Annexes I and II to this document, respectively, could be a basis for the Office of the Union to develop a draft of a joint document explaining the principal features of the systems of OECD, UPOV and ISTA, in consultation with OECD.*

#### INVENTORY ON THE USE OF MOLECULAR MARKER TECHNIQUES, BY CROP

15. The Technical Working Party for Ornamental Plants and Forest Trees (TWO), at its fifty-first session, held in Christchurch, New Zealand, from February 18 to 22, 2019, the Technical Working Party for Vegetables (TWV), at its fifty-third session, held in Seoul, Republic of Korea, from May 20 to 24, 2019, the Technical Working Party for Fruit Crops (TWF), at its fiftieth session, held in Budapest, Hungary, from June 24 to 28, 2019, and the Technical Working Party for Agricultural Crops (TWA), at its forty-eighth session, held in Montevideo, Uruguay, from September 16 to 20, 2019, considered the following elements for the inventory on the use of molecular marker techniques, by crop, which had been developed in consultation with the OECD:

|   |
|---|
| Country or Intergovernmental Organization using molecular marker technique  |
| Source [the name of the Authority] and Contact details [email address]  |
| Type of molecular marker technique  |
| Crop (s) for which the molecular marker technique is used<br>[botanical name(s) and UPOV code(s) to be provided]  |
| Purpose of the use of the molecular technique [UPOV model “Characteristic-Specific Molecular Markers”, UPOV model “Combining Phenotypic and Molecular Distances in the Management of Variety Collections”, Purity, Identity, Verification of hybridity] |
| Is the molecular marker technique used as part of Seed Certification in the last two years? [National certification, OECD certification] [relevant for OECD seed schemes]   |
| In the last 2 years, how many times did the Authority use the molecular marker techniques?  |
| The molecular marker technique is covered by [UPOV Test Guideline(s), UPOV TGP document(s), other document(s) (please specify)]   |
| Is the molecular technique validated? [If yes, please specify a particular organization or authority] [relevant for OECD seed schemes]  |

16. The TWO, at its fifty-first session, endorsed the above elements for the inventory on the use of molecular marker techniques, by crop (see document TWO/51/12 “Report”, paragraphs 42 to 43).

17. The TWO agreed that the term “identity” should be clarified to include the verification of conformity of plant material to a protected variety for the exercise of breeders’ rights. The TWO also agreed to propose that information on molecular markers should provide details on source and availability of the marker, such as whether it was a publicly available or a proprietary marker.

18. The TWV, at its fifty-third session, endorsed the elements in document TWP/3/7 for the inventory on the use of molecular marker techniques, by crop, proposed by the Office of the Union, with the following additions to reflect the current status of molecular marker techniques (i.e. already in use or in development. (highlighted in grey) (see document TWV/53/14 Rev. “Report”, paragraph 48):

|   |
|---|
| Status (i.e. in current use or in development)  |
| Crop(s) for which the molecular marker technique is used and characteristic concerned (in the case of use)<br>[botanical name(s) and UPOV code(s) to be provided] |

19. The TWF, at its fiftieth session, endorsed the elements for the inventory on the use of molecular marker techniques, by crop, proposed in document TWP/3/7, with the additions suggested by the TWV at its fifty-third session, to reflect the current status of molecular marker techniques (i.e. already in use or in development) (see document TWF/50/13 “Report”, paragraph 63).

20. The TWA endorsed the elements for the inventory and agreed that the meaning of the term “validation” should be clarified in the last question. The TWA agreed that the question could lead to confusion and should be considered for exclusion from the survey.

21. The TWA agreed that the question “In the last 2 years, how many times did the Authority use the molecular marker techniques?” should be clarified to explain whether the value provided referred to routine or exceptional use of the technique (e.g. screening of variety collections).

22. The TWA agreed to propose an additional question on whether respondents had constituted databases with information obtained from the molecular markers used.

23. The TWA agreed that the survey should be coordinated with OECD to avoid duplication of work, in particular when the same respondents would also receive the survey from UPOV.

#### Proposal

24. The BMT may wish to consider the following elements be considered as the basis for an inventory on the use of molecular marker techniques, by crop, in conjunction with the comments made by the TWA, TWF, TWO and TWV, as set out in paragraphs 16 to 23:

|   |
|---|
| Country or Intergovernmental Organization using molecular marker technique  |
| Source [the name of the Authority] and Contact details [email address]  |
| Type of molecular marker technique  |
| Crop (s) for which the molecular marker technique is used<br>[botanical name(s) and UPOV code(s) to be provided]  |
| Purpose of the use of the molecular technique [UPOV model “Characteristic-Specific Molecular Markers”, UPOV model “Combining Phenotypic and Molecular Distances in the Management of Variety Collections”, Purity, Identity, Verification of hybridity] |
| Is the molecular marker technique used as part of Seed Certification in the last two years? [National certification, OECD certification] [relevant for OECD seed schemes]   |
| In the last 2 years, how many times did the Authority use the molecular marker techniques?  |
| The molecular marker technique is covered by [UPOV Test Guideline(s), UPOV TGP document(s), other document(s) (please specify)]   |
| Is the molecular technique validated? [If yes, please specify a particular organization or authority]<br>[relevant for OECD seed schemes]   |

25. On the basis of the comments received from the TWPs and BMT, the proposed elements for the inventory on the use of molecular marker techniques will be presented for consideration by the TC at its fifty-fifth session, to be held in Geneva on October 28 and 29, 2019.

26. Subject to agreement by the TC at its fifty-fifth session, and in coordination with the OECD, a circular will be issued to request members of the Union to complete the survey as a basis to develop the inventory on the use of molecular marker techniques, by crop.

27. *The BMT is invited to:*

(a) *consider the elements for an inventory on the use of molecular marker techniques, by crop, proposed by the Office of the Union, as set out in paragraph 24 of this document;*

(b) *note that, on the basis of the comments received from the TWPs and BMT, proposed elements for the inventory on the use of molecular marker techniques, will be presented for consideration by the TC at its fifty-fifth session, as set out in paragraph 25 of this document; and*

(c) *note that, subject to agreement by the TC, at its fifty-fifth session, and in coordination with the OECD, a circular would be issued to request members of the Union to complete a survey as a basis to develop an inventory on the use of molecular marker techniques, by crop, as set out in paragraph 26 of this document; and*

#### LISTS OF POSSIBLE JOINT INITIATIVES WITH OECD AND ISTA IN RELATION TO MOLECULAR TECHNIQUES

28. The BMT may wish to consider possible joint initiatives with OECD and ISTA in relation to molecular techniques, for consideration by the TC, at its fifty-fifth session.

29. *The BMT is invited to develop lists of possible joint initiatives with OECD and ISTA in relation to molecular techniques for consideration by the TC at its fifty-fifth session.*

[Annexes follow]

## RELEVANT ELEMENTS FROM THE WORLD SEED PARTNERSHIP

### What is the World Seed Partnership?

The World Seed Partnership is host to a group of international organizations that closely collaborate on seed systems for sustainable agriculture. Below are short summaries and full profiles of participating organizations.

### The Organisation for Economic Co-operation and Development (OECD)

Type of Organization  
intergovernmental

OECD Seed Schemes  
Participating countries

#### Mission

The OECD Seed Schemes provide an international framework for the varietal certification of agricultural seed moving in international trade. The Schemes were established in 1958 driven by a combination of factors including a fast growing seed trade, regulatory harmonisation in Europe, the development of off season production, the seed breeding and production potential of large exporting countries in America (North and South) and Europe, and the support of private industry. Membership of the Schemes is voluntary and participation varies. There are eight agricultural Seed Schemes.

#### Objectives

- to encourage the production and use of “quality-guaranteed” seed in participating countries. The Schemes authorise the use of labels and certificates for seed produced and processed for international trade according to agreed principles ensuring varietal identity and purity.
- to facilitate the import and export of seed, by the removal of technical barriers to trade by assuring identification and origin through internationally recognised labels (“passports”) for trade. They also lay down guidelines for seed multiplication abroad, as well as for the delegation of some control activities to the private sector (“authorisation”). The quantity of seed certified through the OECD Schemes has grown rapidly in recent years and now exceeds 1 million tonnes.

#### How do the Seed Schemes operate

The success of international certification depends upon close co-operation between maintainers, seed producers, traders and the designated authority (appointed by the government) in each participating country. Frequent meetings allow for a multi-stakeholder dialogue to exchange information, discuss case studies, revise rules and update the Schemes. A wide range of international and non-governmental organisations as well as seed industry networks participate actively in the Schemes.

#### Benefits of the Schemes

- To facilitate international trade by using harmonised certification procedures, crop inspection techniques and use of control plots. The varietal purity standards for the appropriate species are also agreed and standardised by all member states.
- To provide a framework to develop seed production with other countries or companies.
- To participate in the elaboration of international rules for seed certification.
- To develop collaboration between the public and private sectors.
- To benefit from regular exchanges of information with other national certification agencies and Observer organisations.

The Annual List of Varieties eligible for OECD certification includes varieties which are officially recognized as distinct, uniform and stable, and possess an acceptable value in one or more participating country. The List contains the seed varieties internationally traded using the OECD seed Schemes. The number of varieties included has grown steadily over the last thirty years.

## International Union for the Protection of New Varieties of Plants (UPOV)

Type of Organization  
Intergovernmental

Membership

[List of UPOV members](#) / [Situation in UPOV](#)

What is UPOV?

The International Union for the Protection of New Varieties of Plants (UPOV) is an intergovernmental organization based in Geneva, Switzerland. UPOV was established in 1961 by the International Convention for the Protection of New Varieties of Plants (the "UPOV Convention").

The mission of UPOV is to provide and promote an effective system of plant variety protection, with the aim of encouraging the development of new varieties of plants, for the benefit of society.

The UPOV Convention provides the basis for members to encourage plant breeding by granting breeders of new plant varieties an intellectual property right: the breeder's right.

What does UPOV do?

UPOV's mission is to provide and promote an effective system of plant variety protection, with the aim of encouraging the development of new varieties of plants, for the benefit of society. The main objectives of UPOV are, in accordance with the UPOV Convention, to:

- provide and develop the legal, administrative and technical basis for international cooperation in plant variety protection;
- assist States and organizations in the development of legislation and the implementation of an effective plant variety protection system; and
- enhance public awareness and understanding of the UPOV system of plant variety protection.

What are the benefits of plant variety protection and UPOV membership?

The UPOV Report on the Impact of Plant Variety Protection demonstrated that in order to enjoy the full benefits which plant variety protection is able to generate, both implementation of the UPOV Convention and membership of UPOV are important. The introduction of the UPOV system of plant variety protection and UPOV membership were found to be associated with:

- (a) increased breeding activities,
- (b) greater availability of improved varieties,
- (c) increased number of new varieties,
- (d) diversification of types of breeders (e.g. private breeders, researchers),
- (e) increased number of foreign new varieties,
- (f) encouraging the development of a new industry competitiveness on foreign markets, and
- (g) improved access to foreign plant varieties and enhanced domestic breeding programs.

In order to become a UPOV member the advice of the UPOV Council in respect of the conformity of the law of a future member with the provisions of the UPOV Convention is required. This procedure leads, in itself, to a high degree of harmony in those laws, thus facilitating cooperation between members in the implementation of the system.

## International Seed Testing Association (ISTA)

Type of Organization  
Non-profit and non-political association

ISTA Profile

ISTA is an international association that represents the seed quality sampling and testing organizations and laboratories at the world level.

ISTA Members

[List of ISTA Members](#)

Mission

ISTA was founded in 1924 with the aim of developing and publishing standard procedures in the field of seed testing. ISTA members work together to achieve their vision of uniformity in seed quality evaluation worldwide.

## Core tasks

1. Development and maintenance of the ISTA International Rules for Seed Testing  
The International Rules for Seed Testing (ISTA Rules), adopted and updated on an annual basis, today contain seed sampling and quality analysis methodologies for more than 900 different agricultural, forest, vegetable and flower species. The ISTA Rules are reviewed and updated on an annual basis by 18 technical committees. The technical committees comprise seed scientists and technologists from the public and the private sectors from all over the world.
2. Accreditation of seed testing laboratories worldwide  
The ISTA accreditation program ensures that seed testing laboratories achieve accurate and reproducible results in their daily analysis work. The basis for the accreditation programme is the ISTA Accreditation Standard. Every third year, an accredited laboratory is audited by two ISTA auditors. Monitoring of laboratory performance through the ISTA Proficiency Test Programme ensures that the quality of ISTA-accredited laboratories remains high between audits. Each year between five and ten workshops, run by the technical committees, provide training and professional development for seed analysts.
3. Distribution of uniform certificates of seed-testing results to facilitate international seed trade  
Only ISTA-accredited laboratories are authorized to issue ISTA Certificates for seed analysis. The ISTA certificates provide the user with a seed analysis result they can trust is reproducible, true and, and for the Orange International Seed Lot Certificate represents the quality of the seed lot from which the sample tested was drawn.
4. Exchange and dissemination of results of scientific research in various seed symposia, seminars and scientific journals  
ISTA serves as a platform for seed scientists around the world to compare the results of their research and discuss important developments in seed science and technology, through both regular seed symposia and its own scientific journal, Seed Science and Technology.

## International Seed Federation (ISF)

### What is ISF?

ISF is a non-governmental, non-profit making organization that represents the interests of national seed associations and seed companies at a global level. Established in 1924, the International Seed Federation has more than 7500 members in 70 countries today. Working in partnership with organizations responsible for international treaties, conventions and agreements and those that shape policies that impact the seed industry, ISF ensures that the seed industry speaks with one voice.

### Vision & Mission

- Vision: "A world where the best quality seed is accessible to all, supporting sustainable agriculture and food security."
- Mission: "To create the best environment for the global movement of seed and promote plant breeding and innovation in seed."

### Objectives

ISF's strategic objectives are set out in its 5-year Strategic Plan, and relate to the core areas of its work.

#### 1. Innovation

To move towards more consistent policies for products developed through the latest plant breeding methods to enable their use and to ensure uninterrupted trade.

#### 2. Movement of Seed & Quality Seed

- To promote the harmonization of technically and scientifically justified frameworks for phytosanitary measures and to prevent them becoming non-tariff trade barriers.
- To promote the harmonization of regulations governing seed applied technologies at global and regional levels.
- To promote the use of seed certification schemes and seed quality assurance systems.

#### 3. Intellectual Property Rights

- To facilitate cooperation between countries in order to simplify procedures for plant variety protection at an international level.
- To support members in implementing effective intellectual property rights in their countries.
- To promote the International Treaty as the preferred tool to administer Plant Genetic Resources for Food and Agriculture (PGRFA), making the process more business-oriented and user-friendly.

4. Biodiversity

- To promote the International Treaty as the preferred tool to administer Plant Genetic Resources for Food and Agriculture (PGRFA), making the process more business-oriented and user-friendly.

5. Engagement

- To engage with our members to strengthen cooperation so that the seed industry speaks with one voice.
- To engage with all stakeholders in the value chain to foster cooperation.
- To raise awareness and build understanding of the seed industry and the benefits it brings to a global society.

What does ISF do?

- ISF facilitates the free movement of seed within a framework of fair and science-based regulations, whilst serving the interests of farmers, growers, industry and consumers.
- ISF promotes the establishment and protection of intellectual property rights for seeds, plant varieties and associated technologies.
- ISF publishes rules for trading seed and licensing technology to clarify and standardize contractual relations between buyers and sellers at an international level.
- ISF provides for the settlement of disputes through mediation, conciliation and/or arbitration.
- ISF fosters cooperation and collaboration through its calendar of events, enabling seed industry stakeholders to identify issues, stimulate strategic thinking and accelerate the adoption of common positions.
- ISF works in partnership with organizations responsible for international treaties, conventions and agreements and those that shape the policies affecting the global seed industry.

Source: <http://www.worldseedpartnership.org/>

[Annex II follows]

FAQ ON THE USE OF MOLECULAR TECHNIQUES IN THE EXAMINATION OF DUS

Does UPOV allow molecular techniques (DNA profiles) in the examination of Distinctness, Uniformity and Stability (“DUS”)?

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)”.

<https://www.upov.int/about/en/faq.html#QB80>

[End of Annex II and of document]