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INTERNATIONAL UNION FOR THE PROTECTION OF NEW VARIETIES OF PLANTS

Geneva

TECHNICAL WORKING PARTY ON AUTOMATION AND COMPUTER PROGRAMS**Thirty-Third Session
Natal, Brazil, June 30 to July 3, 2015**

REVISION OF DOCUMENT TGP/8: PART II: SELECTED TECHNIQUES USED IN DUS EXAMINATION,
NEW SECTION: DATA PROCESSING FOR THE ASSESSMENT OF DISTINCTNESS AND FOR
PRODUCING VARIETY DESCRIPTIONS

Document prepared by the Office of the Union

Disclaimer: this document does not represent UPOV policies or guidance

EXECUTIVE SUMMARY

1. The purpose of this document is to present developments concerning the possible development of guidance on data processing for the assessment of distinctness and for producing variety descriptions.
2. The TWC is invited to:
 - (a) note that the TWC and the TWA agreed that the guidance on "Different forms that variety descriptions could take and the relevance of scale levels", as reproduced in Annex I of this document, should be used as an introduction to future guidance to be developed on data processing for the assessment of distinctness and for producing variety descriptions;
 - (b) consider information with regard to the steps used in the procedure to obtain the calculated results in order to clarify the methods used that would be provided by those participants to the practical exercise;
 - (c) consider the comparison of results of the practical exercise presented by the different participants to identify differences in the results obtained for further understanding of the different methodologies provided by an expert from France;
 - (d) note that information on the methods used for data processing for the assessment of distinctness and for producing variety descriptions in China will be considered under agenda item 10 "Information on the methods used for data processing for the assessment of distinctness and for producing variety descriptions in China" of the agenda (see document TWC/33/23 "Application Management System (AMS) and Variety Description Database (VDD) in China").
 - (e) note that the European Union reported to the Technical Committee that the project on a ring test on Apple for the management of variety description to be launched in 2015 has been suspended.

3. The following abbreviations are used in this document:

CAJ:	Administrative and Legal Committee
TC:	Technical Committee
TC-EDC:	Enlarged Editorial 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
TWV:	Technical Working Party for Vegetables
TWPs:	Technical Working Parties

4. The structure of this document is as follows:

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DIFFERENT FORMS THAT VARIETY DESCRIPTIONS COULD TAKE AND THE RELEVANCE OF SCALE LEVELS

5. The TC, at its fiftieth session, held in Geneva from April 7 to 9, 2014, agreed to invite an expert from Germany to develop a text to explain the different forms that variety descriptions could take and the relevance of scale levels in that regard (see document TC/50/36 “Report on the Conclusions”, paragraph 56).

6. In response to the request of the TC, the expert from Germany provided a text on the different forms that variety descriptions could take and the relevance of scale levels which is presented in Annex I to this document.

7. The TWO, TWF and TWV noted the explanation of the different forms that variety descriptions could take and the relevance of scale levels in that regard, as reproduced in Annex I to this document (see documents TWO/47/28 “Report”, paragraph 49 TWF/45/32 “Report”, paragraph 39 and TWV/48/43 “Report”, paragraph 45).

8. The TWC and the TWA received an explanation by an expert from Germany on “Different forms that variety descriptions could take and the relevance of scale levels”, as reproduced in Annex I of this document, and agreed that it should be used as an introduction to future guidance to be developed on this matter (see documents TWC/32/28 “Report”, paragraph 28 and TWA/43/27 “Report”, paragraph 42).

PRACTICAL EXERCISE WITH A COMMON DATA SET

Background

9. The Technical Committee (TC), at its forty-eighth session, held in Geneva from March 26 to 28, 2012, considered Annex III: "TGP/8 PART I: DUS Trial Design and data analysis, New Section 6 – Data processing for the assessment of distinctness and for producing variety Descriptions" in conjunction with Annex VIII: "TGP/8 PART II: Techniques used in DUS Examination, New Section 13 - Methods for data processing for the assessment of distinctness and for producing variety descriptions" of document TC/48/19 Rev. It agreed that the information provided in Annex VIII of document TC/48/19 Rev. and at the UPOV DUS Seminar, held in Geneva in March 2010, together with the method provided by Japan and the method used in France for producing variety descriptions for herbage crops, as presented at the TWC at its twenty-sixth session (see document TWC/26/15, TWC/26/15 Add. and TWC/26/24), provided a very important first step in developing common guidance on data processing for the assessment of distinctness and for producing variety descriptions, but concluded that the information as presented in Annex VIII of document TC/48/19 Rev. would not be appropriate for inclusion in document TGP/8. It agreed that the Office of the Union should summarize the different approaches set out in Annex VIII of document TC/48/19 Rev. with regard to aspects in common and aspects where there was divergence. As a next step, on the basis of that summary, consideration could be given to developing general guidance. The TC agreed that the section should include examples to cover the range of variation of characteristics. It further agreed that the detailed information on the methods should be made available via the UPOV website, with references in document TGP/8 (see document TC/48/22 "Report on the Conclusions" paragraph 52).

10. At their sessions in 2012, the TWPs received a presentation prepared by the Office of the Union on "Summary of different approaches of transformation of measurements into notes for Variety Description", as reproduced in the Annex I of document TC/50/25 "Revision of document TGP/8: Part II: Selected Techniques Used in DUS Examination, New Section: Data Processing for the Assessment of Distinctness and for Producing Variety Descriptions".

11. The TWC, at its thirtieth session, held in Chisinau, Republic of Moldova, from June 26 to 29, 2012, agreed that the experts from Finland, Italy and the United Kingdom would support the Office of the Union to summarize the different approaches for further developing common guidance on data processing for the assessment of distinctness and for producing variety descriptions (see document TWC/30/41 "Report", paragraph 42). It also agreed that experts from the United Kingdom in cooperation with experts from France and Germany should conduct a practical exercise. The exercise would be to process a common data set to produce variety descriptions in order to determine the aspects in common and where there was divergence among the methods (see document TWC/30/41 "Report", paragraph 43)

12. In response to the request for a common data set, the Office of the Union received data sets of Chrysanthemum, Pea and Flax from Japan, the Netherlands and France respectively. In the first instance, it was concluded that the practical exercise should be conducted with a data set for flax, provided by experts from France, on the basis that the data was sufficiently comprehensive and structured in a way that should allow the exercise to be completed by all interested UPOV members.

13. On December 20, 2013, a request was issued to France, Germany, Italy, Japan, Netherlands, Republic of Korea and United Kingdom, inviting them to apply their methods to the flax data provided for a single characteristic (Stem: length from cotyledon scar to top boll) for the years 2002-2012.

14. The TC, at its fiftieth session, agreed that the experts from France, Germany, Italy, Japan, Netherlands, Republic of Korea and United Kingdom should provide the results on the practical exercise to the Office of the Union and noted the plans for a summary of aspects in common and divergences between the methods to be presented to the TWPs in 2014 and to the TC at its fifty-first session (see document TC/50/36 "Report on the Conclusions", paragraph 57).

15. The TC, on the basis of the results of the practical exercise, would be invited to consider whether to develop guidance on data processing for the assessment of distinctness and for producing variety descriptions that would be relevant for different types of propagation (see document TC/50/36 "Report on the Conclusions", paragraph 58).

16. Results were received from France, Germany, Italy and United Kingdom. All available results were presented to the TWC at its thirty-second session, held in Helsinki, Finland from June 3 to 6, 2014 (see document TWC/32/18 Add.).

Consideration by the Technical Working Parties in 2014

17. The TWO, TWF, TWC, TWV and TWA considered documents TWO/47/18, TWF/45/18, TWC/32/18, TWV/48/18, TWA/43/18 "Revision of Document TGP/8: Part II: Selected Techniques Used in DUS Examination, New Section: Data Processing for the Assessment of Distinctness and for Producing Variety Descriptions" (see document TWO/47/28 "Report", paragraphs 47 to 51, document TWF/45/32 "Report", paragraphs 37 to 41, document TWC/32/28 "Report", paragraphs 25 to 33, document TWV/48/43 "Report", paragraphs 43 to 48 and document TWA/43/27 "Report", paragraphs 40 to 44).

18. The TWF received a presentation from an expert from New Zealand on the project for "apple reference varieties", as reproduced in Annex II to this document. The TWF noted the importance of the quality of the Test Guidelines in providing good consistent characteristics, and a complete set of example varieties ensuring harmonized variety descriptions (see document TWF/45/32 "Report", paragraph 38).

19. The TWF received information from an expert from the European Union on a ring test project on Apple for the management of variety description to be launched in 2015. The aim of the project was to identify the reason for differences in variety description between offices in Europe, when using similar varieties and the same rootstock. The TWF requested an expert from the European Union to report on progress with this project at its forty-sixth session (see document TWF/45/32 "Report", paragraph 29).

20. The TWC noted that the descriptions of the methods used in France, Germany, Japan and the United Kingdom were provided in the document considered in previous sessions of the TWC.

21. The TWC received a presentation by an expert from Italy on the Italian method for the development of variety descriptions, as reproduced in document TWC/32/18, Annex II.

22. The TWC agreed that the method presented by the expert from Italy had similarities with the method used in the United Kingdom. The TWC noted that the range of expression of the variety means was divided by the amount of notes used for a characteristic, but that in Italy the extreme notes were not always used (e.g. 1 and 9) allowing space for future progress in plant breeding.

23. The TWC considered the results of a practical exercise presented in document TWC/32/18 Add. and agreed to request those participants to the practical exercise to complement the information provided with regard to the steps used in the procedure to obtain the calculated results in order to clarify the methods used.

24. The TWC agreed to request an expert from France to compare the results of the practical exercise presented by the different participants to identify differences in the results obtained for further understanding of the different methodologies. The TWC agreed that the comparison of results should be presented for consideration at the next session of the TWC.

25. The TWC agreed to invite the expert from China to provide information on the methods used for data processing for the assessment of distinctness and for producing variety descriptions in China at the next session of the TWC (see document TWC/32/28 "Report", paragraphs 27 to 33). This item will be considered under agenda item 10 "Information on the methods used for data processing for the assessment of distinctness and for producing variety descriptions in China" of the agenda (see document TWC/33/23 "Application Management System (AMS) and Variety Description Database (VDD) in China").

26. The TWV recognized the importance of the expertise of the DUS examiners, and agreed that in the vegetable sector, measurements were rarely used, therefore the example given in document TWV/48/18 were not relevant for vegetables examination. It further agreed that experts from France, Netherlands and United Kingdom would provide a relevant example for vegetables crops (e.g. onion, pea) (see document TWV/48/43 "Report", paragraphs 48).

27. The TWV agreed on a ring test on lettuce for the management of DUS examinations to be launched in 2015 by experts from France, the Netherlands and other UPOV members. The aim would be to identify possible reasons for differences in DUS examination and variety descriptions for the same varieties. Participants would receive seed of five different varieties and instructions on the examination. The varieties would be described during the technical visit of the forty-ninth session of the TWV, and experts invited to compare the results with their own data (see document TWV/48/43 "Report", paragraph 37).

Consideration by the Technical Committee in 2015

28. The TC noted the information provided in document TC/51/19 “Revision of document TGP/8: Part II: Selected Techniques Used in DUS Examination, New Section: Data Processing for the Assessment of Distinctness and for Producing Variety Descriptions”.

29. The TC welcomed the proposal made by the TWC, as presented in paragraph 32 of document TC/51/19, to compare the results of the practical exercise presented by the different participants to identify differences in the results obtained for further understanding of the different methodologies, for consideration at the thirty-third session of the TWC, to be held in Natal, Brazil.

30. The European Union reported that the project on a ring test on Apple for the management of variety description to be launched in 2015 had been suspended because of the high costs involved (see document TC/51/39 “Report”, paragraphs 146 to 148).

Results of the Practical Exercise

31. On May 29, 2015, the Office received a document from an expert of France titled “Comparison of methods used for producing variety descriptions: Results of the Practical Exercise” as reproduced in Annex III to this document.

32. *The TWC invited to:*

(a) *note that the TWC and the TWA agreed that the guidance on “Different forms that variety descriptions could take and the relevance of scale levels”, as reproduced in Annex I of this document, should be used as an introduction to future guidance to be developed on data processing for the assessment of distinctness and for producing variety descriptions;*

(b) *consider information with regard to the steps used in the procedure to obtain the calculated results in order to clarify the methods used that would be provided by those participants to the practical exercise;*

(c) *consider the comparison of results of the practical exercise presented by the different participants to identify differences in the results obtained for further understanding of the different methodologies provided by an expert from France, as presented in Annex III to this document;*

(d) *note that information on the methods used for data processing for the assessment of distinctness and for producing variety descriptions in China will be considered under agenda item 10 “Information on the methods used for data processing for the assessment of distinctness and for producing variety descriptions in China” of the agenda (see document TWC/33/23 “Application Management System (AMS) and Variety Description Database (VDD) in China”); and*

(e) *note that the European Union reported to the Technical Committee that the project on a ring test on Apple for the management of variety description to be launched in 2015 had been suspended.*

[Annexes follow]

DIFFERENT FORMS THAT VARIETY DESCRIPTIONS COULD TAKE
AND THE RELEVANCE OF SCALE LEVELS

Document prepared by an expert from Germany




Variety descriptions can be based on different data depending on the purpose of the description. Different variety descriptions may be used for the assessment of distinctness or in the official document which forms the basis for granting protection. When variety descriptions are used for the assessment of distinctness it is important to take into account on which data the descriptions for different varieties are based. Special attention has to be given to the potential influence of years and locations.

The different forms of variety descriptions and their relevance for the assessment of distinctness can be classified according to the different process levels to look at a characteristic. The process levels are defined in document TGP/8: Part I: DUS trial design and data analysis. Section 2 (New): Data to be recorded (see TC/50/5, Annex II) as follows:

Table 5: Definition of different process levels to consider characteristics

Process level	Description of the process level
1	characteristics as expressed in trial
2	data for evaluation of characteristics
3	variety description

The process levels relevant for the assessment of distinctness are level 2 and 3. Any comparison between varieties in the same trial (same year(s), same location) is carried out on the actual data recorded in the trial. This approach relates to process level 2. If varieties are not grown in the same trial, they have to be compared on the basis of variety descriptions which relates to process level 3. In general, the identification of similar varieties to be included in the growing trial ("Management of variety collection") relates to process level 3, whereas data evaluation within the growing trial relates to process level 2.

Process level	Measurements (QN)	Visual assessment (QN/QL/PQ)	Remark
2	Values	Notes	Basis for comparison within the same trial
3	 Transformation into notes Notes	 Same Notes as in Process level 1 Notes  "Mean variety description"	Notes resulting from one year and location Basis for management of variety collection
	If varieties are assessed in several trials/years/locations mean descriptions can be established.		

In general, quantitative characteristics are influenced by the environment. An efficient way to reduce the environmental influence is the transformation of actual measurements into notes. The notes represent a standardized description of varieties in relation to example varieties (see TGP/7). In addition, the comparability of variety descriptions for varieties not tested in the same trial can be improved by calculating a mean description over several growing cycles. In particular, the mean description over several growing

cycles at the same location can provide a representative description related to the location. The calculation of a mean description over different locations should only be considered if the effects of the locations are very well known and variety x location interactions can be excluded for all characteristics. The calculation of mean descriptions over locations should be restricted to the cases where these conditions are fulfilled.

If variety descriptions from different growing trials are used for the assessment of distinctness - that means for the management of variety collections - it is important to take into account the origin of the different variety descriptions of the candidate variety and the varieties of common knowledge. The comparability of variety descriptions is influenced by many factors, for example:

- Description based on a single year or a mean over several years?
- Description based on the same location or different locations?
- Are the effects of the different location known?
- Varieties described in relation to the same variety collection or a variety collection which might cover a different range of variation?

The potential bias of variety descriptions due to environmental effects between candidate varieties and varieties in the variety collection have to be taken into account in the process of distinctness testing, and in particular, for the identification of varieties of common knowledge to be included in the growing trial.

[Annex II follows]

APPLE VARIETY REFERENCE PROJECT

New Zealand Plant Variety Rights
Office and Plant and Food Research



FIRST OBJECTIVE

To review the expression of 14 QN characters for 11 varieties routinely used for reference and example purposes.

All characteristics were taken from TG/14/9 2005 and varieties were selected on the basis of global availability, commercial significance in New Zealand and broad distribution with respect to time of harvest

CHARACTERISTICS

- Petiole length
- Leaf length
- Leaf width
- Leaf length/width ratio
- Flower diameter
- Time of beginning of flowering
- Time of fruit harvest
- Fruit size
- Fruit height
- Fruit width (diameter)
- Fruit height/width ratio
- Stalk length
- Depth of stalk cavity
- Width of stalk cavity
- Depth of eye basin
- Width of eye basin

VARIETIES

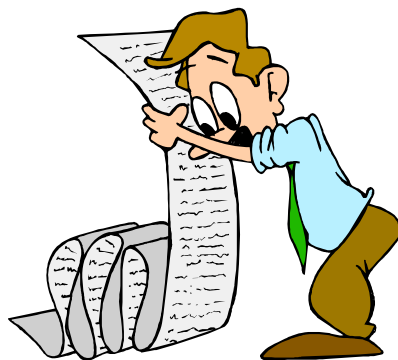
- Sunrise
- Cox's Orange Pippin
- Royal Gala (Tenroy)
- Pinova (Corail)
- Mariri Red
- Honeycrisp (Minnesota Crunch)
- Granny Smith
- Delblush
- Cripps Pink
- Burkitt Gala
- Aztec

METHODOLOGY

- Data was collected over three growing seasons beginning in spring 2011 and recently concluding in autumn 2014
- Each variety was represented by five trees in the variety collection
- Five samples for measurement were taken from each of the five trees
- The same principles used for DUS evaluation were applied to the assessment and data collection

PRELIMINARY RESULTS

With more to do.....



Vegetative Characteristics

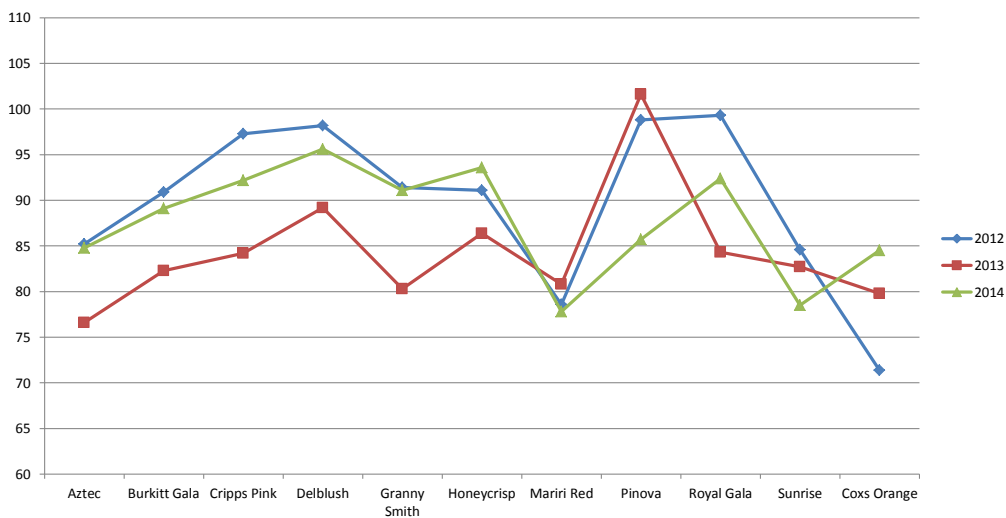
Petiole length, leaf width and leaf length/width ratio

Consistent between years for most varieties and compatible with previous data.

Leaf length Inconsistency between years for most varieties.

❖ Questionable reliability of expression for a number of varieties

Leaf blade: length 2012-2014



Fruit Characteristics

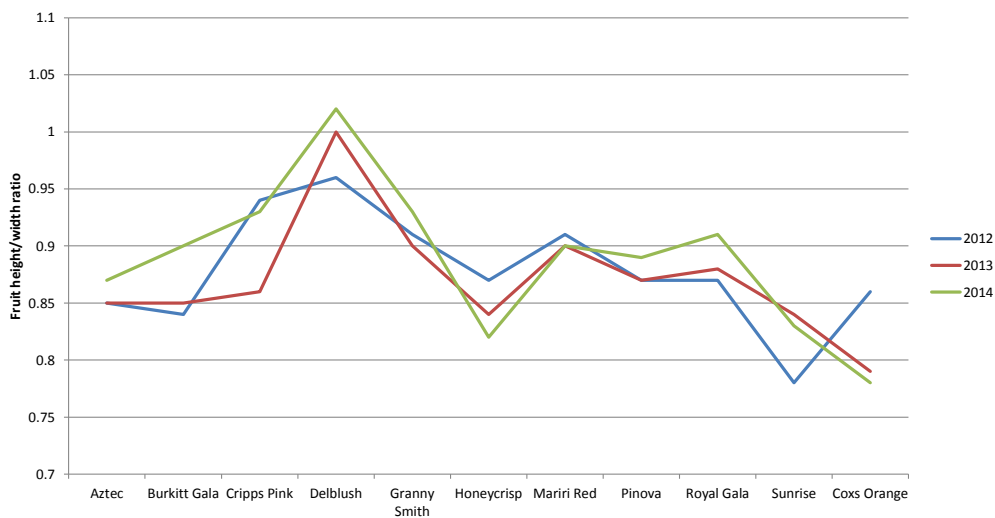
Height, width and height/width ratio

Consistent between years for most varieties and compatible with previous data.

Indicates a review of range of expression values

Size: Inconsistency between years for half the varieties. Requires further consideration and review range of expression values.

Fruit: height/width ratio 2012-2014



Stalk and Eye Basin Characteristics

Stalk length

Consistent between years for most varieties and compatible with previous data, however not fully compatible with TG/14/9

Stalk and eye basin depth and width

Consistent between years for most varieties

Reference to example varieties in TG/14/9

Overall the results were compatible with the example variety 'Cox's Orange' used in leaf width and flower diameter.

The results question the overall suitability of 'Granny Smith' and 'Pinova' as example varieties.

SECOND OBJECTIVE

To complete and improve variety descriptions for 10 significant non protected varieties .

The descriptions were drafted using TG/14/9 2005

VARIETIES

- Braeburn
- Cox's Orange Pippin
- Royal Gala
- Red Delicious Aversang
- Red Delicious Imperial
- Elstar
- Jonagold
- Golden Delicious
- Fuji
- Granny Smith

Why describe older varieties?

The ten varieties described are not and have never been protected in New Zealand and as a result had not been fully described using a UPOV TG

Their use continues as reference/example varieties and full descriptions now can be included in the database, providing more effective characteristic comparisons

AS STATED EARLIER

There is still more to
do.....

- Further analysis of characteristic and variety consistency
- Development of improved scales for range of expression and calibration of characteristics
- Updating the variety description database for apple
- Full review of example varieties and usage

COMPARISON OF METHODS USED FOR PRODUCING VARIETY DESCRIPTIONS: RESULTS OF THE PRACTICAL EXERCISE

Document prepared by an expert from France

1. The main purpose of this practical exercise is to help developing a common guidance by clarifying and comparing the different methods used by UPOV members to transform quantitative characteristics into notes.

Dataset : Description

2. A common dataset on Flax varieties was produced by experts from France for this practical exercise. The dataset is based on observations made on UPOV characteristic 21 (Stem: length from cotyledon scar to top boll). It's a restriction of a larger dataset, which finally has been restricted to observations on the first 20 plants of the varieties and years where 20 or more plants of the variety were observed in the year. This reduced common data set consists of 936 variety-by-year combinations for 153 reference varieties and 30 candidates in 10 years from 2002 to 2012, for which the variety-by-year means were calculated on the original scale of the characteristics.

Methods used by the UPOV members

3. The different methods used by UPOV members in order to assign notes to the candidate varieties are briefly summarized in the table below.

COUNTRY		Method : description	Example varieties	Crop expert judgment	Equal-spaced state
France	Method 1	Combined use of example varieties and reference collection	x		
	Method 2	Adjusted means from COY program + linear regression method calibrated with example varieties	x		
Italy		Average range of historical means + median used as "reference point" + partitioning into equal spaced states + calibration with crop expert judgment and example varieties	x	x	x
Germany		Adjusted mean from COY program + partitioning based on example varieties and crop expert judgment	x	x	
Japan		Adjusted Full Assessment Table (FAT) : states determined with historical data of example varieties	x		x
United Kingdom	Method 1	Range of expression of the over-year means for the reference collection varieties (for the past 10 years) divided into equal spaced states			x
	Method 2	Crop experts define delineating varieties whose over-year means are used to delineate each state		x	

4. We can first notice that all the UPOV members who performed the exercise use example varieties in their process to assign notes. In particular, the method used by Japan and the number 2 French method 2 rely directly on UPOV example varieties (or any other own example varieties), whereas UPOV example varieties are used by crop expert for final calibration in the German and the Italian methods.

5. Italy, Japan and United Kingdom (method 1) divide the total range of expression of the characteristic for the reference varieties into equal-spaced states in order to set a note and Italy and Japan also adjust each state according to crop expert judgment or example varieties.

Results by method

6. The table below shows the notes attributed to the 31 candidate varieties with each method.

Variety	Over-year mean	Note France method 1	Note France method 2	Note Italy	Note Germany 2012	Note Japan 2012	Note UK method 1	Note UK method 2	Average note by variety
Variety 262	381.7	1	1	1	1	2	1	1	1.1
Variety 287	405.7	-	-	1	2	3	1	1	1.6
Variety 263	400.7	2	2	1	2	3	1	1	1.7
Variety 284	413.4	-	-	1	2	3	2	2	2
Variety 283	437.1	-	-	2	2	4	2	2	2.4
Variety 288	478.1	4	4	2	3	4	3	3	3.3
Variety 275	512.2	4	4	2	4	5	3	3	3.6
Variety 290	489	5	-	3	4	4	3	3	3.7
Variety 289	490.4	5	-	3	4	4	3	3	3.7
Variety 303	505.6	5	-	3	4	4	3	3	3.7
Variety 269	516.2	4	4	2	4	5	3	4	3.7
Variety 297	518.8	5	-	3	4	5	3	4	4
Variety 302	524.6	5	-	3	4	5	4	4	4.2
Variety 277	544.1	5	5	3	4	5	4	4	4.3
Variety 274	550.2	5	5	3	4	5	4	4	4.3
Variety 228	663.5	6	6	5	6	7	6	5	5.9
Variety 270	693.8	7	7	5	6	7	7	6	6.4
Variety 293	706.6	6	-	6	7	7	7	7	6.7
Variety 267	723.8	7	8	5	7	7	7	7	6.9
Variety 295	733.3	7	-	6	7	8	7	7	7
Variety 268	733.1	7	8	-	7	7	7	7	7.2
Variety 273	739.9	8	8	6	8	8	7	7	7.4
Variety 300	756.6	7	-	7	7	8	8	8	7.5
Variety 299	769.2	7	-	7	7	8	8	8	7.5
Variety 291	760.5	7	-	7	7	8	8	8	7.5
Variety 292	741.3	8	-	6	8	8	7	8	7.5
Variety 272	760.6	8	8	6	7	8	8	8	7.6
Variety 294	763.7	8	-	7	8	8	8	8	7.8
Variety 298	807.5	9	-	7	8	9	9	9	8.5
Variety 301	840.3	9	-	8	9	9	9	9	8.8
Variety 296	839	9	-	8	9	9	9	9	8.8
Mean by method		6.1	5.4	4.3	5.4	6	5.2	5.3	
Standard deviation		2	2.4	2.3	2.3	2.1	2.7	2.7	

7. Only 13 out of the 31 candidate varieties have been noted with the French method 2 because this method requires having data of two years for the candidate varieties in order to calculate an adjusted mean with the COY program and then to assign the corresponding note.

8. The presence of both linseed and flax varieties in the complete dataset is responsible for a non-normal distribution with a peak of small varieties with low notes (linseed) and a peak of tall varieties with high notes (flax). Consequently, the probability for a candidate variety to obtain a medium note (between the two peaks) is low. That's why, for several methods, one of the medium note has never been attributed to a candidate variety. For example, with the Italian method, each note but the note 4 has been assigned to at least one candidate variety.

9. Some methods try to take into account the annual effect using COY adjusted means (French method 2, German method, UK method) or by calibrating their model with data of the year, as in the Japanese method with the FAT sliding adjustment or in the French method 1.

Comparison of the results

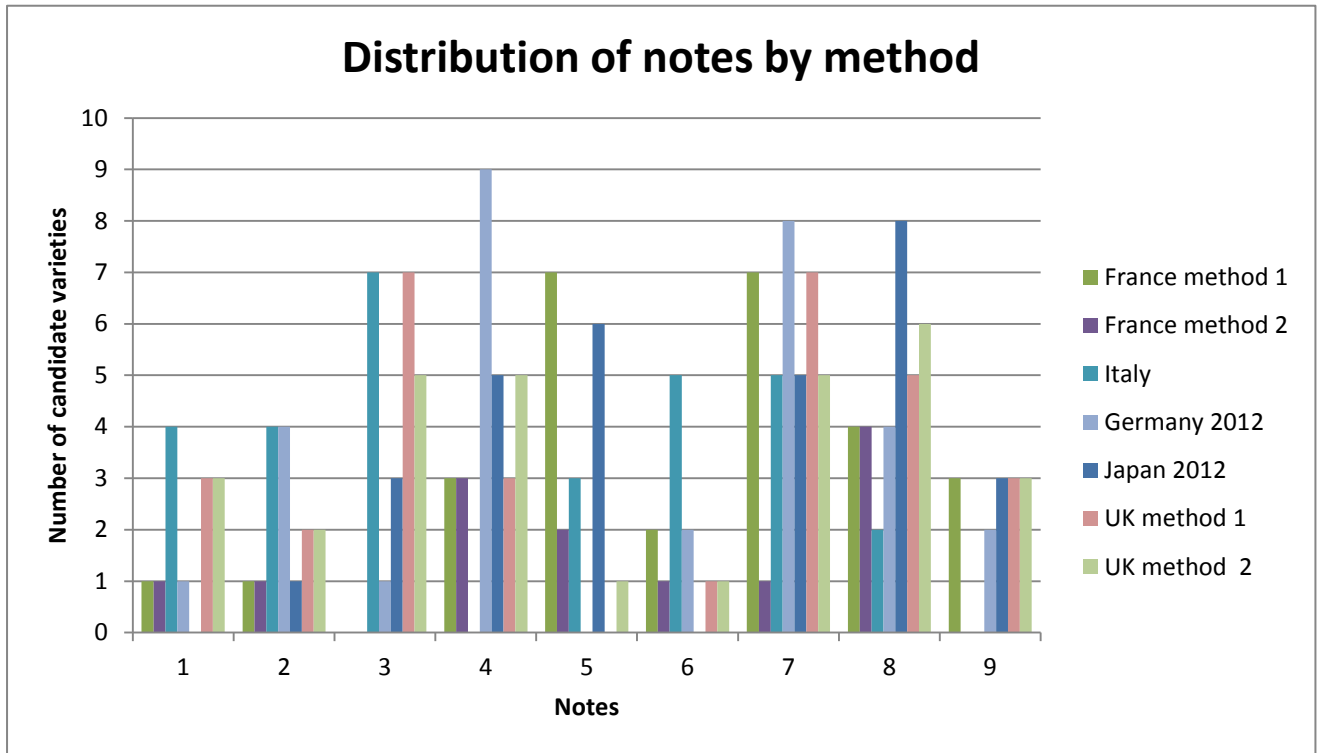


Figure 1 : Distribution of notes by method.

10. The graph above shows that the distribution of notes is not normally distributed in the tested methods. But in most of the cases, distributions reveal two distinct peaks, which correspond to the two kinds of varieties: the first one corresponds to linseed varieties (smaller varieties with low notes) and the second one to flax varieties (taller varieties with higher notes).

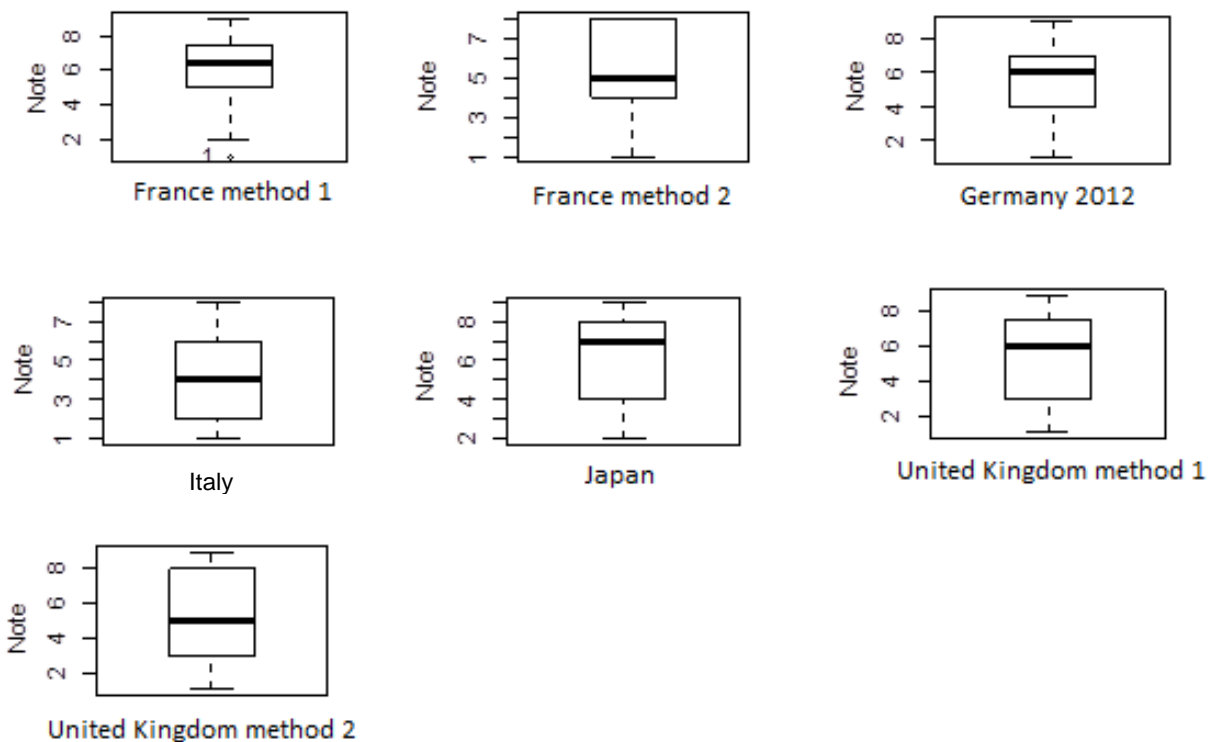


Figure 2 : Boxplot of notes for candidate varieties by method.

11. The boxplots show that the median of notes is higher with the Japanese method than the median of the French method 2 or the Italian method. 50% of the candidates' notes are concentrated between 2 and 6 with the Italian method.

12. The percentage of common notes between each pair of methods has been calculated (number of varieties with identical notes divided by number of varieties notated with both methods) and summarized in the table below.

Method	Note France method 2*	Note Italy*	Note Germany 2012	Note Japan 2012	Note UK method 1	Note UK method 2
Note France method 1*	84,6%	18,5%	57,1%	53,6%	39,3%	39,3%
Note France method 2*		8,3%	46,2%	46,2%	30,8%	23,1%
Note Italy*			16,7%	0,0%	26,7%	26,7%
Note Germany 2012				35,5%	48,4%	58,1%
Note Japan 2012					38,7%	38,7%
Note UK method 1						83,9%

Table 1: Percentage of candidate varieties with identical notes.

*: total number of candidate varieties notated inferior to 31 (28 for the French method 1, 13 for the French method 2, 30 for the Italian method)

13. The two French methods are the closest ones because 85% of the candidate varieties obtain the same note with these two methods. The Japanese method also shares nearly 50% of common notes with these two methods. These three methods seem to assign close descriptions.

14. The two UK methods give very similar results (84% of identical notes) and the German method is also close to both UK methods. This can define a second group of close methods.

15. The Italian method doesn't share many common notes with the other methods. In particular, the Japanese and the Italian methods appear to be quite distinct because they never produce identical notes for a candidate variety. A candidate variety obtains always a higher note with the Japanese method than with the Italian method. The average note for a candidate variety varies from 4,3 with the Italian method to 6,0 with the Japanese method. Moreover, the range of notes varies from 1 to 8 with the Italian method and from 2 to 9 in the case of the Japanese one.

16. All the methods have then been compared with a non-parametric test, namely the Wilcoxon signed rank test for paired samples, because the distributions are not normally distributed. According to that test, the notes obtained with these methods are significantly different from one method to another, except for the two French methods, each French method with the Japanese method, the two UK methods and each UK method with the German method. Therefore, we can consider three different groups: a first one composed by the two French methods and the Japanese method, a second composed by the two UK methods and the German method. The third group contains only the Italian method which seems to be significantly distinct from every other method. This confirms the groups previously defined on the percentage of common notes.

17. We can't distinguish a special common point between the methods used in each group.

Conclusion

18. The methods used by UPOV members to assign a note to the candidate varieties rely on a combination of division into equal-spaced states, use of the results of examples varieties and crop expert judgment.

19. The non-normal distribution of notes in most of the methods is explained by the composition of the dataset, which includes two different types of linseed and flax varieties among the candidate varieties.

20. Despite the diversity between the UPOV member methods, the notes set for the candidate varieties are finally close. Nevertheless, we can distinguish 3 groups of methods which are significantly different based on the Wilcoxon signed rank test for paired samples:

- the two French methods and the Japan method;
- the two UK methods and the German method; and
- the Italian method. On average, a note assigned by the Italian method is lower than with the others methods.

[End of Annex III and of document]