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INTERNATIONAL UNION FOR THE PROTECTION OF NEW VARIETIES OF PLANTS

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**TECHNICAL WORKING PARTY ON AUTOMATION AND
COMPUTER PROGRAMS****Thirtieth Session****Chisinau, Republic of Moldova, June 26 to 29, 2012****HANDLING MEASURED, QUANTITATIVE CHARACTERISTICS FOR VEGETABLE AND
HERBAGE CROPS TESTED IN THE UNITED KINGDOM***Document prepared by an expert from the United Kingdom*

1. 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 used in DUS examination: New Section 13 - Methods for data processing for the assessment 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 twenty-ninth session of the TWC in document TWC/29/14, 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. It 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, as presented in Annex VIII of document TC/48/19 Rev., should be made available via the UPOV website, with references in document TGP/8 (see document TC/48/22 "Report on conclusions", paragraph 52).

2. The Technical Working Party on Automation and Computer Programs (TWC), at its twenty-ninth session held in Geneva, from June 7 to June 10, 2011, agreed that the expert from the United Kingdom should update the information on the species presented in the method for data processing for the assessment distinctness and for producing variety descriptions from the United Kingdom and that it should be included in TGP/8, in conjunction with discussion on Annex VIII "TGP/8 Part II: Techniques used in DUS examination: New Section 13 - Methods for data processing for the assessment distinctness and for producing variety descriptions" of document TWC/29/14 concerning revision of document TGP/8 (see document TWC/29/31 "Report", paragraph 29).

3. The Annex to this document contains the updated information on the species presented in the above-mentioned method from the United Kingdom, in conjunction with Annex VIII of document TWC/29/14 and document TC/48/19 Rev..

[Annex follows]

ANNEX

HANDLING MEASURED, QUANTITATIVE CHARACTERISTICS FOR VEGETABLE AND HERBAGE CROPS TESTED IN THE UNITED KINGDOM

SUMMARY

3. For characteristics that are quantitative in expression and vary within varieties, distinctness is determined by comparison of variety means through statistical analysis. Such characteristics often arise in cross-pollinated species and in some self-pollinated species. To produce a variety description for the variety, the means for these characteristics are converted to notes by division of the range of expression of the characteristic into states. This may be done either so that the states are equally spaced, or by the use of delineating or example varieties.

METHOD

4. This document provides an explanation of how measured, quantitative characteristics are handled and used to develop variety descriptions in the United Kingdom for vegetable and herbage crops.

5. In vegetable and herbage crops, which are mostly cross-pollinated except for pea which is self-pollinated, the trials are conducted according to the UPOV Test Guidelines.

6. For the measured, quantitative characteristics, as part of the determination of distinctness, COYD is applied on the original scale of the characteristics.

7. To develop variety descriptions, over-year variety means are calculated on the original scale of the characteristics. These over-year means are then converted to notes.

8. For each crop the over-year variety means of the varieties in trial are calculated from their yearly means in trials. For herbage crops the past 10 years are used, whereas for vegetable crops all years are included in which the reference collection varieties have been tested. As not all varieties are present in all years, a fitted constants analysis is used to adjust the over-year means for the different years varieties were present in. This is done using the DUSTNT module FITC in conjunction with the module FIND.

9. The over-year means are converted to notes using the DUSTNT module VDES. This permits two methods of division of the range of expression into states and notes as follows, where the number of states is as given in the UPOV Test Guideline:-

- a) By use of delineating varieties to divide the range of expression into states.
- b) By division of the range of expression of the over-year means for the reference collection varieties into equal-spaced states.

These methods are illustrated by an example in Figures 1 and 2 respectively.

10. For vegetable crops excluding potato method (b) is used to divide the range of expression into states and notes, and for herbage crops method (a) is used.

11. For herbage crops the DUSTNT module SAME is used to check whether there are varieties with the same variety description.

12. For herbage crops the DUSTNT module MOST, is used in conjunction with the modules SSQR and DIST to find most similar varieties based on multivariate distances.

Figure 1: Example illustrating how Variety Descriptions are developed in the United Kingdom for Herbage crops using delineating varieties

Characteristic: UPOV No 20, Inflorescence: number of spikelets (see TG/4/8)

The five states for this characteristic are defined by the following delineating reference varieties (shown in bold in the table below).

Reference variety	Delineates
R2	Upper limit of state 1
R5	Lower limit of state 3
R10	Upper limit of state 3
R14	Lower limit of state 5

To obtain notes for the candidate varieties (C1...C5) for this characteristic, the over-year variety means of the candidate and reference varieties are calculated from their yearly means in a fitted constants analysis. The yearly and over-year variety means, sorted by the latter, are shown below.

As the yearly means for candidates C1 and C2 are between those for varieties R2 and R5, they have note 2.
As the yearly mean for candidate C3 is between those for varieties R10 and R14, it has note 4.
As the yearly mean for candidate C4 is between those for varieties R5 and R10, it has note 3.
As the yearly mean for candidate C5 is less than that for variety R2, it has note 1.

Reference variety	Yearly means										Over-year mean	Note
	1	2	3	4	5	6	7	8	9	10		
R1	*	*	*	22.4	23.1	20.4	22.8	23.7	20.8	22.3	21.95	1
R2	*	*	*	23.4	22.9	21.7	21.4	24.2	19.5	23.3	22.05	1
R3	*	*	*	*	*	22.3	21.4	24.6	20.1	23.1	22.20	2
R4	19.8	22.1	22.2	25.3	21.8	20.6	22.6	23.6	21.8	23.6	22.32	2
R5	21.2	23.1	23.8	24.7	23.7	23.7	23.8	25.3	21.7	24.6	23.55	3
R6	*	*	*	*	24.6	23.0	23.8	25.0	22.2	24.3	23.62	3
R7	*	*	*	*	*	21.5	25.9	24.7	23.1	25.2	23.98	3
R8	*	*	25.0	24.9	25.0	23.5	24.6	26.0	22.3	25.9	24.34	3
R9	*	24.3	25.4	24.2	25.7	23.1	24.7	26.2	23.6	25.9	24.56	3
R10	*	*	*	*	*	22.2	24.8	26.3	25.1	25.6	24.72	3
R11	*	*	*	*	*	*	25.4	27.8	24.6	27.1	25.83	4
R12	25.1	27.6	28.6	27.0	28.0	25.4	28.5	27.9	27.3	27.3	27.27	4
R13	*	*	*	*	28.3	26.3	27.7	30.0	26.6	28.4	27.71	4
R14	26.8	27.5	28.7	28.9	29.3	28.2	28.2	29.8	27.9	28.0	28.32	5
R15	*	*	*	*	29.5	28.4	30.3	29.9	27.5	29.5	28.99	5
Candidate variety												
C1	*	*	*	*	*	*	*	22.9	22.7	23.4	22.57	2
C2	*	*	*	*	*	*	*	24.8	22.3	23.2	23.01	2
C3	*	*	*	*	*	*	*	27.0	24.7	27.4	25.95	4
C4	*	*	*	*	*	*	*	*	22.6	26.1	24.47	3
C5	*	*	*	*	*	*	*	*	21.0	22.1	21.67	1
Year means												
	22.3	24.17	24.99	25.27	25.12	23.36	24.75	25.93	23.37	25.31		

Figure 2: Example illustrating how Variety Descriptions are developed in the United Kingdom for Peas by division of the range of expression into equal-spaced states

Characteristic: UPOV No 15, Stipule: length (see TG/7/10)

To obtain notes for the candidate varieties (C1...C5) for this characteristic, the over-year variety means of the candidate and reference varieties are calculated from their yearly means in a fitted constants analysis. The yearly and over-year variety means, sorted by the latter, are shown below.

The five states for this characteristic are defined here by division of the range of expression of the over-year means for the reference collection varieties into equal-spaced states. The range of expression is 109 (= 139 - 30). So each state is of width $109/5 = 21.8$, and the upper limits of states 3, 4, 5 and 6 are 51.8, 73.6, 95.4 and 117.2 respectively.

If the technical experts judge the range of variation to be large, the 3-7 scale may be expanded to a 1-9 scale.

As the yearly means for candidates C1 and C2 are less than 51.8, they have note 3.

As the yearly mean for candidate C3 is between 51.8 and 73.6, it has note 4.

As the yearly mean for candidate C4 is between 73.6 and 95.4, it has note 5.

As the yearly mean for candidate C5 is greater than 117.2, it has note 7.

Reference variety	Yearly means									Over-year mean	Note
	1	2	3	4	5	6	7	8	9		
R1	*	*	*	*	*	21	36	22	24	30.0	3
R2	*	*	*	29	39	29	39	25	28	35.4	3
R3	*	55	65	68	48	44	59	56	28	54.7	4
R4	72	61	73	45	59	52	68	56	53	59.9	4
R5	*	*	*	*	*	68	70	58	60	68.4	4
R7	*	*	77	61	73	72	80	64	61	72.2	4
R8	*	*	*	*	96	107	102	101	91	102.7	6
R9	121	120	113	78	117	102	109	105	79	104.7	6
R10	*	97	112	95	124	110	117	112	88	108.7	6
R11	*	*	*	122	121	128	105	102	85	117.7	7
R12	*	*	*	*	110	130	129	106	97	114.6	7
R13	*	*	*	*	*	132	133	130	112	131.2	7
R15	*	*	*	*	*	121	155	157	106	139.0	7
Candidate variety											
C1	*	*	*	*	*	*	55	32	27	43.3	3
C2	*	*	*	*	*	*	55	58	25	51.2	3
C3	*	*	*	*	*	*	*	46	44	55.7	4
C4	*	*	*	*	*	*	*	75	54	75.2	5
C5	*	*	*	*	*	*	*	124	102	123.5	7
Year means	96.9	83.9	90.6	75.2	84.4	80.9	87.9	79.4	64.7		

[End of Annex and of document]