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REVISION OF DOCUMENT TGP/8:
HANDLING MEASURED QUANTITATIVE CHARACTERISTICS
FOR VEGETABLE AND HERBAGE CROPS TESTED IN UNITED KINGDOM

Document prepared by experts from United Kingdom

1. At its twenty-seventh session, held in Alexandria, Virginia, United States of America, from June 16 to 19, 2009, the Technical Working Party on Automation and Computer Programs (TWC) considered document TWC/27/11 "Document TGP/8: Sections for separate development", as the basis for a future revision of document TGP/8 (document TGP/8/2). The TWC agreed that experts from Finland, France, Germany, Italy, Japan, Kenya and United Kingdom should provide a short description of the principles underlying the detailed methods provided in Part II and that Mrs. Sally Watson (United Kingdom) would provide an example for Section 13.1 (see document TWC/27/21 "Report", paragraph 62).

2. The Annex to this document contains the text prepared by Mrs. Sally Watson (United Kingdom).

[Annex follows]

ANNEX

Handling Measured, Quantitative Characteristics for Vegetable and Herbage Crops Tested in the United Kingdom

1.1 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.

1.2 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.

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

1.4 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.

1.5 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.

1.6 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.

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

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

1.9 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 UK Herbage crops using delineating varieties

Characteristic: UPOV No 20, Inflorescence: number of spikelets

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 5
R10	Upper limit of state 5
R14	Lower limit of state 9

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 3.

As the yearly mean for candidate C3 is between those for varieties R10 and R14, it has note 7.
As the yearly mean for candidate C4 is between those for varieties R5 and R10, it has note 5.
As the yearly mean for candidate C5 is less than that for variety R2, it has note 1.

Reference variety	Yearly means 1	2	3	4	5	6	7	8	9	10	Over-year mean	Note
R1	*	*	*	22.44	23.09	20.40	22.83	23.71	20.79	22.33	21.95	1
R2	*	*	*	23.36	22.88	21.65	21.39	24.23	19.49	23.27	**22.05**	1
R3	*	*	*	*	*	22.26	21.35	24.57	20.13	23.14	22.2	3
R4	19.77	22.05	22.17	25.33	21.84	20.57	22.57	23.55	21.80	23.55	22.32	3
R5	21.15	23.13	23.75	24.74	23.74	23.67	23.80	25.25	21.71	24.55	**23.55**	5
R6	*	*	*	*	24.64	23.00	23.76	25.02	22.16	24.25	23.62	5
R7	*	*	*	*	*	21.47	25.93	24.65	23.07	25.24	23.98	5
R8	*	*	25.00	24.92	24.97	23.51	24.55	26.03	22.31	25.88	24.34	5
R9	*	24.33	25.43	24.18	25.73	23.13	24.74	26.19	23.59	25.90	24.56	5
R10	*	*	*	*	*	22.22	24.82	26.28	25.14	25.56	**24.72**	5
R11	*	*	*	*	*	*	25.35	27.77	24.60	27.11	25.83	7
R12	25.13	27.58	28.57	27.01	27.98	25.42	28.52	27.88	27.30	27.27	27.27	7
R13	*	*	*	*	28.34	26.31	27.68	30.01	26.63	28.41	27.71	7
R14	26.77	27.49	28.65	28.90	29.33	28.19	28.22	29.76	27.91	28.00	**28.32**	9
R15	*	*	*	*	29.48	28.4	30.34	29.85	27.48	29.5	28.99	9
Candidate variety												
C1	*	*	*	*	*	*	*	22.93	22.65	23.36	22.57	3
C2	*	*	*	*	*	*	*	24.84	22.25	23.17	23.01	3
C3	*	*	*	*	*	*	*	26.97	24.73	27.39	25.95	7
C4	*	*	*	*	*	*	*	*	22.63	26.08	24.47	5
C5	*	*	*	*	*	*	*	*	20.98	22.12	21.67	1
Year means	22.30	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 could be developed in UK Herbage crops by division of the range of expression into equal-spaced states

Characteristic: UPOV No 19, Inflorescence: length

Note: Variety Descriptions are developed in UK Herbage crops for this characteristic by using delineating varieties. However, this example is given solely to illustrate the method of division of the range of expression into equal-spaced states.

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 10.28 (=29.81 - 19.53). So each state is of width 10.28/5 = 2.06 and the upper limits of states 1, 3, 5 and 7 are 21.59, 23.64, 25.70 and 27.75 respectively.

As the yearly means for candidates C1 and C2 are less than 21.59, they have note 1.
As the yearly mean for candidate C3 is between 23.64 and 25.70 it has note 5.
As the yearly mean for candidate C4 is between 21.59 and 23.64, it has note 3.
As the yearly mean for candidate C5 is greater than 27.75, it has note 9.

Reference variety	Yearly means 1	2	3	4	5	6	7	8	9	10	Over-year mean	Note
R3	*	*	*	*	*	19.18	18.58	20.08	18.67	18.89	19.53	1
R2	*	*	*	19.39	20.34	19.16	19.40	20.41	19.00	19.29	19.95	1
R6	*	*	*	*	21.79	19.38	20.80	21.70	21.83	19.88	21.20	1
R4	20.33	21.95	22.98	23.25	21.22	21.19	20.91	22.32	22.05	19.34	21.55	1
R5	23.65	22.56	23.75	20.95	22.35	21.93	21.63	23.20	22.06	21.77	22.39	3
R11	*	*	*	*	*	*	23.26	23.40	22.27	22.42	23.02	3
R8	*	*	24.12	22.52	23.78	21.22	23.68	24.45	22.89	22.58	23.39	3
R13	*	*	*	*	26.04	22.88	27.07	26.63	26.52	25.49	26.07	7
R12	28.50	28.37	27.63	24.23	28.03	23.72	26.55	27.28	26.85	24.33	26.55	7
R9	*	26.13	27.58	25.86	28.78	25.89	27.39	28.10	27.58	25.22	27.08	7
R14	29.94	29.70	26.86	24.08	27.81	25.39	27.54	28.44	28.61	24.83	27.32	7
R15	*	*	*	*	27.39	24.47	29.38	29.30	26.94	26.13	27.57	7
R1	*	*	*	28.61	28.48	27.45	29.20	26.85	26.58	24.92	27.83	9
R7	*	*	*	*	*	28.64	29.52	29.69	29.36	27.57	29.41	9
R10	*	*	*	*	*	27.56	28.45	31.78	32.02	26.95	29.81	9
Candidate variety												
C1	*	*	*	*	*	*	*	21.93	22.26	18.98	21.31	1
C2	*	*	*	*	*	*	*	21.93	19.64	19.24	20.53	1
C3	*	*	*	*	*	*	*	25.29	23.94	21.87	23.96	5
C4	*	*	*	*	*	*	*	*	21.10	20.85	21.76	3
C5	*	*	*	*	*	*	*	*	28.77	26.57	28.45	9
Year means	25.59	25.20	25.21	23.54	24.90	22.89	24.48	25.23	24.45	22.86		

[End of Annex and of document]