



**TWF/31/2**

**ORIGINAL:** English

**DATE:** April 12, 2000

**INTERNATIONAL UNION FOR THE PROTECTION OF NEW VARIETIES OF PLANTS**

GENEVA

**TECHNICAL WORKING PARTY  
FOR  
FRUIT CROPS**

**Thirty-First Session  
Budapest, July 3 to 7, 2000**

CROP INVENTORY

*Document prepared by the Office of the Union*

## INTRODUCTION

During the Thirtieth Session of the Technical Working Party for Fruit Crops held in Nitra, Slovakia, from September 6 to 10, 1999, it was agreed to make an inventory on how far the number of characteristics actually used in each member State differed from the adopted UPOV Test Guidelines, how many and which of the characteristics from the non-asterisk characteristics had been selected and which additional characteristics not included in the UPOV Test Guidelines are used.

The Working Party agreed to select the species Apple (TG/14/8) and to ask all member States to submit to the Office of UPOV the list of characteristics they actually used for testing, including characteristics needed only once or twice in special cases. A copy of the Request for Comments, Circular U2874, is attached as Annex I.

The Office received comments from 11 member States, that is to say Austria, Denmark, Germany, Hungary, Ireland, New Zealand, Portugal, Slovakia, South Africa, Sweden and the U.S.A. as well as the Community Plant Variety Office (CPVO). These comments can be found in Annex II. A summary of the comments follows.

## SUMMARY

Denmark and Ireland do not have any DUS-test carried out on Apple.

Austria and Sweden do not have any DUS-test carried out on Apple and rely on assistance from the United Kingdom.

Germany and Slovakia use the complete list of characteristics regardless of whether these characteristics are marked with an asterisk or not. No additional characteristics have been used so far.

The CPVO, Hungary and New Zealand use the complete list of characteristics regardless of whether these characteristics are marked with asterisks or not, and in some cases special technology, enhancement of characteristics or additional characteristics are used.

Portugal uses some additional characteristics. South Africa uses all characteristics in the Test Guidelines and 55 additional characteristics.

The U.S.A. does not use UPOV Test Guidelines. If it were to develop a form for use with Apple, it would differ in many respects from the UPOV Test Guidelines.

[Two Annexes follow]

TWF/31/2

ANNEX I

INTERNATIONALER VERBAND  
ZUM SCHUTZ VON  
PFLANZENZÜCHTUNGEN

GENÈVE, SCHWEIZ



UNION INTERNATIONALE  
POUR LA PROTECTION  
DES OBTENTIONS VÉGÉTALES

GENÈVE, SUISSE

INTERNATIONAL UNION  
FOR THE PROTECTION OF  
NEW VARIETIES OF PLANTS

GENEVA, SWITZERLAND

Circular U 2874  
TWF 2000

September 28, 1999

Subject: Crop Inventory: Request for Comments: Deadline: March 1, 2000

Madam,  
Sir,

I have the pleasure to inform you that during the last session of the Technical Working Party for Fruit Crops it was agreed to make an inventory on how far the number of characteristics actually used in each member State differed from the adopted UPOV Test Guidelines, how many and which of the characteristics from the non-asterisk characteristics had been selected and which additional characteristics not included in the UPOV Test Guidelines are used.

The Working Party agreed to select the species Apple and to ask all member States to submit to the Office of UPOV the list of characteristics they actually used for testing, including characteristics needed only once or twice in special cases.

Sincerely yours,

Evgeny Saranin  
Consultant

Distribution: List T3 a + b

**34, chemin des Colombettes - CH-1211 Genève 20 - ☎ (+41-22) 338 91 11 - Fax: (+41-22) 733 03 36**  
**E-mail: [upov.mail@wipo.int](mailto:upov.mail@wipo.int) - Internet: <http://www.upov.int>**

[Annex II follows]

## ANNEX II

## COMMENTS ON CROP INVENTORY

Community Plant Variety Office (CPVO)

Further to the request on the number of characteristics actually used by the Community Plant Variety Office from the Apple Test Guidelines, the technical protocol of our Office obliges each of our examination offices for these species to observe the totality of all characteristics in the present version (TG/14/8). No characteristics outside the guidelines are measured unless requested to do so by the applicant – and this is only under exceptional circumstances.

Hungary

Hungary used TG/14/8 for the testing of varieties without any amendments. All characteristics are tested irrespectively of the fact if the given characteristic has an asterisk or not.

There is another situation in the cases of mutants having different coloration. In this case we use a tristimulus color analyzer for measuring reflective colors of overcolor of the skin. We use the Minolta CR-200 Chroma Meter. It is calibrated first on a standard white calibration plate at illuminant C. We try to measure the overcolor on the part with the highest color assessed visually. Minolta CR-200 has an 8 mm-diameter measuring area. In such a way we can get measured data for colors and we can decide more slightly using the standard method that the difference between two varieties is considered clear if it exceeds the LSD at the 1% probability level. Breeders can be convinced more slightly if the decision is supported by statistical analysis in the case if the difference is not clear.

Measuring absolute chromaticity we use data of the  $L^*$   $a^*$   $b^*$  and  $L^*$   $C^*$   $H^\circ$  color systems, where:

$L^*$  = lightness factor (it is small for dark colors and large for light colors)

$a^*$  = chromaticity coordinate ( $a^*$  is negative for green and positive for red, extends from -60 to 60)

$b^*$  = chromaticity coordinate ( $b^*$  is negative for blue and positive for yellow, extends from -60 to 60)

$C^*$  = metric chroma (saturation) defined by  $a^*$  and  $b^*$  chromaticity coordinates

$H^\circ$  = metric hue angle defined by  $a^*$  and  $b^*$  chromaticity coordinates.

The table of characteristics of the original TG/14/8 is amended as follows:

36.	Fruit: over color
36a.	Fruit: chromaticity coordinate $a^*$ of over color
36b.	Fruit: chromaticity coordinate $b^*$ of over color
36c.	Fruit: chroma (saturation) $C^*$ of over color
36d.	Fruit: hue angle $H^\circ$ of over color
37.	Fruit: intensity of over color
37a.	Fruit: lightness of over color

New Zealand

New Zealand uses all characteristics, asterisks and non-asterisks, in the UPOV Test Guidelines TG/14/8. We do not use any additional characteristics.

In many varieties the fruit color and pattern characteristics 34-38, do not provide sufficient details for a precise description. It is our usual practice to describe fruit coloration and pattern in greater details in the additional description part of our national apple guidelines. This would be in a sentence that provides a clearer, more precise description. This description does not include additional characteristics but an enhancement of 34-38. In the future, we will be testing several mutation varieties from “Fuji” which claim to have levels of resistance to the internal fruit disorder water core. This is likely to require the use of characteristics that describe this claim. These characteristics will have to be prepared specifically for these varieties. This has not been started as yet.

Portugal

In point 7 we add remarks concerning the shape of floral and foliar buds and apex shape and size.

In point 9 - flowers – we make observations on shape, length and attitude of sepals and we measure the length and width of 20 petals.

Point 10 concerns the relative position of stamen and style.

As to the leaves, apart from the points 11 to 15, we indicate the position of its maximum width, the apex and the bottom shape, and the profile – whether it is plane or the margins are upwards or downwards.

In point 16 we remark the existence of stipules, their length, shape and size relatively to petiole.

Concerning the fruit – points 23 to 27 – we observe the position of sepals (erect or curved) and their bottom (separate, tangent or overlapping) and the presence of ribbing in the region.

In stalk cavity – points 28 to 31 – we observe the stalk relatively to cavity (above, at level, beneath).

Concerning the lenticels, we observe their shape and number.

In the evaluation of the quality of flesh – points 43 and 44 – we take into account its texture, juiciness, sugar and acid contents and flavor.

We go on remarking the shape of the heart of the fruit in lengthwise and broadwise cuts, the link of the heart to the stalk cavity and eye basin and the number, size, shape and top of the seeds.

We believe that, by moving from 43 characters to 47, much of the important and essential information for distinguishing varieties has been lost.

South Africa

Number of characteristics used compared to that of the Test Guidelines TG/14/8:  
We use 55 characteristics additional to the 47 characteristics of the Test Guidelines.

How many and which of non-asterisk characteristics are used?  
We use all the characteristics in the Test Guidelines.

The following characteristics are used in addition to the Test Guidelines:

	Characteristic	State of expression	Note
Flower			
1.	Pedicel color	Green	1
		Red	2
2.	Pedicel pubescence	Absent	1
		Few	3
		Medium	5
		Many	7
		Predominant	9
3.	Petal shape	Narrow elliptic	1
		Elliptic	2
		Broad elliptic	3
		Round	4
		Narrow ovate	5
		Ovate	6
		Oblong	7
4.	Petal: color of upper side	White	1
		Light pink	2
		Medium pink	3
		Dark pink	4
		Red	5
		Purple	6
5.	Petal: intensity of color of upper side	Light	3
		Medium	5
		Dark	7
6.	Time of leaf budburst in relation to flower bud burst during full bloom	Very early	1
		Early	3
		Medium	5
		Late	7
		Very late	9

	Characteristic	State of expression	Note
<u>Young fruit:</u> The observations must be done between 30 and 40 days after full bloom			
7.	Young fruit: shape	Globose	1
		Globose conical	2
		Broad globose conical	3
		Flat	4
		Flat globose	5
		Conical	6
		Narrow conical	7
		Truncate conical	8
		Ellipsoid	9
		Ellipsoid conical	10
		Oblong	11
		Oblong conical	12
8.	Young fruit: color	Green	1
		Yellow	2
		Red	3
		Green red	4
9.	Young fruit: % of over color	Very low	1
		Low	3
		Medium	5
		High	7
		Very high	9
10.	Young fruit: intensity of over color	Light	3
		Medium	5
		High	7
11.	Fruit: attitude of sepals at base	Spreading	3
		Converging with tips curled	5
		Converging	7
12.	Fruit: crowning at calyx end	Absent	1
		Present	9
13.	Fruit: degree of crowning at calyx end	Weak	3
		Medium	5
		Strong	7
14.	Fruit: pubescence at calyx end	Sparse	3
		Medium	5
		Dense	7

	Characteristic	State of expression	Note
15.	Fruit: stalk anthocyanin coloration	Absent	1
		Slight	3
		Medium	5
		Predominant	7
16.	Fruit diameter	Small	3
		Medium	5
		Large	7
17.	Young leaf anthocyanin coloration	Absent	1
		Slight	3
		Medium	5
		Predominant	7
Leaf:			
18.	Petiole: angle with shoot	Small	3
		Medium	5
		Large	7
19.	Leaf: curving of main vein	Absent	1
		Slight	3
		Medium	5
		Strong	7
20.	Leaf: shape in cross section	Folded	3
		Flat	5
		Folded back	7
21.	Leaf blade: depth of indentation of margin	Shallow	3
		Medium	5
		Deep	7
22.	Leaf blade: pubescence on lower side	Very sparse	
		Sparse	
		Medium	
		Dense	
		Very dense	
23.	Leaf blade: intensity of green color on upper side	Light	3
		Medium	5
		Dark	7



	Characteristic	State of expression	Note
24.	Stipule: size	Very small	1
		Small	3
		Medium	5
		Large	7
		Very large	9
25.	Petiole foot: anthocyanin coloration	Absent	1
		Reddish	2
		Purplish	3
26.	Petiole foot: extent of anthocyanin coloration	Very few	1
		Few	3
		Medium	5
		Large	7
		Very large	9
27.	Leaf: size	Very small	1
		Small	3
		Medium	5
		Large	7
		Very large	9
28.	Tree: predominant position of bearing fruit	On spurs	1
		On spurs and shoots	2
		On shoots	3
29.	Tree: tendency to set fruit	None or very weak	1
		Weak	3
		Medium	5
		Strong	7
		Very strong	9
30.	Fruit: symmetry in side view	Asymmetrical	1
		Symmetrical	2
31.	Fruit: shape in cross section	Roundish	3
		Medium deformed	5
		Strongly deformed	7
32.	Fruit: prominence of ribbing	Very weak	1
		Weak	3
		Medium	5
		Strong	7
		Very strong	9

	Characteristic	State of expression	Note
33.	Fruit: degree of crowning at calyx end	Weak	3
		Medium	5
		Strong	7
34.	Fruit: attitude of sepals at base	Free	3
		Touching	5
		Overlapping	7
35.a	Fruit: texture of surface	Smooth	1
		Hammered	2
		Bumpy	3
35.b	Fruit: skin tendency to crack	Absent	1
		Present	9
36.	Fruit skin: intensity of over color	Light	3
		Medium	5
		Dark	7
37.	Fruit: lenticels number	Very few	1
		Few	3
		Medium	5
		Many	7
		Very many	9
38.	Fruit: height	Very short	1
		Short	3
		Medium	5
		Long	7
		Very long	9
39.	Fruit: size	Very small	1
		Small	3
		Medium	5
		Large	7
		Very large	9
40.	Fruit: mass	Small	3
		Medium	5
		Large	7
41.	Fruit in cross section: distinct line at core	Absent or very weak	1
		Weak	3
		Medium	5
		Strong	7
		Very strong	9

	Characteristic	State of expression	Note
42.	Fruit: skin toughness	Weak	3
		Medium	5
		Strong	7
43.	Fruit: texture of flesh	Fine	3
		Medium	5
		Coarse	7
44.	Fruit: juiciness	Dry	3
		Medium	5
		Juicy	7
45.	Fruit: sugar content (% brix)	Very low	1
		Low	3
		Medium	5
		High	7
		Very high	9
46.	Fruit: acidity (sourness)	Low	3
		Medium	5
		High	7
47.	Fruit browning of flesh	Absent or very weak	1
		Weak	3
		Medium	5
		Strong	7
		Very strong	9
Dormant one year old shoot			
48.	Leaf: autumn color	Yellow	1
		Orange	2
		Red	3
		Brown	4
49.	Leaf fall date	Early	3
		Medium	5
		Late	7
50.	Dormant shoot: size of lenticels	Very small	1
		Small	3
		Medium	5
		Large	7
		Very large	9

	Characteristic	State of expression	Note
51.	Dormant shoot: size of leaf bud	Very small	1
		Small	3
		Medium	5
		Large	7
		Very large	9
52.	Leaf bud: shape of tip	Pointed	1
		Rounded	2
53.	Leaf bud: attitude relative to axis	Adpressed	1
		Slightly held out	2
		Markedly held out	3
54.	Leaf bud: size of support on shoot	Very small	1
		Small	3
		Medium	5
		Large	7
		Very large	9
55.	Leaf bud support: crimping	Weak	3
		Medium	5
		Strong	7

Fruit size: we measure the diameter with a Cranston measuring tool and consider that as the size of the fruit, because in the industry the fruit count (diameter) is used to determine size for packing. Is this correct or was it the intention that size should be the actual 3-dimensional size of the fruit (length x width)?

#### United States of America

The United States Plant Variety Protection Office does not have an Objective Description form specific to the crop Apple. Also, the United States has a system in which the grower (applicant) conducts the trials and reports the results using standardized forms. Therefore, we do not have Test Guidelines such as those used by UPOV.

If we were to develop a form for use with apples, some of the differences would be as follows. Document TG/14/8 has been used as the basis for the comments.

1. Vigor – we probably would not use this trait, since it appears to be a complex trait. We would accept sub-characters which contribute to vigor, such as region of best adaptability, minimum survivable temperature, etc.
2. Tree Type – we would use this trait.
3. Tree Habit – we would use this trait.
4. Shoot Pubescence – we would use this trait.
5. Shoot Thickness – we would want this trait reported as a measurement, in millimeters.
6. Shoot Internode Length – we would want this trait reported as a measurement, in millimeters.

7. Shoot Lenticels – we would want this reported as a count per unit area.
8. Flower Bud Color – we would use this trait with the addition of a color chart reference code.
9. Flower Diameter – we would want this trait reported as a measurement, in millimeters. We would add petal length and petal width measurements.
10. Petal Position – we would use this trait.
11. Leaf Attitude – we would use this trait, and we may add a measurement of the leaf angle relative to the stem.
12. Leaf Length – we would want this reported as a measurement, in millimeters.
13. Leaf Width – we would want this reported as a measurement, in millimeters.
14. Length/Width Ration – we might use this, as a measurement.
15. Leaf Margins – we would use this.
16. Petiole Length – we would want this reported as a measurement, in millimeters.
17. Fruit Size – we would want this reported as several measurements, such as fruit width towards the calyx, fruit width towards the stem, fruit length towards the calyx, fruit length towards the stem, fruit height, and fruit weight.
18. Fruit Height/Width Ration – we might use this, as a measurement.
19. Fruit Maximum Width – we might use this.
20. Fruit Shape – we would use this.
21. Fruit Ribbing – we would use this.
22. Fruit Crowning as Calyx end – we might use this.
23. Fruit Eye Aperture – we would use this trait.
24. Fruit Eye Size – we would want this reported as a measurement.
25. Fruit Sepal Length – we would want this reported as a measurement.
26. Fruit Eye Basin Depth – we would want this reported as a measurement.
27. Fruit Eye Basin Depth – we would want this reported as a measurement.
28. Fruit Stalk Thickness – we would want this reported as a measurement.
29. Fruit Stalk Length – we would want this reported as a measurement.
30. Fruit Stalk Cavity Depth – we would want this reported as a measurement.
31. Fruit Stalk Cavity Width – we would want this reported as a measurement.
32. Fruit Skin Bloom – we might use this, or perhaps modify it to use color chart reference.
33. Greasiness of skin – we would use this.
34. Fruit Ground Color – we would use this with the addition of a color chart reference code.
35. Amount of Over Color – we would use this.
36. Fruit Over Color – we would use this with the addition of a color chart reference code.
37. Over Color Intensity – we would NOT use this – it is covered in the color chart reference.
38. Pattern of Over Color – we would use this.
39. Amount of Russet Around Eye Basin – we would use this.
40. Amount of Russet on Cheeks – we would use this.
41. Amount of Russet around Stalk Cavity – we would use this.
42. Size of lenticels – we might use this, perhaps modified to be a measurement.
43. Flesh firmness – we would use this.
44. Flesh Color – we would use this with the addition of a color chart reference code.
45. Locules Apertures – we would use this.
46. 10% flowers Open – we would want this reported as a number of days or cumulative growing degree days.

47. Edible Maturity – we would want this reported as a number of days or cumulative growing degree days.

In addition to these traits, we would include traits which give a complete objective botanical description of the variety. These traits may include:

- a. Mature Tree height and width.
- b. Leaf color, surface (smooth/rough), pubescence, etc.
- c. Flower mature color, petal length and width, anther color, fragrance, etc.
- d. Fruit Flavor – various gradations from tart to sweet; or perhaps sugar content.
- e. Fruit core size, seed size, seed color, etc.
- f. Disease and Insect ratings – various gradations from susceptible to resistant (or tolerant).
- g. Other traits recommended by apple breeders, or taxonomists.

As you can see, our apple form would differ in many respects from the UPOV Test Guidelines. These differences are necessary since our work is based exclusively on breeder trials, each of which can be conducted under very different circumstances.

In order to use the information collected in this manner, we search the computer for varieties with traits that fall within a range of values around the measurements reported. For example, we may look for edible maturity with 5 or 10 days of the reported value for the application variety. In this way, we can account for most environmental influences affecting the different trials.

[End of Annex II and of document]