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INTERNATIONAL UNION FOR THE PROTECTION OF NEW VARIETIES OF PLANTS

Geneva

TECHNICAL COMMITTEE

Fifty-First Session
Geneva, March 23 to 25, 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

1. The purpose of this document is to present developments concerning a possible new section for document TGP/8 "Data Processing for the Assessment of Distinctness and for Producing Variety Descriptions".

2. 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

3. The structure of this document is as follows:

BACKGROUND

4. 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).

5. 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".

6. The TWC, at its thirtieth session, 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)

DEVELOPMENTS IN 2013

Technical Committee

7. The Technical Committee (TC), at its forty-ninth session held in Geneva from March 18 to 20, 2013, considered document TC/49/29 "Revision of document TGP/8: Part II: Techniques Used in DUS Examination, New Section: Data Processing for the Assessment of Distinctness and for Producing Variety Descriptions".

8. The TC requested the Office of the Union to request experts from the United Kingdom, France and Germany, or other members of the Union, to provide a common data set of self-pollinated and/or vegetatively propagated varieties for performing a practical exercise (see document TC/49/41 "Report on the Conclusions", paragraph 66).

DEVELOPMENTS IN 2014

Technical Committee

9. The TC at its fiftieth session, held in Geneva from April 7 to 9, 2014 considered document TC/50/25 "Revision of document TGP/8: Part II: New Section: Data Processing for the Assessment of Distinctness and for Producing Variety Descriptions".

10. The TC, noted the invitation by the TWF to an expert from New Zealand to make a presentation at its forty-fifth session, on the project for "apple reference varieties" that began in New Zealand in 2011, and how that work would contribute to developing improved example varieties and variety descriptions (see document TC/50/36 "Report on the Conclusions", paragraph 55).

11. The TC, 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).

12. 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.

13. Following the fiftieth session of the TC, an expert from Italy provided a presentation on “Guidance for development of Variety Descriptions in Italy”, as reproduced in the Annex II of this document.

Practical exercise with a common data set

14. 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.

15. 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.

16. 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).

17. 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).

18. 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

19. 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).

20. The TWO noted that an expert from New Zealand had been invited to make a presentation at the forty-fifth session of the TWF, on the project for “apple reference varieties” that began in New Zealand in 2011 (see document TWO/47/28 “Report”, paragraph 48).

21. 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 II to this document (see documents TWO/47/28 “Report”, paragraph 49 TWF/45/32 “Report”, paragraph 39 and TWV/48/43 “Report”, paragraph 45).

22. The TWO, TWF, TWV and TWA noted the information on the guidance for varieties description in Italy, as reproduced in Annex II to this document (see documents TWO/47/28 “Report”, paragraph 50 TWF/45/32 “Report”, paragraph 40, TWV/48/43 “Report”, paragraph 46 and document TWA/43/27 “Report”, paragraph 43).

23. The TWO and the TWF noted that the results of the practical exercise with a common data set would be presented to the TWC at its thirty-second session (see documents TWO/47/28 “Report”, paragraph 51 and TWF/45/32 “Report”, paragraph 41).

24. The TWF received a presentation from an expert from New Zealand on the project for “apple reference varieties”, as reproduced in Annex III 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).

25. 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).

26. The TWC, TWV and TWA noted that an expert from New Zealand had made a presentation at the forty-fifth session of the TWF, on the project for “apple reference varieties” that began in New Zealand in 2011 as reproduced in Annex III to this document (see documents TWC/32/28 “Report”, paragraph 26, document TWC/32/28 “Report”, paragraph 44, and document TWA/43/27 “Report”, paragraph 41).

27. 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 (see document TWC/32/28 “Report”, paragraph 27).

28. The TWC and the TWA received an explanation by an expert from Germany on Annex II to document TWC/32/18 “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).

29. The TWC received a presentation by an expert from Italy on the Italian method for the development of variety descriptions, as reproduced in Annex II of this document (see document TWC/32/28 “Report”, paragraph 29).

30. 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 (see document TWC/32/28 “Report”, paragraph 30).

31. 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 (see document TWC/32/28 “Report”, paragraph 31).

32. 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 (see document TWC/32/28 “Report”, paragraph 32).

33. 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”, paragraph 33).

34. The TWV noted that the results of the practical exercise with a common data set were presented to the TWC at its thirty-second session (see document TWV/48/43 “Report”, paragraph 47).

35. 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).

36. 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).

37. The TWA noted that the results of the practical exercise with a common data set had been presented to the TWC at its thirty-second session and noted that an expert from France had been requested to compare the results of the practical exercise to identify differences in the results obtained, for further understanding of the different methodologies (see document TWA/43/27 “Report”, paragraph 44).

38. The TC invited to:

(a) note the information in this document and;

(b) consider the proposal made by the TWC, as presented in paragraph 32 of this document, 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.

[Annexes follow]

ANNEX I

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	Notes resulting from one year and location
	"**Mean variety description**" If varieties are assessed in several trials/years/locations mean descriptions can be established.		Basis for management of variety collection

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]

CRA SCS - Council for Agricultural Research

CRA
CONSIGLIO PER LA RICERCA
E LA SPERIMENTAZIONE
IN AGRICOLTURA

Guidance for Development of Varieties Descriptions

The Italian experience

Drafter: M. Giolo

1

Method:

Progressive partitioning of expression range into states

(Turfgrass and Forage varieties)

2

The Italian experience

This presentation is based on our esperience that is in progress.

At present this method is used together with the previous one based on experience and reference varieties.

Contents

Total range of historical averages

Reference and candidates varieties can be tested over two or more years, producing two or more means.

Because each variety must contribute equally only the average of its past means must be used.

Range of historical averages covers the mid part of total range of expression. Using averages is easier than using a large amount of data.

6

Total Range of Expression

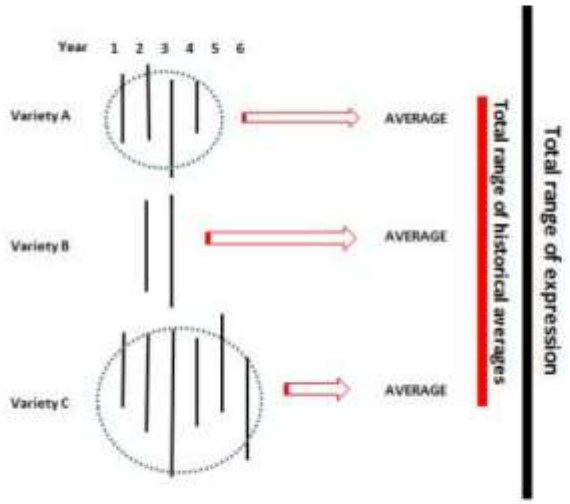
The total range of expression of a quantitative characteristic includes the range of values seen during past trials.

It is the difference between the largest and the smallest item in past data and it gives the possibility of knowing the dispersion of observations.

Historical data do not cover all the possible range and different phenological characteristics could be expected in the future.

5

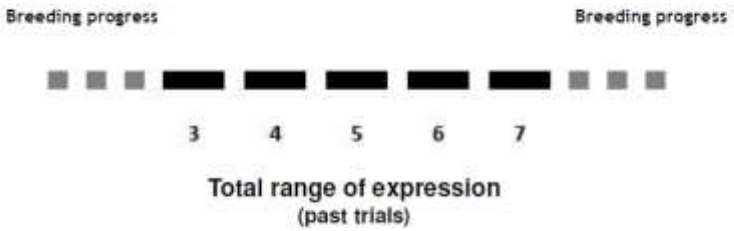
Total range: equal contribution of each variety



7

Total range: future expansion

The partitioning into notes of the total expression range, calculated from historical data, is in accord with leaving free space to extremes of the range for a possible future expansion because of breeding progress.

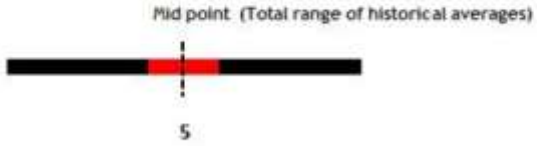


8

Mid reference

The midpoint of total range of historical averages for each characteristic is considered a good reference for the purpose of dividing all the range.

Midpoint of note 5 coincides with midpoint of historical averages range.



9

Partitioning of total expression range into notes

The goal of the method is to divide the total range into spaces of equal width (notes).

The first step is the division of total range calculated into notes; it is an arbitrary choice since the operation can lead to different intervals (3 notes ... 9 notes).

10

Basic rules to divide total range into notes

- Midpoint (note 5)
- Equal spaces for each note
- Notes for possible future expansion
- (Past varietal descriptions)

Problem: how to calculate width of notes (experience)

11

Transformation of varieties means into notes

For each quantitative characteristic the average of past trials means of each variety is transformed into note in accord with values that limit each note.

12

Example of equal contribution of CEBIOS variety

Ryegrass

(UPOV car. 14 - Flag length)

(Trials Data 2009-2013)

Variety	Trial plants	Year	Mean (cm)
CEBIOS	80	2009	22,6
CEBIOS	80	2010	22,0
CEBIOS	80	2011	17,6
CEBIOS	80	2012	21,6
CEBIOS	80	2013	24,4
		Average	**21,6**

Equal contribution to total range of historical averages

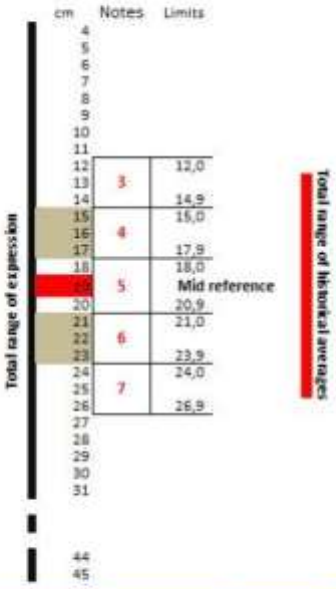
13

Example of partitioning of total range of historical averages into notes

Ryegrass

(UPOV car. 14 - Flag length)

(Trials Data 2009-2013)



14

Example of transformation of varieties means into notes

Ryegrass

(UPOV car. 14 - Flag length)

(Trials Data 2009-2013)

RYEGRASS: Car. 14: Flag length

	Type	Variety	Averages of 2 or more years	Note
	LMW	SARLT	13,9	3
	LMW	NUSPRINT	14,4	3
	LMW	GREENLINK	15,1	4
	LMW	FLYING A	16,7	4
	LM	ALTAIR	17,2	4
	LM	NIBBIO	17,4	4
	LM	CERTO	18,0	5
	LMW	LIFLORIA (F)	18,5	5
	LMW	DIAMOND D	18,5	5
	LMW	ESMERALDA	18,5	5
	LM	KARTETRA	19,1	5
	LM	GALACTICO	19,1	5
*	LM	OCALA	19,2	5
	LMW	TAMTBO	19,6	5
	LM	DAYTONA	21,1	6
	LM	CEBIOS	21,6	6
*	LMW	DS MARINA	21,6	6
	LMW	TAURO	22,5	6
*	LMW	ATTAIN	22,7	6
	LM	BARMULTRA	23,7	6
*	LM	JUNGLE	24,5	7

* new entries

LM Italian ryegrass
LMW Westerwolds ryegrass

15

Update of total range

The total range of expression and the total range of historical averages could be **updated** (for example every "n" years).

In this case the mid reference (midpoint) and some varietal descriptions could change slightly.

16

[Annex III follows]

APPLE VARIETY REFERENCE PROJECT

New Zealand Plant Variety Rights Office and Plant and Food Research

NEW ZEALAND | INTELLECTUAL PROPERTY OFFICE PLANT VARIETY RIGHTS

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

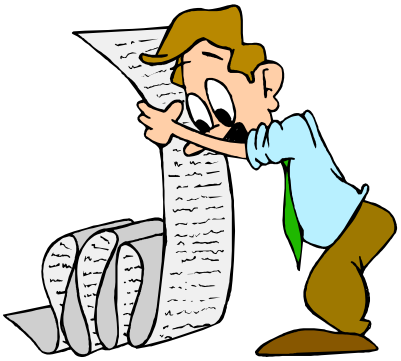
- Sunrise
- Cox's Orange Pippin
- Royal Gala (Tenroy)
- Pinova (Corail)
- Mariri Red
- Honeycrisp (Minnesota Crunch)
- Granny Smith
- Delblush
- Cripps Pink
- Burkitt Gala
- Aztec

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

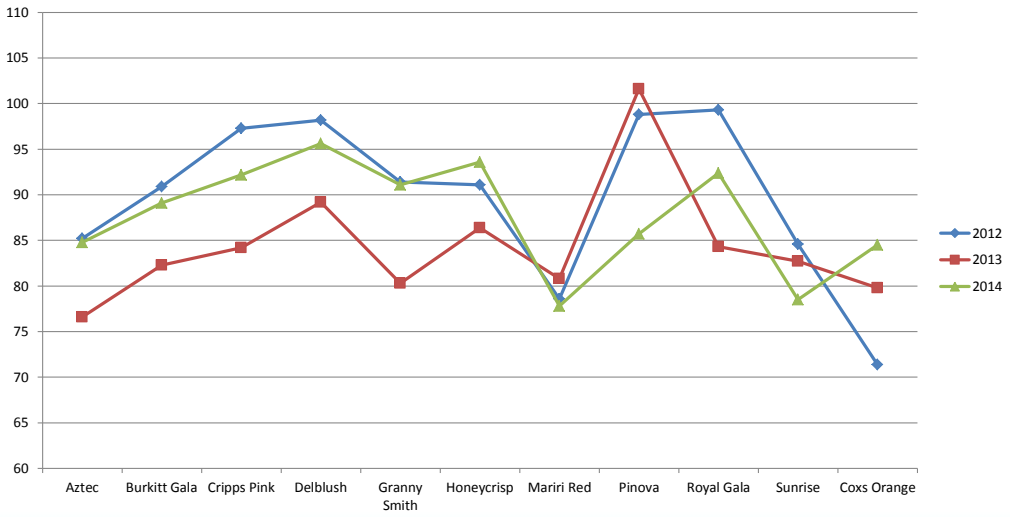
Petiole length, leaf width and leaf length/width ratio

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

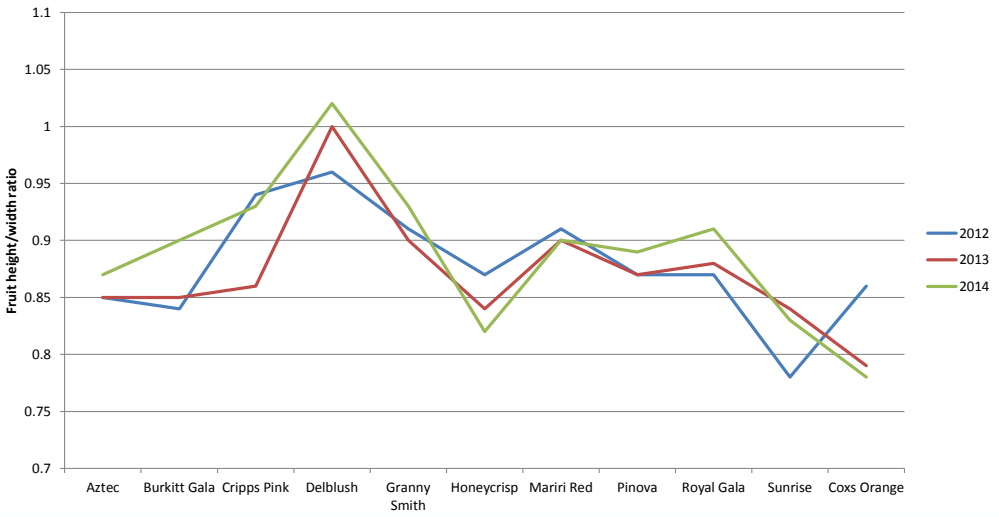
Height, width and height/width ratio

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

[End of Annex III and of document]