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INTERNATIONAL UNION FOR THE PROTECTION OF NEW VARIETIES OF PLANTS
Geneva

TECHNICAL WORKING PARTY FOR FRUIT CROPS

Forty-Seventh Session
Angers, France, November 14 to 18, 2016

ADDENDUM TO

NUMBER OF GROWING CYCLES IN DUS EXAMINATION

Document prepared by the Office of the Union

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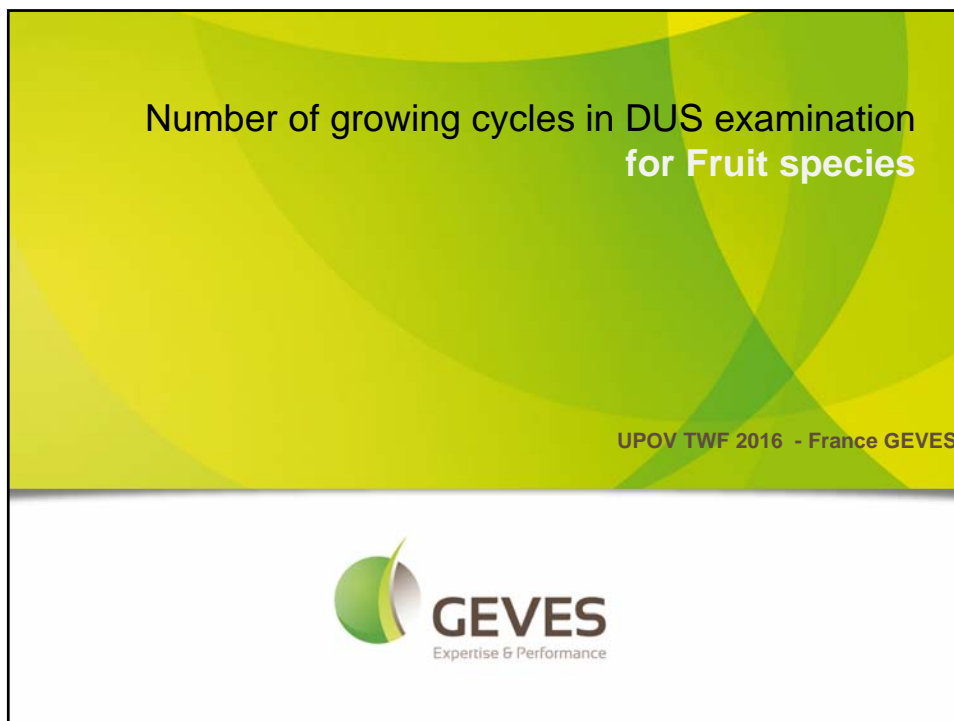
This document contains presentations to be made at the forty-seventh session of the Technical Working Party for Fruit Crops (TWF), as follows:

- Annex I: “Number of growing cycles in DUS Examination for fruit species”, by an expert from France;
- Annex II: “Variability of assessment data over years in apple”, by an expert from Germany.
- Annex III: “Interpreting Variety Descriptions for Apple – Environmental influence on Quantitative Characters”, by an expert from New Zealand.

[Annexes follow]


ANNEX I

NUMBER OF GROWING CYCLES IN DUS EXAMINATION
BY AN EXPERT FROM FRANCE

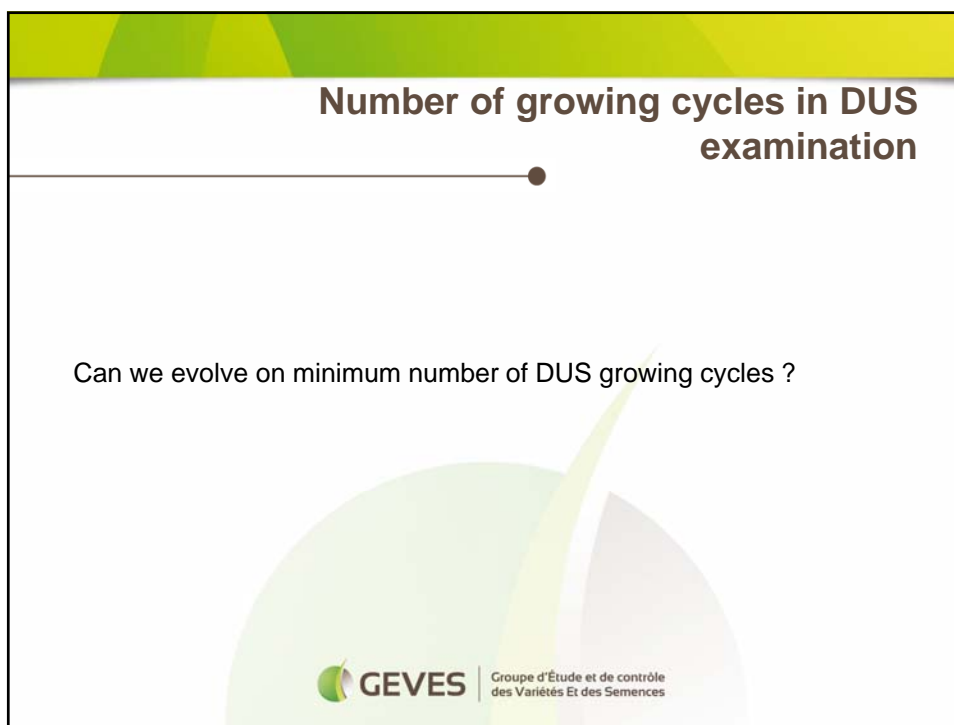


Number of growing cycles in DUS examination
for Fruit species

UPOV TWF 2016 - France GEVES




GEVES
Expertise & Performance



Number of growing cycles in DUS
examination

●

Can we evolve on minimum number of DUS growing cycles ?





GEVES | Groupe d'Étude et de contrôle
des Variétés Et des Semences

Number of growing cycles in DUS examination


Today, to validate « sufficiently consistent differences »:


- field crops 2 DUS cycles
- vegetables 2 DUS cycles
- fruits 2 DUS cycles + opening to 1 DUS cycle
- ornamentals 1 DUS cycle + species with 2 DUS cycles



Number of growing cycles in DUS examination

CPVO R&D Project « reducing the number of obligatory observation periods in DUS testing for candidate varieties in the fruit sector », 2013, (Brand, Palau, Gandelin for GEVES France)

 Influence of the reduction of the number of observation periods on **Distinctness, Uniformity and description**



Number of growing cycles in DUS examination

For France, investigation on candidate varieties that have their DUS test ended between 2007 and 2011: **154 peach** varieties, **40 apple** varieties, either seedling or mutants.

- the second year of observation revealed a possible **problem of distinctness**
- the second year of observation revealed a possible **problem of uniformity**
- **some characteristics are affected** by the second year of observation

Number of growing cycles in DUS examination

Results

Peach:

148 hybrids studied: all of them could have been declared D and H after 1 year of observation.

But none could have been fully described after only one year.

Number of growing cycles in DUS examination

Results

Apple:

19 mutants studied: 7 revealed problems of distinctness during the first year, 2 during the second year.
No problem of Uniformity revealed during the second year.
None could have been fully described after only one year.

19 hybrids studied: all of them could have been declared D and H after 1 year of observation.
2 of them got a full description after 1 year of observation.

Number of growing cycles in DUS examination

Results

Between 2007 and 2011, the examiners knew that they had 2 years to describe the variety: in some cases, the description should probably have been done in 1 year.



in some cases, it is possible to reduce the number of observation cycles

We don't forget that some characters can evaluate between third and four leaves, especially for Peach.

Number of growing cycles in DUS examination

in 2015, first year that France proceeded with **1 significant fruit production observation**, if:

- this is a **hybrid** variety
- the observations of the first fruits and the first significant production are **consistent**
- the variety is **clearly Distinct**
- the examiner manages to produce a **full description**

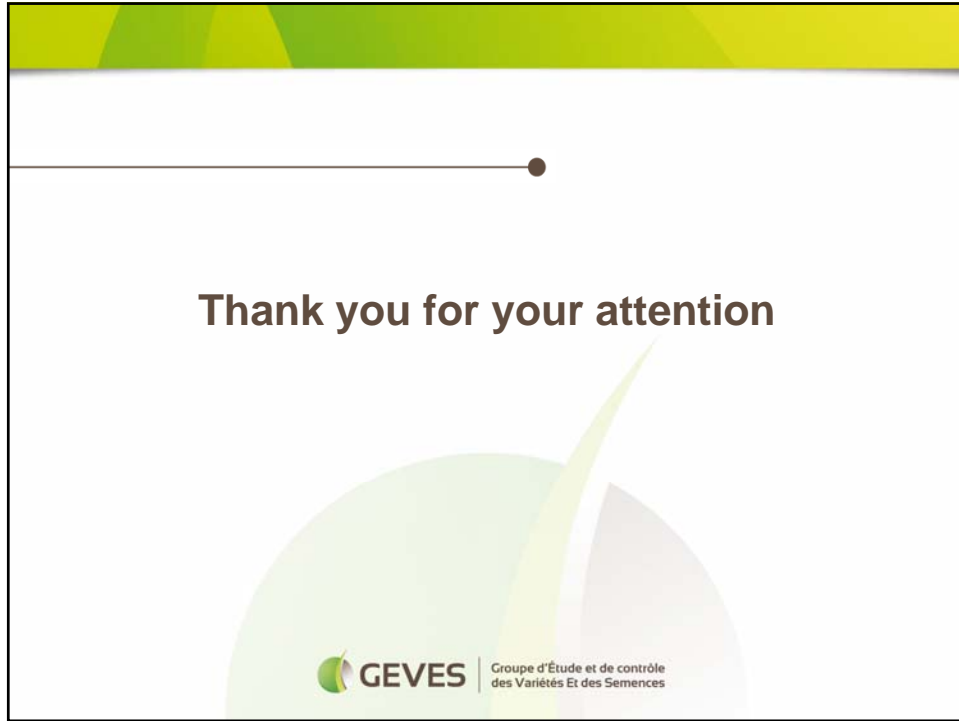


4 hybrids for Apple
1 hybrid for Pear

Number of growing cycles in DUS examination

Highly valuable for the **applicant** (quicker valorization of innovation, reducing costs) and for the **examiner** (reducing time of work on very simple cases).

If here is any doubt, proceed to a second year of observation !



[Annex II follows]

ANNEX II

VARIABILITY OF ASSESSMENT DATA OVER YEAR IN APPLE
BY AN EXPERT FROM GERMANY



Variability of assessment data over years in apple

Erik Schulte, Bundessortenamt
UPOV-TWF 2016



DUS examination in apple

- Records since 1992
- Large living collection (2016: 550 varieties)
- Datas stored in database (2016: 600 varieties)
- Long term data comparison revealed variation over years:

What are the reasons? How to deal with?



Factors with influence on DUS characteristics:

- **Alternate bearing** (effect on e.g.: type of bearing, shoot thickness, leaf [green] coloration)
- **Age of tree** (e.g. type of bearing, tree habit, internode length, fruit size)
- **Climatic conditions** (e.g. ballon stage color, anthocyanin coloration, fruit over color, fruit russetting, stalk length, all phenological data)
- **Shoot thickness** (e.g. shoot pubescence [shoot thickness itself depends on fruit set])
- **Pollination** (e.g. fruit ratio length/width)
- **Flower set** (e.g. flower diameter)
- **Fruit set** (e.g. tree vigor and habit, shoot thickness, leaf [green] coloration, fruit ground and over color, fruit size, fruit ribbing)
- **Fruit maturity** (e.g. fruit skin and flesh color, fruit firmness, greasiness of skin)

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Can this be proved?

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(to focus on:)

- **Age of the trees**
- **Alternate bearing effect**



(to focus on:)

- **Age of the trees**



Influence of age of tree on fruit size (variety 'Elstar', plantation in 1993 and 2003)

year	fruit set (note)	fruit size (note)
1995	2	7
1996	5	6
1997	5	5
1998	5	5
1999	3	4
2000	4	4
2001	4	3
2002	4	5
2005	3	6
2006	5	5
2007	4	4
2008	7	5

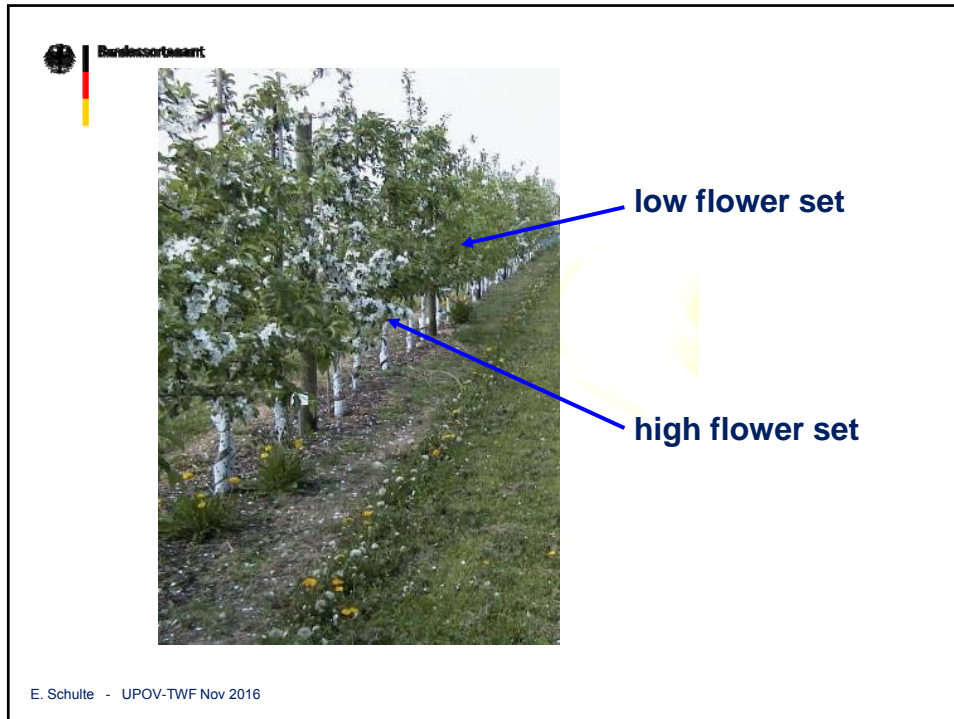
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(to focus on:)

- Age of the trees
- **Alternate bearing effect**

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Influence of year and alternate bearing on flower diameter
(variety 'Ingrid Marie')

testing year	flower set (note)	flower diameter [mm]	mean value (all varieties) [mm]
1996	7	44	47
1997	4	56	49
2000	2	64	59

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Reifensortiment

Thickness of shoot

with yield
without yield

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Reifensortiment

Variation of characteristic assessments

(exam. years 2011+2012, 56 varieties)

TG/14/9	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30				
	Tree: vigor	Baum Typ	Tree: habit	Baum Fruchtansatz	...shoot: thickness	...shoot: length of	...shoot: colorshoot: pubescence	...shoot: pubescence	in terminal	Leaf blade: attitude...	Leaf blade: length	Leaf blade: width	Leaf blade: length/width	Leaf blade: ...green	Leaf blade: ...color	Leaf blade: incisions...	Leaf blade: pubescence	Petiole: length	Petiole: ...anthocyanin...	Petiole: ...color at bloom	stage	Flower: diameter...	Petal: arrangement of	Petal: ...relative to anthers	Young fruit: ...anthocyanin...	Fruit: size	Fruit: height	Fruit: diameter	Fruit: diameter	Fruit: shape	Fruit: ribbing	Fruit: crowning...	
+ 5 notes																																		
+ 4 notes																																		1
+ 3 notes								1	1			1											1			1							2	
+ 2 notes	1	1	1	5	5	2	4	5		3	5		2	7	3	1	3	1	5							9	3	3	2	1	2			
+ 1 note	13	17	12	17	17	9	9	12	5	23	15	10	8	8	19	14	10	10	21	6	6	25	8	11	6	9	2	6	5					
0 notes	18	5	33	37	16	28	30	22	20	41	19	22	28	22	37	32	29	16	42	16	34	44	21	24	23	29	32	34	41	40				
- 1 note	18	5	5	12	4	11	10	14	10	9	13	15	20	4	2	11	19	4	11	17	7				13	15	19	10	4	8	11			
- 2 notes	6		1	6	2	1	7	5		2		3	3				1	6		2					7	3	1	3	1	1				
- 3 notes								2	1						1					2						1					1			
- 4 notes								2																		1					6			
- 5 notes																																3		

green = no, or very low, variation between 1st and 2nd exam. year
yellow = variation in > 50% of varieties

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Reifensortiment (part 2)

TG/14/9	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57
+ 5 notes										2																	
+ 4 notes		1								1																	
+ 3 notes		1				1								1				3	1				1				
+ 2 notes	6	4	1	5	3	3	3						1	2	4	2	6	6		2	1	1	2	2			1
+ 1 note	21	10	7	10	1	9	3	20	14	2			10	8	12	14	10	20	15	9	8	9	2	14	6	3	3
0 notes	14	22	45	37	40	38	46	25	32	51	44	53	34	30	20	21	20	18	33	18	21	32	36	30	25	33	44
- 1 note	10	11	4	8	4	4	2	6		1	9	3	11	11	13	17	14	7	4	22	24	8	13	10	19	18	8
- 2 notes	4	7		4	2	1		2	3				3	5	2	6	2	3	5	2	5	1			5	2	
- 3 notes	1			2	1		1							1	1							1	1			1	
- 4 notes									5						1												
- 5 notes										2																	

green = no, or very low, variation between 1st and 2nd exam. year
 yellow = variation in > 50% of varieties
 red = variation in > 75% of varieties

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Reifensortiment

Conclusions:

- apply Equal treatment (pruning, fertilization etc.)
- try to reduce Alternate bearing effect (by thinning, pruning etc.),
- minimize Environmental effect + Age effect on final description by testing >1 year

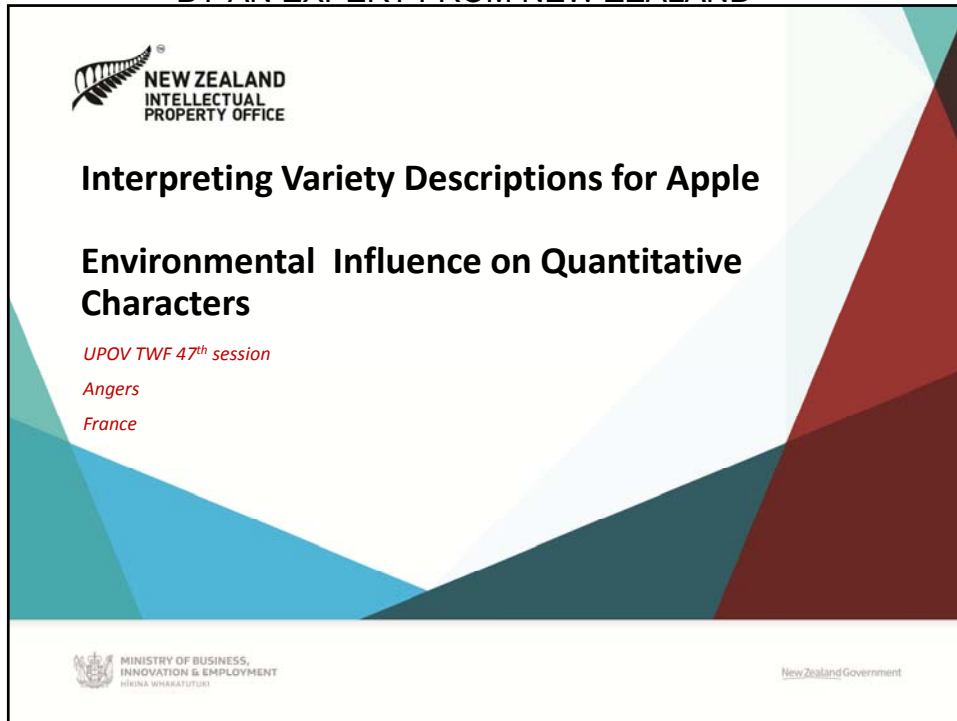
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[Annex III follows]

ANNEX III

INTERPRETING VARIETY DESCRIPTIONS FOR APPLE –
ENVIRONMENTAL INFLUENCE ON QUANTITATIVE CHARACTERS
BY AN EXPERT FROM NEW ZEALAND



The cover page features a white background with a decorative geometric pattern of overlapping triangles in shades of teal, blue, and red on the right side. In the top left corner is the logo of the New Zealand Intellectual Property Office, which includes a stylized leaf and the text 'NEW ZEALAND INTELLECTUAL PROPERTY OFFICE'. The main title is centered in bold black text: 'Interpreting Variety Descriptions for Apple' followed by 'Environmental Influence on Quantitative Characters'. Below the title, the text 'UPOV TWF 47th session' is written in red, followed by 'Angers' and 'France' in red. At the bottom left is the logo of the Ministry of Business, Innovation & Employment, and at the bottom right is the text 'New Zealand Government'.

NEW ZEALAND INTELLECTUAL PROPERTY OFFICE

Interpreting Variety Descriptions for Apple

Environmental Influence on Quantitative Characters

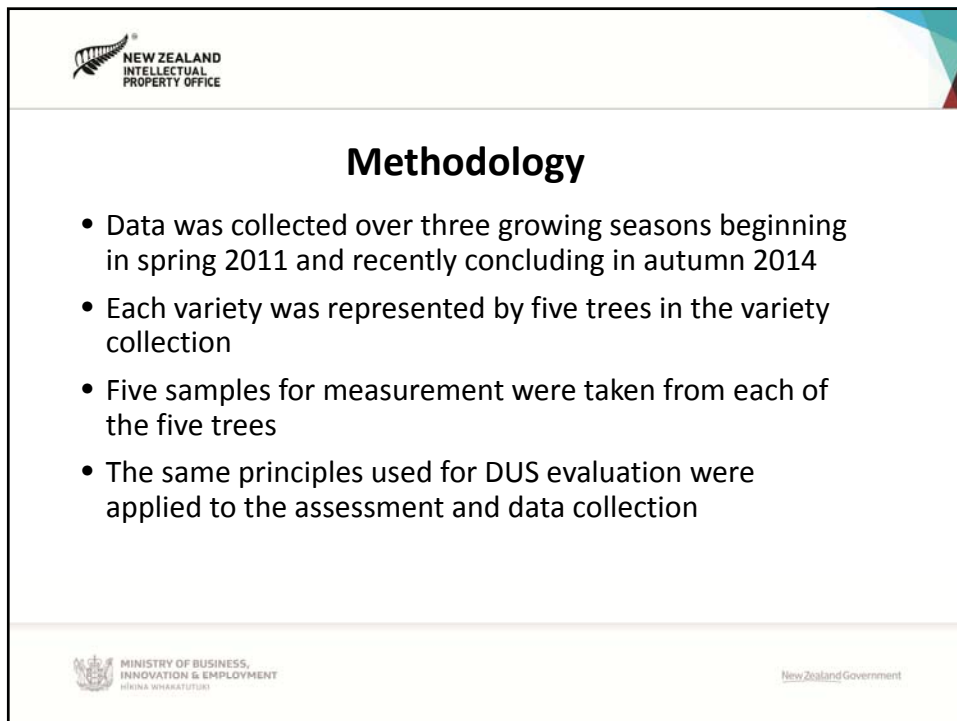
UPOV TWF 47th session

Angers

France

MINISTRY OF BUSINESS, INNOVATION & EMPLOYMENT
HĪKINA WHAKATUTUHI

New Zealand Government



The methodology page has a white background with the same decorative geometric pattern as the cover page. It features the New Zealand Intellectual Property Office logo in the top left. The title 'Methodology' is centered in bold black text. Below the title is a bulleted list of four points. At the bottom left is the Ministry of Business, Innovation & Employment logo, and at the bottom right is the text 'New Zealand Government'.

NEW ZEALAND INTELLECTUAL PROPERTY OFFICE

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

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Over years variability measured by standard deviation

Characteristic	Leaf length			Leaf width			Petiole length		
	2011/12	2012/13	2013/14	2011/12	2012/13	2013/14	2011/12	2012/13	2013/14
Year									
Aztec	6.6	8.5	8.9	5.4	6.5	5.7	2.5	4.6	3.3
Burkitt Gala	11.9	8.3	10.3	6.4	6	4.1	5.7	3.6	3.8
Cripps Pink	8.2	6	8.9	5.2	5.9	7	2.9	1.6	2.7
Delblush	10.7	7.7	10.1	8.5	6.3	6.4	5.9	4.1	3.9
Granny Smith	9.8	6.7	7	7	4.3	6.2	3.1	8.1	2.5
Honeycrisp	8.5	5.6	7.1	5.3	5.9	5.2	3.8	3.4	3.4
Mariri Red	8.2	8.9	8.4	5.6	5.9	3.3	3.3	4.6	3.9
Pinova		10.7	8.7	7.2	6.8	5.4	4.5	3.8	4.1
Royal Gala	9.8	8.7	10.4	6.5	4.6	6.9	4.2	4.8	5.1
Sunrise	7.4	8.2	7.4	5.2	5.6	4.9	3.2	3.6	3.9
Coxs Orange	6.4	6.9	9.3	4.7	4.3	5.3	4.6	3.3	3.4
<i>Influence of environment</i>	low to medium			low to medium			low to medium		

Over years variability measured by standard deviation

Characteristic	Fruit weight			Fruit height			Fruit width		
	2011/12	2012/13	2013/14	2011/12	2012/13	2013/14	2011/12	2012/13	2013/14
Year									
Aztec	26.6	25.2	46.8	3.9	4	5.8	2.5	3.5	6.4
Burkitt Gala	14.5	26.6	13.6	3.1	3.8	3.3	2.8	3.1	2.8
Cripps Pink	36.2	25.8	31	2.8	4	3.4	5.6	3.5	4.1
Delblush	15.1		21	3	3.5	4.4	2.1	3.4	2.6
Granny Smith	18.9	24.3	27.3	3.5	3.9	3.1	2.7	2.8	3.5
Honeycrisp	17.8	25.2	22.3	3.7	2.8	3.3	1.8	3.5	2.9
Mariri Red	18.8	36.1	29.2	4.2	6	4.5	2.7	4.1	3.3
Pinova	16.4	31.4	24.7	4.1	3.4	2.7	3.6	13.3	3.5
Royal Gala	12	28.9	23.9	2.3	4.8	3.7	2.9	4.4	3.5
Sunrise	27.4	18.2	20.8	4.2	3.5	3.1	4.1	3.1	4.6
Coxs Orange	22.5	31.4	31.2	2.7	3.4	4.1	4.8	3.8	4.2
<i>Influence of environment</i>	very high			very low			medium		



Over years variability measured by standard deviation

Characteristic	Fruit height/width ratio			Stalk length			Stalk cavity depth		
	2011/12	2012/13	2013/14	2011/12	2012/13	2013/14	2011/12	2012/13	2013/14
Year									
Aztec	0.03	0.05	0.06	2.4	3.3	2.7	5.4	2.8	2.5
Burkitt Gala	0.03	0.04	0.04	3.8	4.5	2.9	1.9	1.8	1.9
Cripps Pink	0.06	0.03	0.04	5.4	5.8	4.2	1.5	3	2.7
Delblush	0.03	0.04	0.05	2.5	2.5	3.6	1.9	2.1	2.3
Granny Smith	0.04	0.03	0.04	2.1	2.6	3.6	1.7	2.1	1.8
Honeycrisp	0.04	0.02	0.02	4.4	2.7	2.1	2.1	2.2	1.8
Mariri Red	0.06	0.06	0.05	2.8	2.8	3.5	1.5	2.7	2.2
Pinova	0.04	1.6	0.03	3.3	4.6	5.4	1.8	1.9	2.5
Royal Gala	0.04	0.05	0.04	3.9	3.9	5.1	1.5	2.4	2.2
Sunrise	0.04	0.03	0.04	4	2.5	4.1	2.5	1.3	1.4
Coxs Orange	0.05	0.04	0.03	3.4	3.5	3.7	1.5	17.2	1.5
<i>Influence of environment</i>	very low			low			low to medium		



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Over years variability measured by standard deviation

Characteristic	Stalk cavity width			Eye basin depth			Eye basin width		
	2011/12	2012/13	2013/14	2011/12	2012/13	2013/14	2011/12	2012/13	2013/14
Year									
Aztec	2.7	3.2	3.3	1.1	1.7	1.8	2.7	2.7	2.6
Burkitt Gala	6.3	2.1	1.6	1.8	2.2	1.5	3	2.3	2.1
Cripps Pink	3.7	2.5	2.5	1.3	1.8	1.4	2.5	2	1.9
Delblush	1.6	2.7	1.8	1.6	1.8	1.7	1.7	2.7	1.8
Granny Smith	2.3	2.4	2.6		1.9	1.1	2.3	1.8	2.1
Honeycrisp	2.1	2.4	2.3	1.7	1.5	1.4	1.8	3.2	2.3
Mariri Red	2.1	2.3	2.6	1.5	1.6	1.3	2.3	2.4	2.2
Pinova	1.8	1.8	2.4	1.5	1.9	0.97	1.7	2.4	2.8
Royal Gala	1.9	2.2	2.1	1.5	1.5	1.9	2.3	3.4	2.4
Sunrise	2.4	2.1	2.3	2.8	1.5	1.6	2.8	1.9	2.2
Coxs Orange	3.1	3.1	3.1	1.4	1.9	1.2	2.4	2.1	2.4
<i>Influence of environment</i>	low to medium			low			very low		



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