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UPOV

INTERNATIONAL UNION FOR THE PROTECTION OF NEW VARIETIES OF PLANTS
GENEVA

TECHNICAL WORKING PARTY ON AUTOMATION AND COMPUTER PROGRAMS

Twenty-Fifth Session
Sibiu, Romania, September 3 to 6, 2007

ADDENDUM TO
TGP DOCUMENTS

ORAL PRESENTATIONS ON MEASURED QUANTITATIVE CHARACTERISTICS

made by experts from Japan, Republic of Korea, United Kingdom

TABLE OF CONTENTS

The Methods to adjust the Assessment Table for Quantitative Characteristics

Mariko ISHINO
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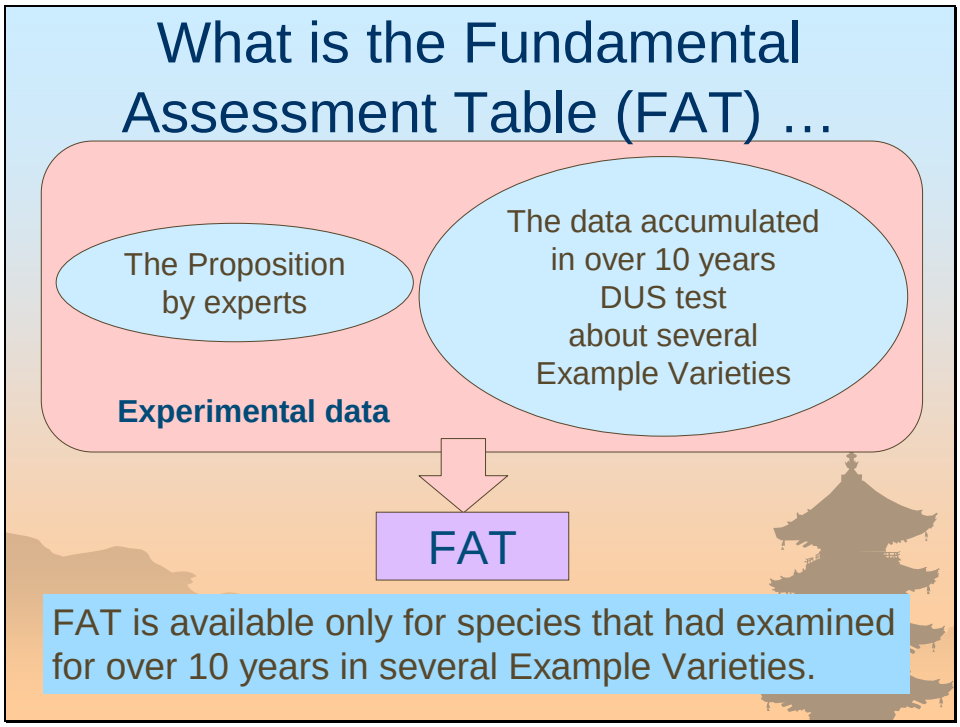
The Context

General Method

The relative assessment based on the data of the Example Variety(EV) in this year .

* demerit
  —No consideration of yearly variations

the Method with
Fundamental Assessment Table(FAT)



Composition of FAT

Plant: Chrysanthemum

No.	Characteristics	d.p.	Note	1	2	3	4	5	6	7	8	9
3	Excluding varieties for cut flower :Excluding varieties for upright type : Plant width	0	Range		~ 9	10 ~ 19	20 ~ 29	30 ~ 49	50 ~ 69	70 ~ 89	90 ~ 109	110 ~
			Width		10	10	10	20	20	20	20	
			Median		4.5	14.5	24.5	39.5	59.5	79.5	99.5	
			Example variety									
	mm		Remarks			<20		40		70<		
5	Stem: internode length	0	Range	~ 7	8.0 ~ 12	13 ~ 17	18 ~ 22	23 ~ 27	28 ~ 35	36 ~ 44	45 ~ 54	55 ~
			Width		5	5	5	5	8	9	10	
			Median		10.0	15.0	20.0	25.0	31.5	40.0	49.5	
			Example variety			Shuhu-no-Chikara				Sei-rosa (Sei-maria)		
	mm		Remarks			15		25		40		
10	Leaf : length	0	Range	~ 48	49.0 ~ 55	56 ~ 63	64 ~ 71	72 ~ 89	90 ~ 109	110 ~ 129	130 ~ 149	150 ~
			Width		7	8	8	18	20	20	20	
			Median		52.0	59.5	67.5	80.5	99.5	119.5	139.5	
			Example variety			Oki-no-Shiranami		Shuhu-no-Chikara				
	mm		Remarks	<49		60		80		120		150<
							⋮					

Composition of FAT

No.	Characteristics	d.p.	Note	1	2	3	4	5	6	7	8	9
10	Leaf : length	0	Range	~ 48	49.0 ~ 55	56 ~ 63	64 ~ 71	72 ~ 89	90 ~ 109	110 ~ 129	130 ~ 149	150 ~
			Width		7	8	8	18	20	20	20	
			Median		52.0	59.5	67.5	80.5	99.5	119.5	139.5	
			Example variety			Oki-no-Shirana mi		Shuhu-no-Chikara				
	mm		Remarks	<49		60		80		120		150<

Note number : 1～9

e.g. Note 5

Range : 72～89 (mm)

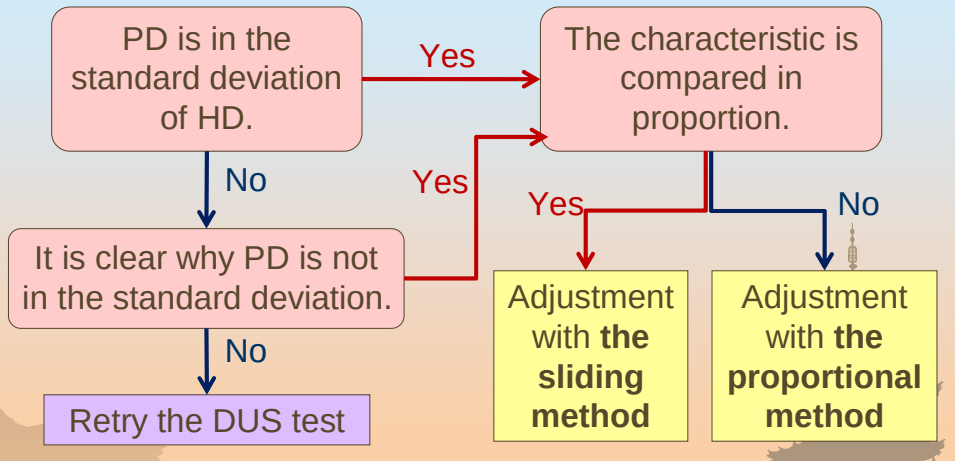
Width → Note-interval : 18 (mm)

Median : 80.5 (mm)

Example Variety ‘Shuhu-no-Chikara’ ; Note 5

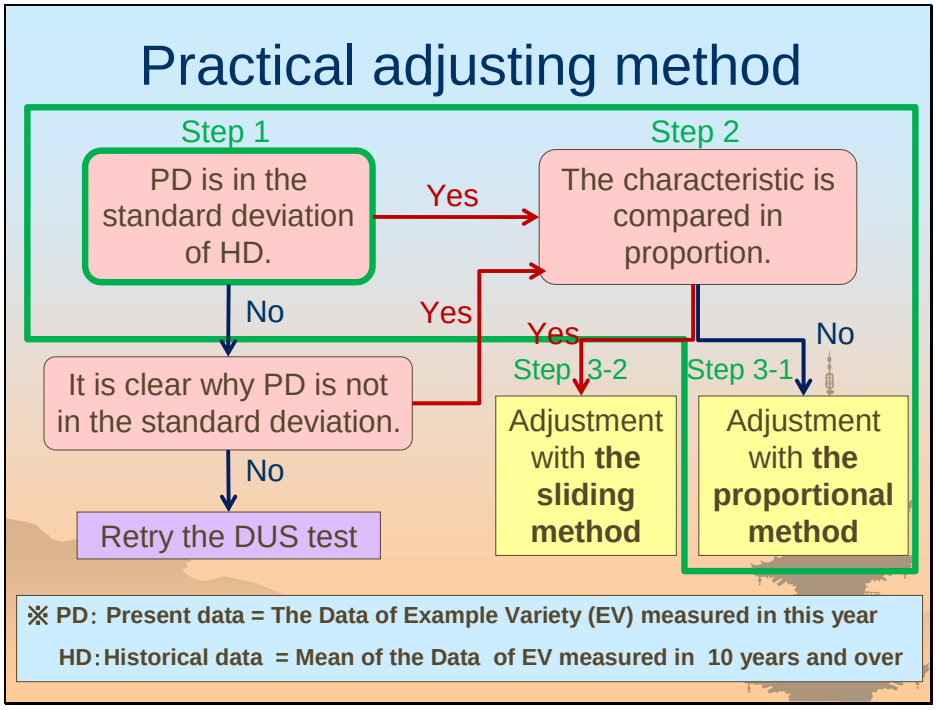
5

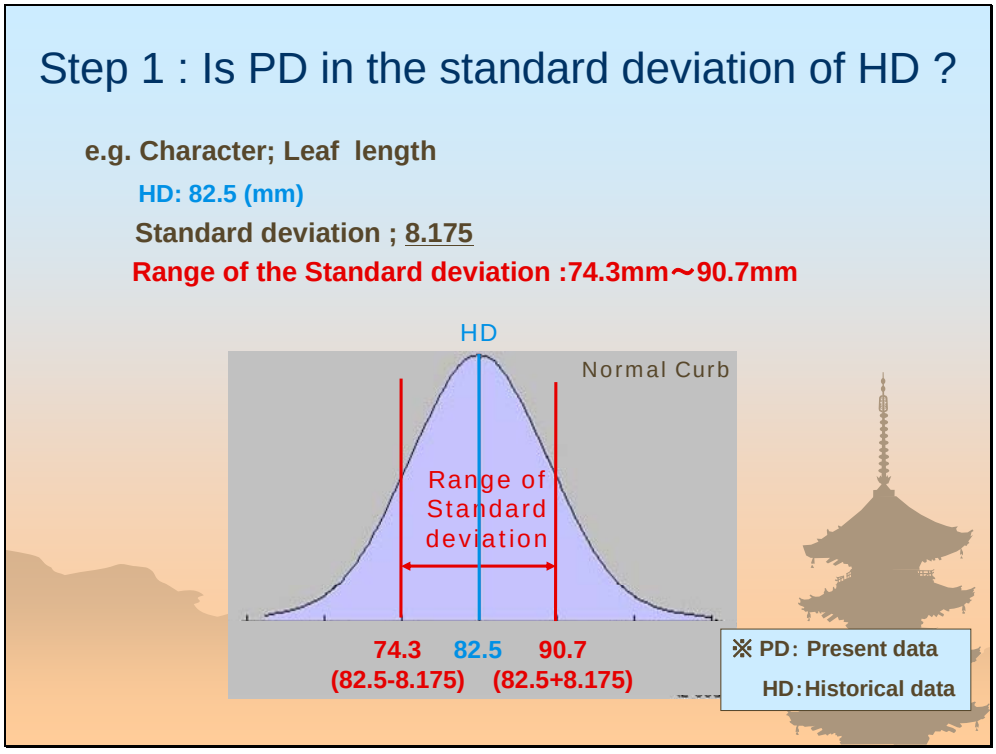
Practical adjusting method

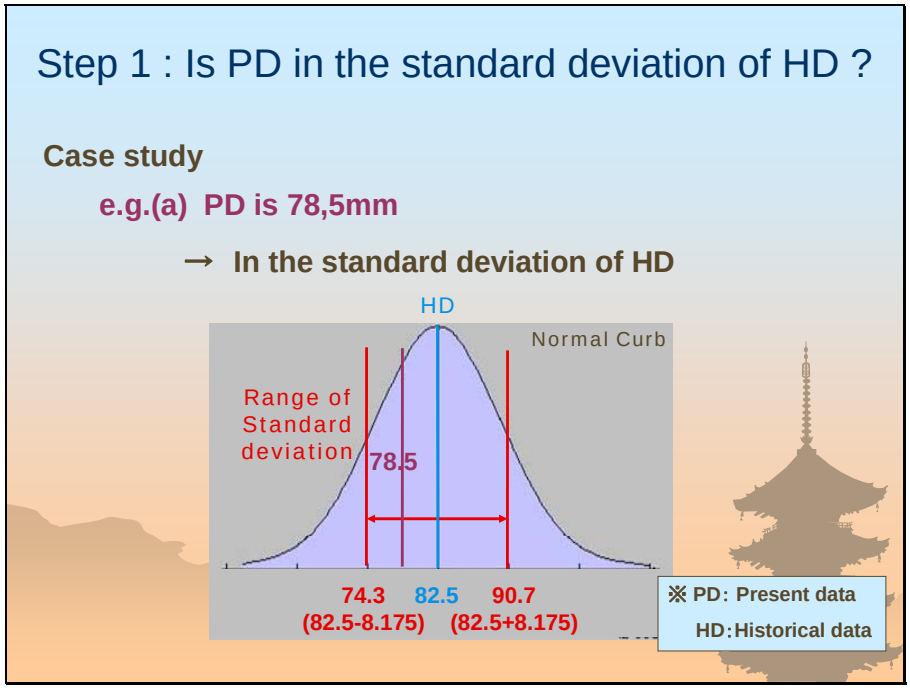


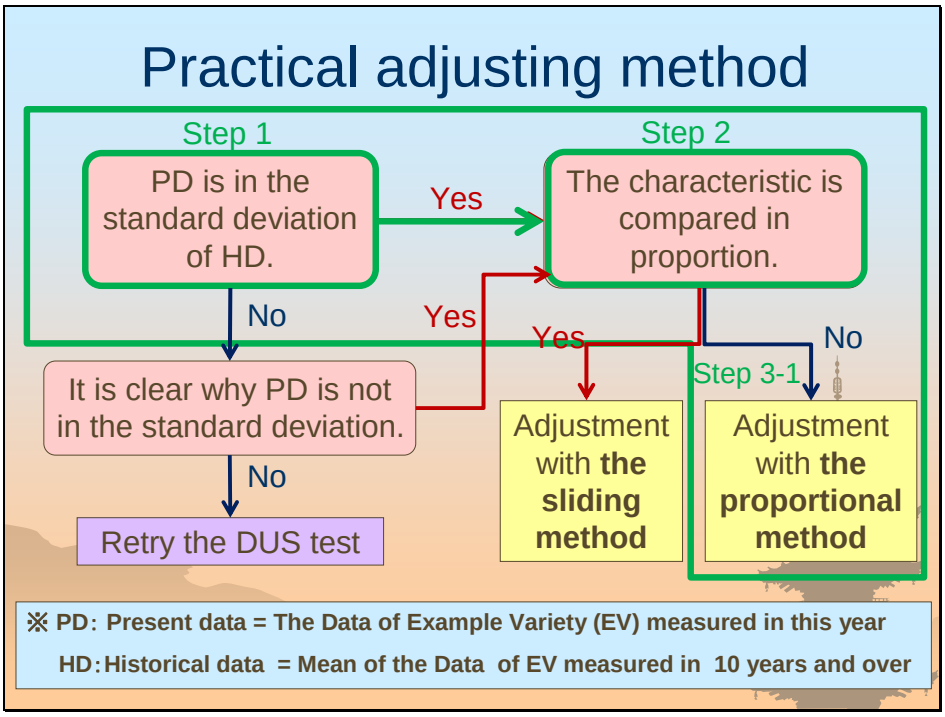
※ PD: Present data = The Data of Example Variety (EV) measured in this year

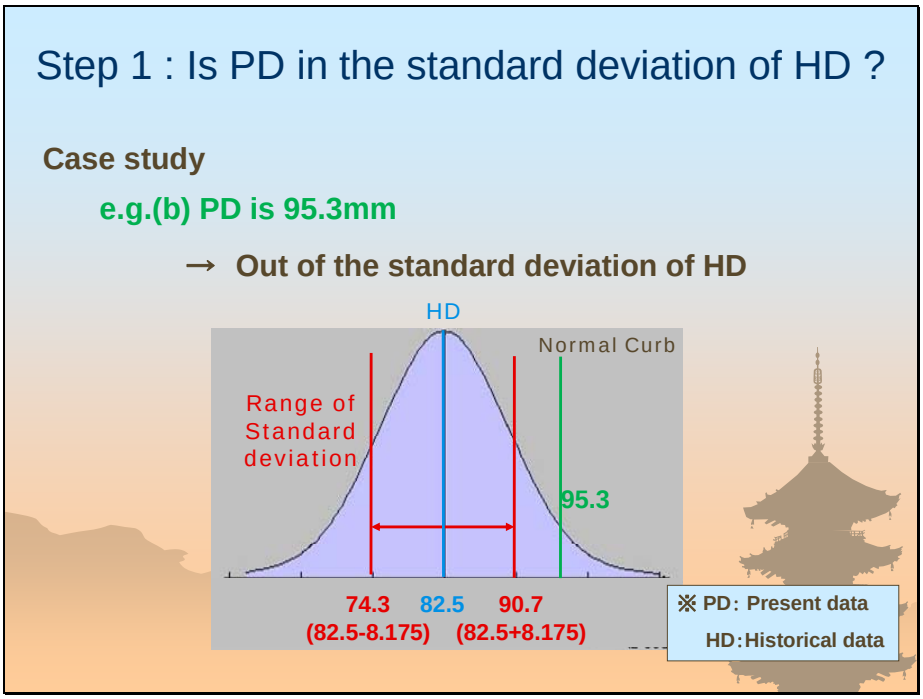
HD: Historical data = Mean of the Data of EV measured in 10 years and over

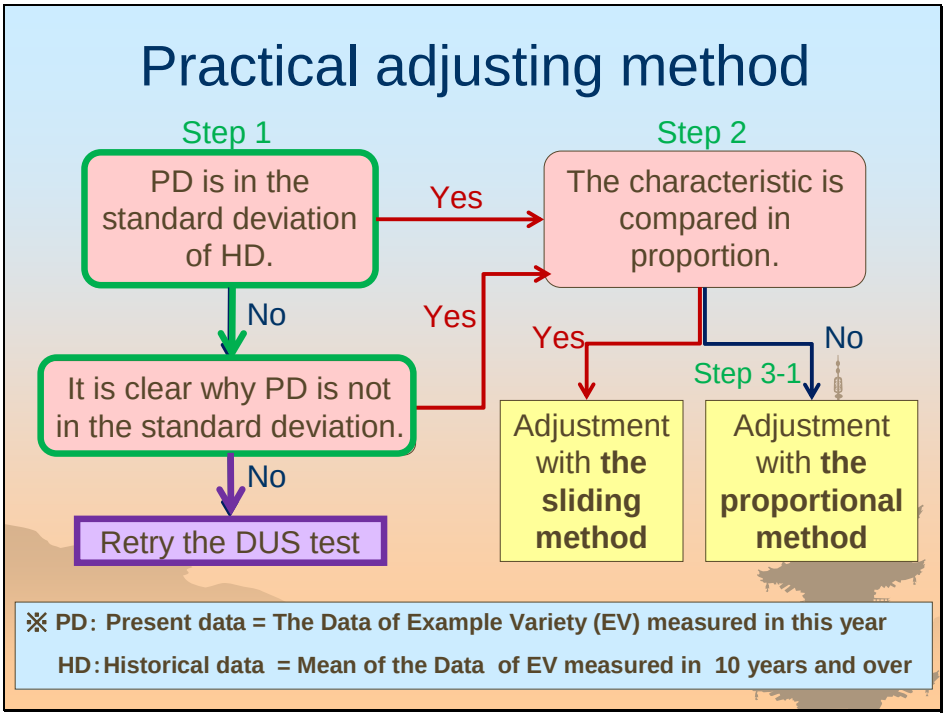

Practical adjusting method
Step 1
PD is in the standard deviation of HD.
Yes
Step 2
The characteristic is compared in proportion.
No
Yes
Yes
No
It is clear why PD is not in the standard deviation.
Step 3-2
Step 3-1
Adjustment with the sliding method
Adjustment with the proportional method
No
Retry the DUS test
※ PD: Present data = The Data of Example Variety (EV) measured in this year
HD: Historical data = Mean of the Data of EV measured in 10 years and over


Step 1 : Is PD in the standard deviation of HD ?
e.g. Character; Leaf length
HD: 82.5 (mm)
Standard deviation ; 8.175
Range of the Standard deviation :74.3mm～90.7mm
HD
Normal Curb
Range of Standard deviation
74.3
(82.5-8.175)
82.5
90.7
(82.5+8.175)
※ PD: Present data
HD: Historical data


Step 1 : Is PD in the standard deviation of HD ?
Case study
e.g.(a) PD is 78,5mm
→ In the standard deviation of HD
HD
Normal Curb
Range of Standard deviation
78.5
74.3 (82.5-8.175)
82.5
90.7 (82.5+8.175)
※ PD: Present data
HD:Historical data


Practical adjusting method
Step 1
PD is in the standard deviation of HD.
Yes
Step 2
The characteristic is compared in proportion.
No
Yes
Yes
No
Step 3-1
It is clear why PD is not in the standard deviation.
No
Retry the DUS test
Adjustment with the sliding method
Adjustment with the proportional method
※ PD: Present data = The Data of Example Variety (EV) measured in this year
HD:Historical data = Mean of the Data of EV measured in 10 years and over


Step 1 : Is PD in the standard deviation of HD ?
Case study
e.g.(b) PD is 95.3mm
→ Out of the standard deviation of HD
HD
Normal Curb
Range of Standard deviation
95.3
74.3
82.5
90.7
(82.5-8.175)
(82.5+8.175)
※ PD: Present data
HD:Historical data


Practical adjusting method
Step 1
PD is in the standard deviation of HD.
Yes
Step 2
The characteristic is compared in proportion.
No
Yes
Yes
No
Step 3-1
It is clear why PD is not in the standard deviation.
No
Retry the DUS test
Adjustment with the sliding method
Adjustment with the proportional method
※ PD: Present data = The Data of Example Variety (EV) measured in this year
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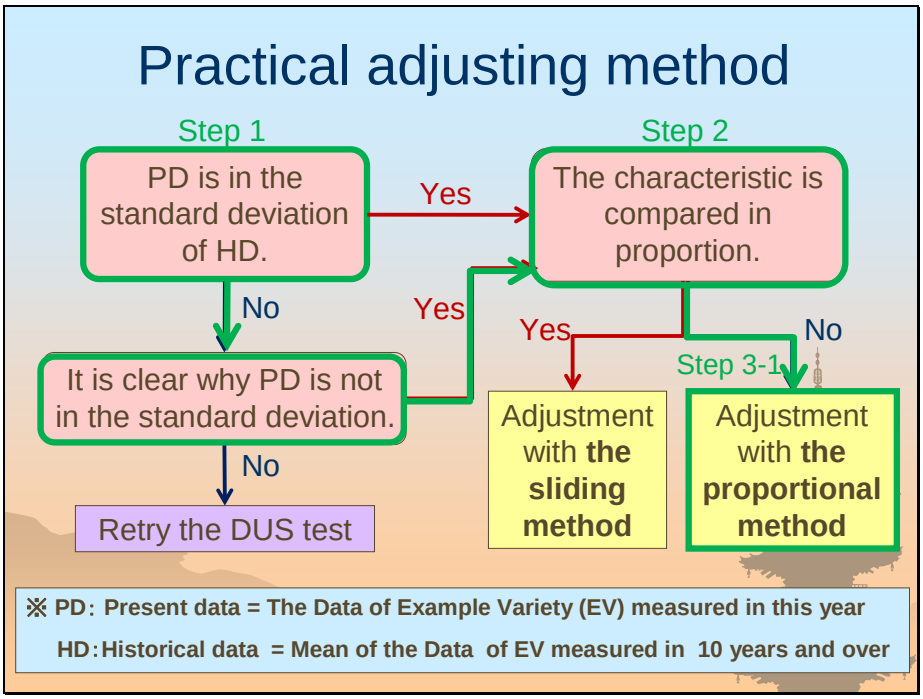
Practical adjusting method
Step 1
PD is in the standard deviation of HD.
Yes
Step 2
The characteristic is compared in proportion.
No
Yes
Yes
No
Step 3-1
It is clear why PD is not in the standard deviation.
Adjustment with the sliding method
Adjustment with the proportional method
No
Retry the DUS test
※ PD: Present data = The Data of Example Variety (EV) measured in this year
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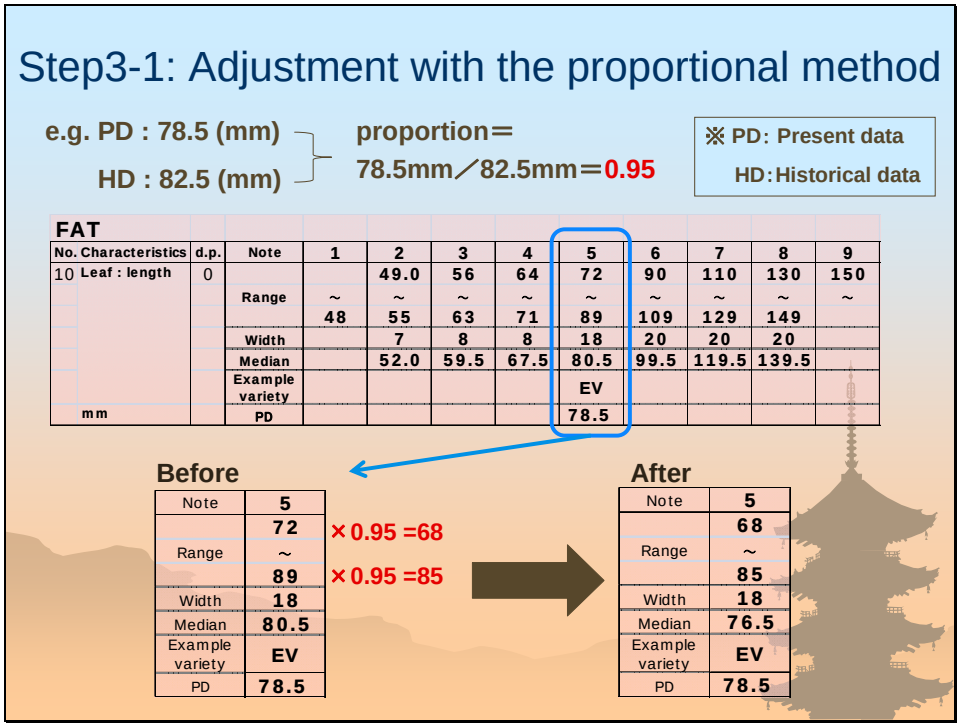
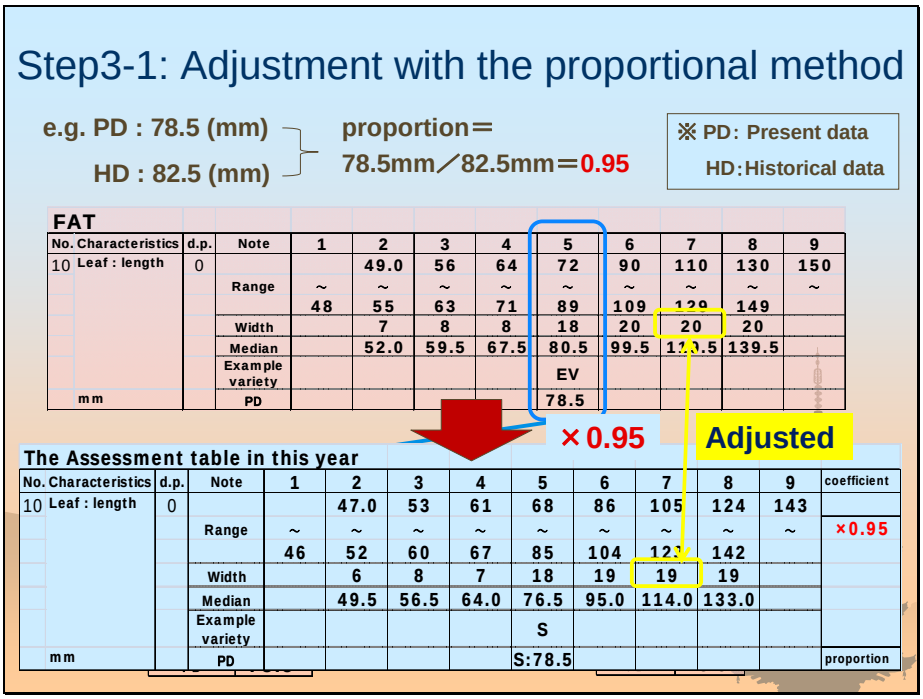
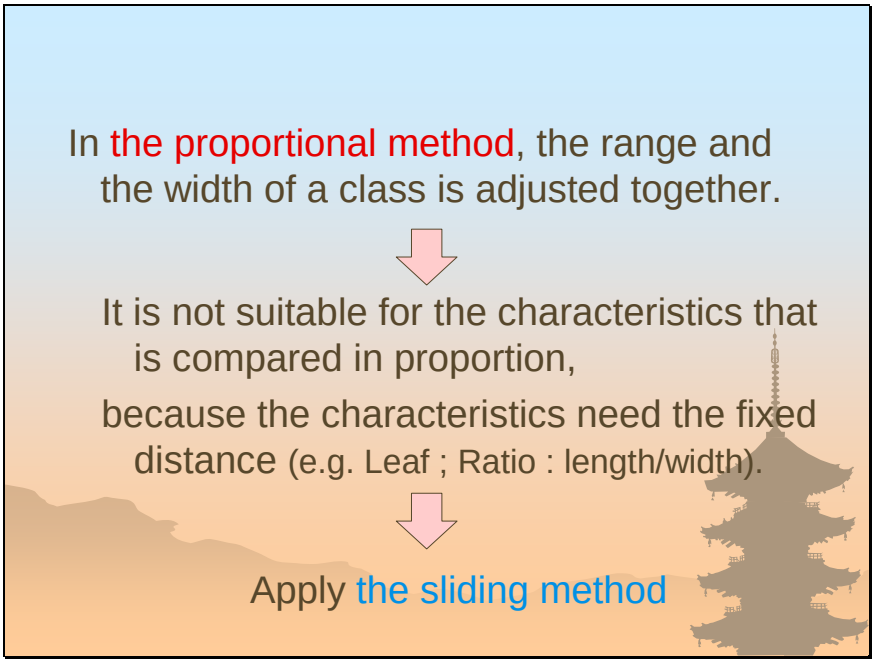
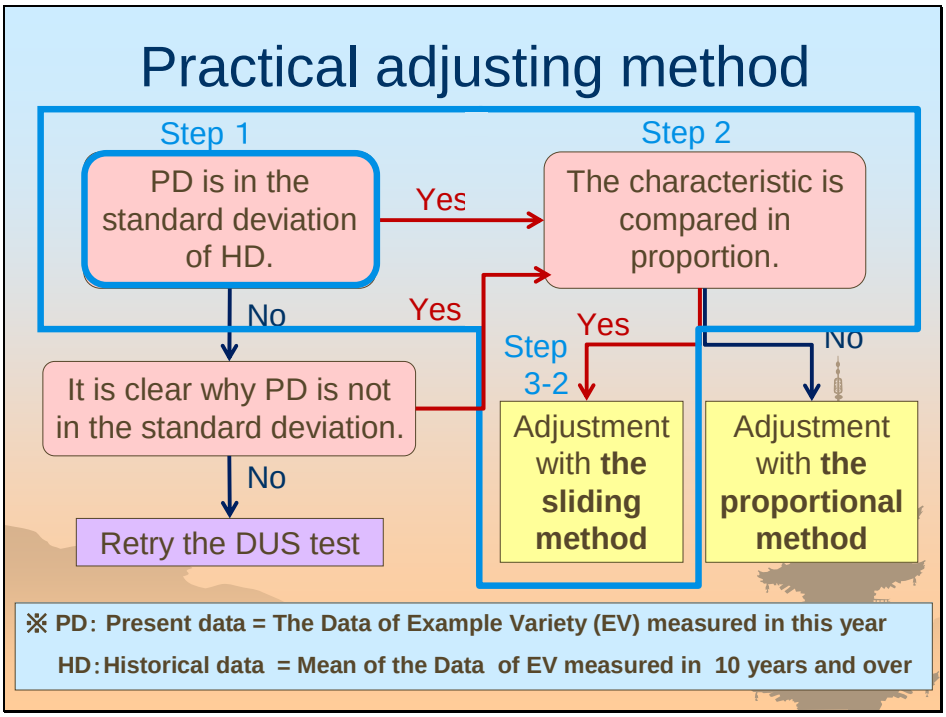
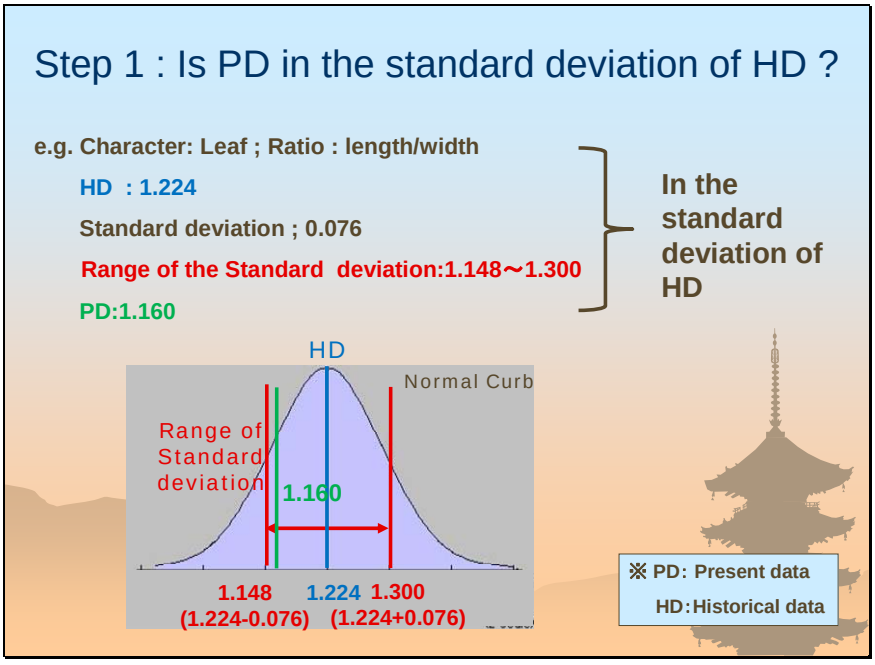
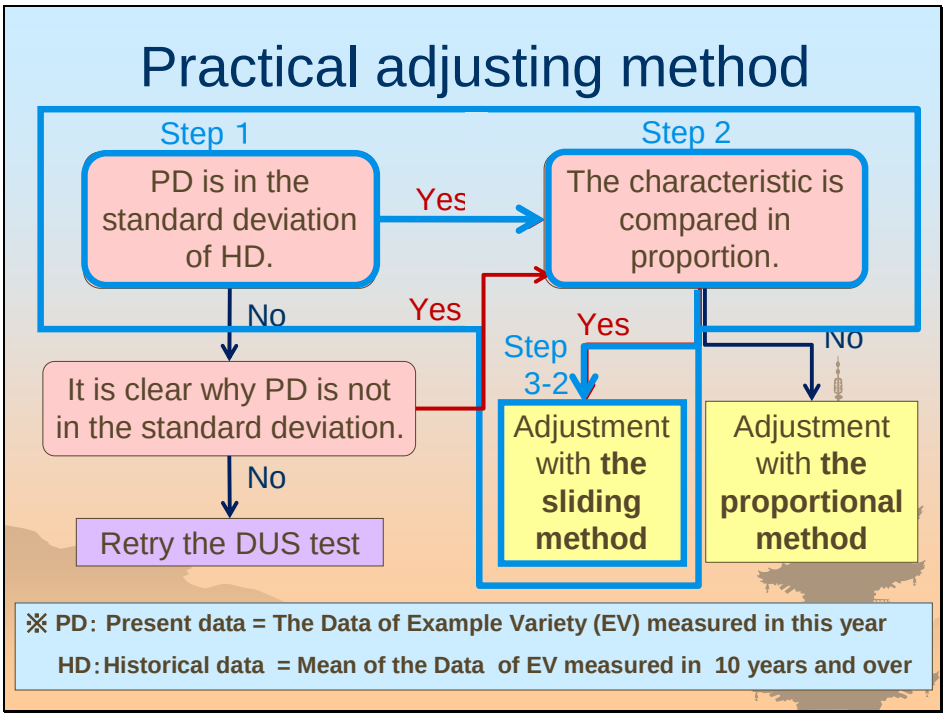

Step3-1: Adjustment with the proportional method
e.g. PD : 78.5 (mm)
HD : 82.5 (mm)
proportion=
78.5mm／82.5mm=0.95
※ PD: Present data
HD: Historical data
FAT
No. Characteristics | d.p. | Note | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9
10 Leaf : length | 0 | Range | | 49.0 ~ 55 | 56 ~ 63 | 64 ~ 71 | 72 ~ 89 | 90 ~ 109 | 110 ~ 129 | 130 ~ 149 | 150 ~
Width | | 7 | 8 | 8 | 18 | 20 | 20 | 20 |
Median | | 52.0 | 59.5 | 67.5 | 80.5 | 99.5 | 119.5 | 139.5 |
Example variety | | | | | | EV | | | | |
mm | PD | | | | | 78.5 | | | | |
Before
Note | 5
Range | 72 ~ 89
Width | 18
Median | 80.5
Example variety | EV
PD | 78.5
×0.95 =68
×0.95 =85
After
Note | 5
Range | 68 ~ 85
Width | 18
Median | 76.5
Example variety | EV
PD | 78.5


Step3-1: Adjustment with the proportional method
e.g. PD : 78.5 (mm)
HD : 82.5 (mm)
proportion＝
78.5mm／82.5mm＝0.95
※ PD: Present data
HD:Historical data
FAT
No. Characteristics | d.p. | Note | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9
10 Leaf : length | 0 | Range | ~ 48 | 49.0 ~ 55 | 56 ~ 63 | 64 ~ 71 | 72 ~ 89 | 90 ~ 109 | 110 ~ 129 | 130 ~ 149 | 150 ~
Width | 7 | 8 | 8 | 18 | 20 | 20 | 20
Median | 52.0 | 59.5 | 67.5 | 80.5 | 99.5 | 119.5 | 139.5
Example variety | EV
mm | PD | 78.5
×0.95
Adjusted
The Assessment table in this year
No. Characteristics | d.p. | Note | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | coefficient
10 Leaf : length | 0 | Range | ~ 46 | 47.0 ~ 52 | 53 ~ 60 | 61 ~ 67 | 68 ~ 85 | 86 ~ 104 | 105 ~ 123 | 124 ~ 142 | 143 ~ | ×0.95
Width | 6 | 8 | 7 | 18 | 19 | 19 | 19
Median | 49.5 | 56.5 | 64.0 | 76.5 | 95.0 | 114.0 | 133.0
Example variety | S
mm | PD | S:78.5 | proportion


In the proportional method, the range and the width of a class is adjusted together.
It is not suitable for the characteristics that is compared in proportion,
because the characteristics need the fixed distance (e.g. Leaf ; Ratio : length/width).
Apply the sliding method


Practical adjusting method
Step 1
PD is in the standard deviation of HD.
Yes
Step 2
The characteristic is compared in proportion.
No
Yes
Yes
Step 3-2
No
It is clear why PD is not in the standard deviation.
No
Retry the DUS test
Adjustment with the sliding method
Adjustment with the proportional method
※ PD: Present data = The Data of Example Variety (EV) measured in this year
HD: Historical data = Mean of the Data of EV measured in 10 years and over


Step 1 : Is PD in the standard deviation of HD ?
e.g. Character: Leaf ; Ratio : length/width
HD : 1.224
Standard deviation ; 0.076
Range of the Standard deviation:1.148～1.300
PD:1.160
In the standard deviation of HD
HD
Normal Curb
Range of Standard deviation
1.160
1.148 (1.224-0.076)
1.224
1.300 (1.224+0.076)
※ PD: Present data
HD: Historical data


Practical adjusting method
Step 1
PD is in the standard deviation of HD.
Yes
Step 2
The characteristic is compared in proportion.
No
Yes
Yes
Step 3-2
No
It is clear why PD is not in the standard deviation.
No
Retry the DUS test
Adjustment with the sliding method
Adjustment with the proportional method
※ PD: Present data = The Data of Example Variety (EV) measured in this year
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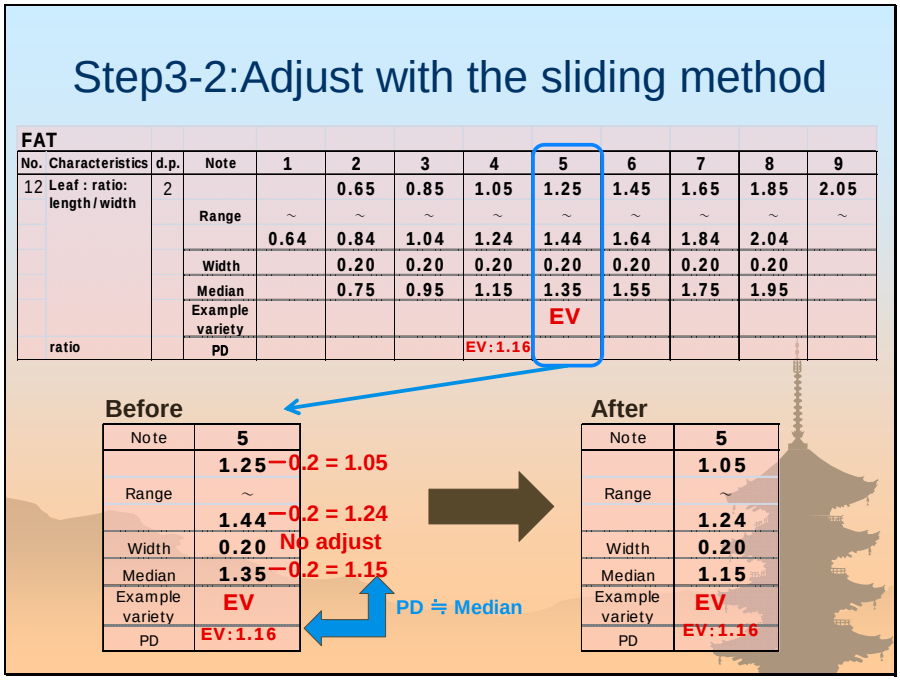

Step3-2:Adjust with the sliding method
FAT
No. Characteristics d.p. Note 1 2 3 4 5 6 7 8 9
12 Leaf : ratio: length / width 2
Range ~0.64 0.65~0.84 0.85~1.04 1.05~1.24 1.25~1.44 1.45~1.64 1.65~1.84 1.85~2.04 2.05~
Width 0.20 0.20 0.20 0.20 0.20 0.20 0.20
Median 0.75 0.95 1.15 1.35 1.55 1.75 1.95
Example variety EV
ratio PD EV:1.16
Before
Note 5
Range 1.25−0.2 = 1.05 ~ 1.44−0.2 = 1.24
Width 0.20 No adjust
Median 1.35−0.2 = 1.15
Example variety EV
PD EV:1.16
PD ≒ Median
After
Note 5
Range 1.05 ~ 1.24
Width 0.20
Median 1.15
Example variety EV
PD EV:1.16

Step3-2:Adjust with the sliding method

FAT

No.	Characteristics	d.p.	Note	1	2	3	4	5	6	7	8	9
12	Leaf : ratio: length / width	2			0.65	0.85	1.05	1.25	1.45	1.65	1.85	2.05
			Range	~	~	~	~	~	~	~	~	~
				0.64	0.84	1.04	1.24	1.44	1.64	1.84	2.04	
			Width		0.20	0.20	0.20	0.20	0.20	0.20	0.20	
			Median		0.75	0.95	1.15	1.35	1.55	1.75	1.95	
			Example variety					EV				
	ratio		PD				EV:1.16					

The Assessment Table in this year

No.	Characteristics	d.p.	Note	1	2	3	4	5	6	7	8	9
12	Leaf : ratio: length / width	2			0.45	0.65	0.85	1.05	1.25	1.45	1.65	1.85
			Range	~	~	~	~	~	~	~	~	~
				0.44	0.64	0.84	1.04	1.24	1.44	1.64	1.84	
			Width		0.20	0.20	0.20	0.20	0.20	0.20	0.20	
			Median		0.55	0.75	0.95	1.15	1.35	1.55	1.75	
			Example variety					EV				
	ratio		PD					EV:1.16				

The points of the adjustment with FAT

- The proportional method
- The sliding method
  (for the characteristic with fixed distance)

* In addition, we use the least variable Example Variety during many years' DUS growing tests about each characteristic.

ANNEX II

Distinctness assessment of Rice in Korea

National Seed Management Office
Republic of Korea

NSMO National Seed Management Office

Selection of similar varieties

☐ **Examiner selects similar varieties as comparing varieties based on;**

○ **Information provided in Technical Questionnaire**
- **similar variety claimed by applicant**
- **variety description**

○ **Database : protected varieties, reference varieties ...**

☐ **In case that researcher responsible for the DUS trial find out more similar varieties on the basis of experience or any other information, additional comparing varieties can be included in trial after consultation with examiner**

Layout of the trial

☐ The step which can enhance efficiency and accuracy of distinctness assessment

→ Side-by-side arrangement of candidate / comparing variety

Distinctness assessment concerning the types of characteristic

☐ (Pseudo) Qualitative characteristics
- ○ Visual observation
- ○ Different notes between candidate and comparing variety is considered to be distinct

☐ Quantitative characteristics
- ○ Mostly, measure a number of plants or parts of plants (MS)
- ○ Assessing method slightly differ on the basis of TG
  - under previous TG : assessment by notes
  - under current TG : statistical analysis

Distinctness assessment by notes

☐ Circumstance

○ Previous rice TG (which had been applied until 2006) included example varieties which are easily available varieties in Korea

○ Examiners have much experience in DUS test

- Wide range of information about varieties of common knowledge, reference varieties

Assessment procedure

1. Data obtaining during DUS test
   Candidate, reference, example varieties

2. Mean calculation

3. Determination interval of notes
   - considering minimum and maximum value of expression

4. Specific adjustment of ranges of notes based on example varieties

5. In principle, 2 notes difference are required for distinctness

Simplified example : Stem length

Stem length (excluding panicle)	Example varieties	Note
Very short		1
Short	EV-3	3
Medium	EV-5	5
Long		7
Very long		9

○ Measured data of varities

- Min. : 66cm
- Max. : 120cm
- EV-3 : 75cm
- EV-5 : 94cm

- Candidate var. CV-a: 77cm
- Comparing var. SV-a: 82cm
- Candidate var. CV-b: 77cm
- Comparing var. SV-b: 91cm

- 1st step : whole Range
  120-66 = 54
- 2nd step : Interval
  54/6 = 9cm (Note 2~8)
- 3rd step : determination of range of states based on example varieties
  EV-3 : 75cm, EV-5 : 94cm

Range	Notes	
62-70	2	
71-79	3	EV-3 : 75cm
80-88	4	
89-97	5	EV-5 : 94cm
98-106	6	
107-115	7	
116-124	8	

Results

Range	Notes	Compared pairs	Compared pairs
62-70	2		
71-79	3	CV-a	CV-b
80-88	4	SV-a	
89-97	5		SV-b
98-106	6		
107-115	7		
116-124	8		

- CV-a (77cm), SV-a (82cm) : not distinct (1 note difference)
- CV-b (77cm), SV-b (91cm) : distinct (2 notes difference)

※ Even if 1 note difference, If necessary, further statistical analysis might be carried out
ex) candidate 81cm, comparing var. 96cm

Distinctness assessment by statistics

☐ Circumstance

○ Rice TG revised in 2005 and has been applied since 2006
○ Example varieties are not included at the moment

Statistical method : t-test

☐ t-test

Assess whether the means of two varieties are statistically different from each other

- formula

$$t_s = \frac{\overline{X_1} - \overline{X_2}}{\sqrt{\left(\frac{(n_1-1)s_1^2+(n_2-1)s_2^2}{n_1+n_2-2}\right)\left(\frac{n_1+n_2}{n_1 \bullet n_2}\right)}}$$

Simplified example : Stem length

Replication	1	2	3	Mean
Candidate var.	60	63	62	61.7
Comparing var.	69	68	67	68.0

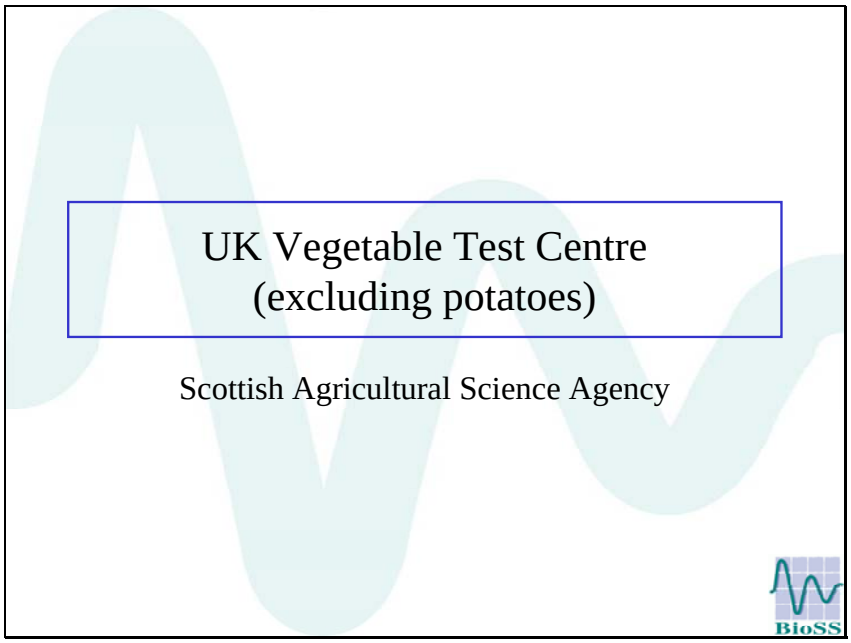
○ Computation results

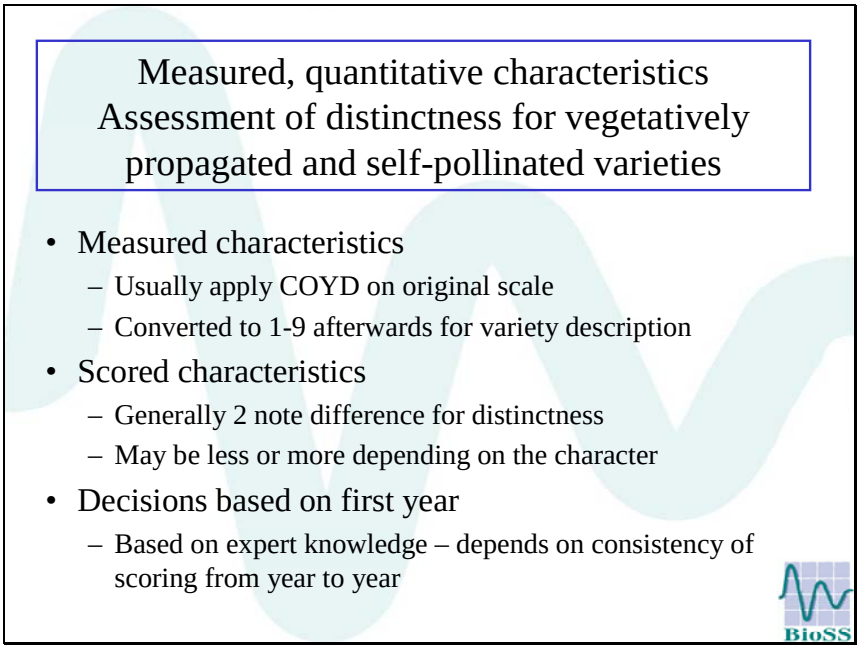
- t_s = 6.0083
- df = 6-2 =4
- $t_{0.01(4)}$ = 4.604

→ two varieties are significantly different

→ considered to be distinct

ANNEX III


UK Vegetable Test Centre
(excluding potatoes)
Scottish Agricultural Science Agency
BioSS


Measured, quantitative characteristics
Assessment of distinctness for vegetatively propagated and self-pollinated varieties
• Measured characteristics
– Usually apply COYD on original scale
– Converted to 1-9 afterwards for variety description
• Scored characteristics
– Generally 2 note difference for distinctness
– May be less or more depending on the character
• Decisions based on first year
– Based on expert knowledge – depends on consistency of scoring from year to year
BioSS

Development of variety descriptions

DUST has a procedure, VDES, for calculating variety descriptions for quantitative characters based on over-year variety means. Two methods:

a) By division of the range of over-year means for the reference collection varieties into equal-spaced groups. The number of groups is equal to the number of levels on the required description scale.

b) Use of delineating varieties to divide the scale.

- UK Veg Centre uses (a) – UK as whole uses both

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[End of Annex III and of document]