UPOV

International Union for the Protection of New Varieties of Plants

E

Technical Working Party for Agricultural Crops
Forty-Sixth Session
Hanover, Germany, June 19 to 23, 2017

Technical Working Party for Vegetables
Fifty-First Session
Roelofarendsveen, Netherlands, July 3 to 7, 2017

Technical Working Party for Ornamental Plants and Forest Trees
Fiftieth Session
Victoria, Canada, September 11 to 15, 2017

Technical Working Party for Fruit Crops
Forty-Eighth Session
Kelowna, Canada, September 18 to 22, 2017

Technical Working Party on Automation and Computer Programs
Thirty-Fifth Session
Buenos Aires, Argentina, November 14 to 17, 2017

TWP/1/16

Original: English
Date: June 9, 2017

SOFTWARE FOR STATISTICAL ANALYSIS IN DUS EXAMINATION

Document prepared by the Office of the Union

Disclaimer: this document does not represent UPOV policies or guidance

EXECUTIVE SUMMARY

1. The purpose of this document is to report on the development of software for statistical analysis in the examination of distinctness, uniformity and stability (DUS).

2. The TWPs are invited to note the developments concerning software for statistical analysis in DUS examination, as set out in paragraphs 3 to 7 of this document.

BACKGROUND

Statistical methods used in the DUSTC software package

3. The TWC, at its thirty-fourth session, held in Shanghai, China, from June 7 to 10, 2016, received a presentation by an expert from China on “Statistical methods used in the DUSTC software package”, including a demonstration of the software package that incorporates statistical analysis procedures, including the methods for calculating COYU and COYD (see document TWC/34/32 “Report”, paragraph 89).

A ring-test comparing three different software packages for COYD

4. The TWC received a presentation by an expert from China on “A ring-test comparing three different software packages for COYD”, a copy of which is reproduced in the Annex to this document. The TWC noted that the same data set was used to compare results generated for the COYD procedure using the statistical packages developed in China (DUSTC), Germany (SAS) and the United Kingdom (DUST). The TWC noted that the three different software packages produced the same result (see document TWC/34/32 “Report”, paragraph 95).

A single tool for DUS computation process

5. The TWC received a presentation by an expert from France on “A single tool for DUS computation process”, a copy of which is reproduced in the Annex to document TWC/34/29. The TWC noted the integration of new functions in the GAIA software and use of the same interface for different processes, such as COYD and COYU, using the same data set (see document TWC/34/32 “Report”, paragraphs 92 to 94).

6. The TWC noted the changes to the data structure in the Excel file used to upload data to GAIA with the introduction of information on replicates and number of plants per replicate. The TWC noted that the improvements made would still allow GAIA to be available free of charge.

7. The TWC agreed to invite France to report on progress in the development of a single tool for DUS computation process at the thirty-fifth session of the TWC.

8. The TWPs are invited to note the developments concerning software for statistical analysis in DUS examination, as set out in paragraphs 3 to 7 of this document.

[Annex follows]

DUS Beijing

A ring-test comparing three different software packages for COYD

Mr. Kun Yang

Deputy director of Beijing Station of DUS Testing for New Varieties of Plants, Ministry of Agriculture, China

Shanghai, China, June 7-10, 2016

DUS Beijing

Index

- Data used for COYD
- Statistical Tools
- Results

DUS Beijing

Data used for COYD

- 45 varieties of Sorghum with two cycles, last five are candidate varieties:

✓**Time of anthesis**, one datum for each cycle

✓**Plant length**, twenty data for each cycle

DUS Beijing

Time of anthesis (days)

variety number	cycle 1	cycle 2
G01	54	61
G02	59	59
G03	55	58
G04	57	62
G05	55	62
G06	59	60
G07	59	63
G08	61	61
G09	54	60
G10	57	61
G11	58	59
G12	59	59
G13	63	64
G14	63	63
G15	60	61
G16	63	64
G17	61	61
G18	60	60
G19	54	58
G20	58	59
G21	59	62
G22	65	65
G23	63	63
G24	56	56
G25	58	57
G26	59	62
G27	61	63
G28	58	58
G29	58	57
G30	62	57
G31	61	58
G32	62	61
G33	60	58
G34	62	58
G35	61	62
G36	57	58
G37	64	61
G38	61	61
G39	61	62
G40	45	47
G41	60	59

Plant length (centimeter)

variety number	cycle 1	cycle 2
G01	152.35	144.6
G02	155.9	145.85
G03	150.2	142.85
G04	133.8	130.4
G05	139.55	141.15
G06	163	152.05
G07	145.45	135.75
G08	162.15	150.6
G09	135.95	126.05
G10	157.7	145.1
G11	136.6	122.9
G12	156.6	150.55
G13	161.3	156.25
G14	146.6	143.1
G15	161.2	152.05
G16	137.1	121.9
G17	160.35	128.95
G18	149.5	130.5
G19	115.3	114.7
G20	137.1	126.25
G21	157.8	145.7
G22	176.6	155.25
G23	147.7	126.45
G24	144.2	129.4
G25	147.1	125.95
G26	146.55	120.4
G27	168	140.9
G28	143.55	123.4
G29	129.3	116.3
G30	156.4	130.55
G31	149.25	119.45
G32	150.1	125.6
G33	156.7	130.15
G34	166.9	133
G35	160.25	139.25
G36	146.8	136
G37	164.85	144.85
G38	159.2	139.5
G39	159.4	134.5
G40	92.65	81.4
G41	147.75	123.5

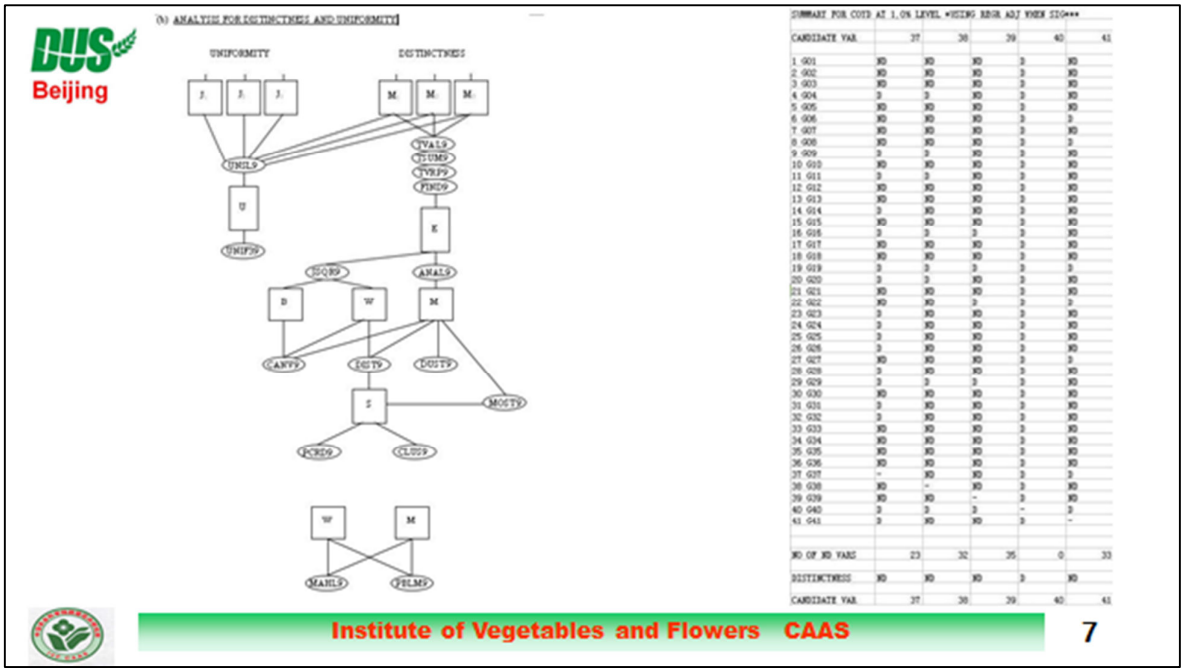
DUS Beijing

Statistical tools

- DUST software, created by the United Kingdom (GB) in 1998, written by FORTRAN 90 language.
- SAS software, data collected by a Visual Basic (VB) software created by Germany (DE).
- DUSTC software, created by China in 2012, written by Pascal language in Delphi plantform.

DUS Beijing

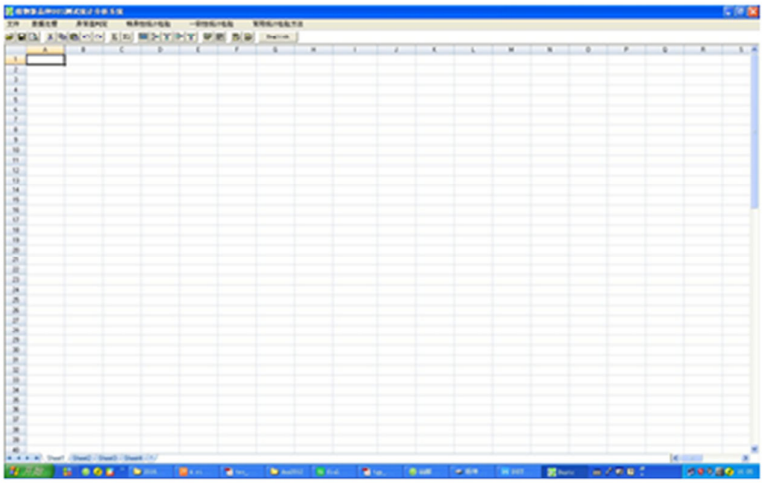
DUSTN——GB



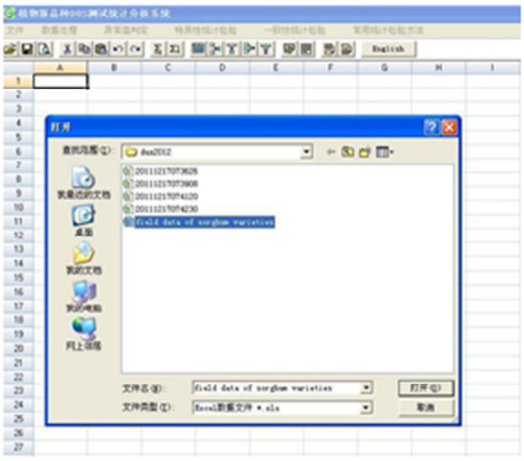
SUMMARY FOR COUP AT 1.0% LEVEL *USING RBUR ADJ WHEN SIG***

CANDIDATE VAR.	37	38	39	40	41
1 G01	MD	MD	MD	3	MD
2 G02	MD	MD	MD	3	MD
3 G03	MD	MD	MD	3	MD
4 G04	3	3	MD	3	MD
5 G05	MD	MD	MD	3	MD
6 G06	MD	MD	MD	3	3
7 G07	MD	MD	MD	3	MD
8 G08	MD	MD	MD	3	3
9 G09	3	3	MD	3	MD
10 G10	MD	MD	MD	3	MD
11 G11	3	3	MD	3	MD
12 G12	MD	MD	MD	3	MD
13 G13	MD	MD	MD	3	MD
14 G14	3	MD	MD	3	MD
15 G15	MD	MD	MD	3	MD
16 G16	3	3	3	3	MD
17 G17	MD	MD	MD	3	MD
18 G18	MD	MD	MD	3	MD
19 G19	3	3	3	3	3
20 G20	3	3	MD	3	MD
21 G21	MD	MD	MD	3	MD
22 G22	MD	MD	3	3	3
23 G23	3	MD	MD	3	MD
24 G24	3	MD	MD	3	MD
25 G25	3	MD	MD	3	MD
26 G26	3	MD	MD	3	MD
27 G27	MD	MD	MD	3	3
28 G28	3	MD	MD	3	MD
29 G29	3	3	3	3	MD
30 G30	MD	MD	MD	3	MD
31 G31	3	MD	MD	3	MD
32 G32	3	MD	MD	3	MD
33 G33	MD	MD	MD	3	MD
34 G34	MD	MD	MD	3	MD
35 G35	MD	MD	MD	3	MD
36 G36	MD	MD	MD	3	MD
37 G37	-	MD	MD	3	3
38 G38	MD	-	MD	3	MD
39 G39	MD	MD	-	3	MD
40 G40	3	3	3	-	3
41 G41	3	MD	MD	3	-
NO OF MD VARS	23	32	35	0	33
DISTINCTNESS	MD	MD	MD	3	MD
CANDIDATE VAR.	37	38	39	40	41

DUSTC——CN

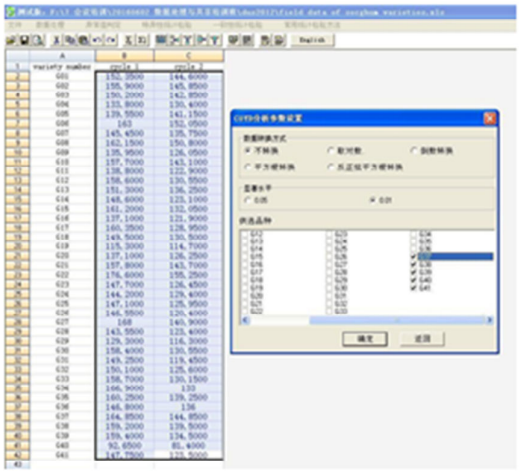


DUS Beijing



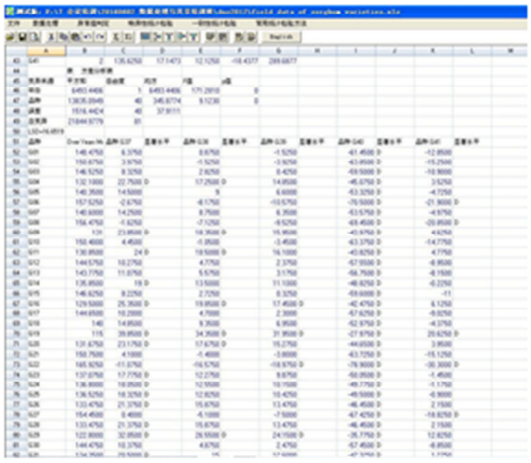
open an excel document with field data

DUS Beijing



select data zone, click parameters board to select method to convert original data, significance level, candidate varieties

DUS Beijing

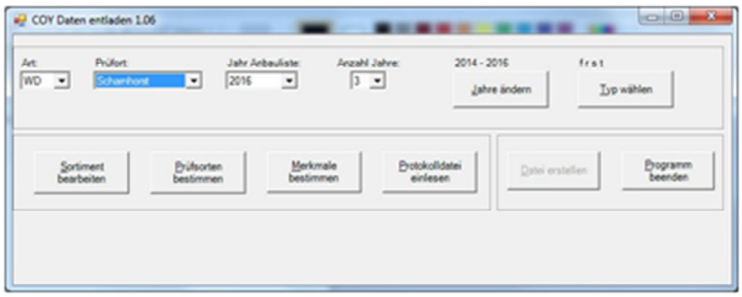


results will be showed in another sheet

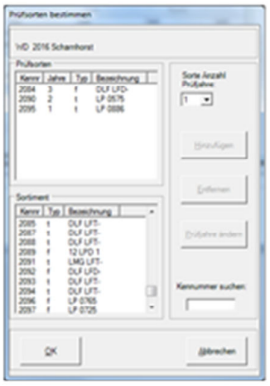
DUS Beijing

SAS——DE

In the first step we choose species, trial-station and time-period

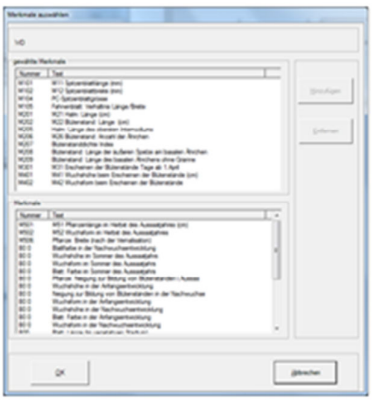


In the second step we choose the candidate-varieties:

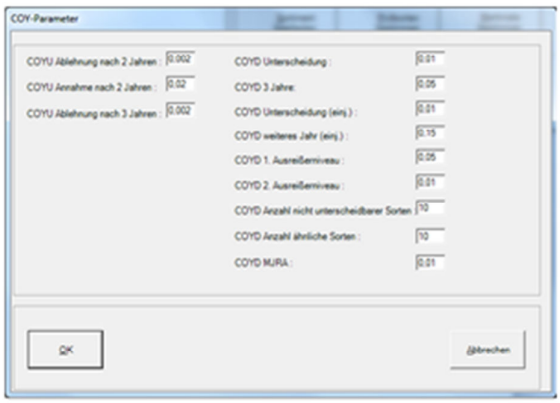


DUS Beijing

In the third step we choose the characteristics:



In the last step we choose the probability-levels:



DUS Beijing

Kenn-Nr.	Sorte	37	38	39	40	41
1	Sorte 01	1J	NU	1J	2U	1J
2	Sorte 02	NU	NU	NU	2U	1J
3	Sorte 03	1U	1J	1J	2U	NU
4	Sorte 04	1U	1U	1J	2U	NU
5	Sorte 05	2J	NU	NU	2U	NU
6	Sorte 06	NU	NU	NU	2U	1U
7	Sorte 07	1J	NU	NU	2U	NU
8	Sorte 08	NU	NU	NU	2U	1U
9	Sorte 09	2U	1U	2J	2U	NU
10	Sorte 10	NU	NU	NU	2U	1J
11	Sorte 11	1U	1U	1J	2U	NU
12	Sorte 12	NU	NU	NU	2U	NU
13	Sorte 13	NU	NU	NU	2U	1J
14	Sorte 14	1U	1J	NU	2U	NU
15	Sorte 15	NU	NU	NU	2U	NU
16	Sorte 16	1U	1U	1U	2U	1J
17	Sorte 17	NU	NU	NU	2U	NU
18	Sorte 18	1J	NU	NU	2U	NU
19	Sorte 19	2U	1U	2U	2U	1U
20	Sorte 20	1U	1U	1J	2U	NU
21	Sorte 21	NU	NU	NU	2U	1J
22	Sorte 22	NU	1U	1U	2U	2U
23	Sorte 23	1U	NU	NU	2U	NU
24	Sorte 24	2U	2J	1U	2U	NU
25	Sorte 25	1U	1J	1J	2U	NU
26	Sorte 26	1U	1J	1J	2U	NU
27	Sorte 27	NU	NU	NU	2U	1U
28	Sorte 28	2U	2J	2J	2U	NU
29	Sorte 29	1U	1U	1U	2U	1J
30	Sorte 30	NU	NU	NU	2U	NU
31	Sorte 31	1U	1J	1J	2U	NU
32	Sorte 32	1U	NU	NU	2U	NU
33	Sorte 33	1J	NU	NU	2U	NU
34	Sorte 34	NU	NU	NU	2U	1J
35	Sorte 35	NU	NU	NU	2U	1J
36	Sorte 36	2J	NU	1J	2U	NU
37	Sorte 37	-	NU	NU	2U	1U
38	Sorte 38	NU	-	NU	2U	1J
39	Sorte 39	NU	NU	-	2U	NU
40	Sorte 40	2U	2U	2U	-	2U
41	Sorte 41	1U	1J	NU	2U	-
.	Anz. NU/3J	16	23	23	0	23
.	Unter./3J	nein	nein	nein	ja	nein

1J: further test year necessary in one characteristic (difference between test and candidate variety is lying between least significant difference for the first (1%) and for second (5%) limit)

2J: further test year necessary in two characteristics (difference between test and candidate variety is lying between least significant difference for the first (1%) and for second (5%) limit)

1U: there is a difference in one characteristic

2U: there is a difference in two characteristics

NU: there is no significant difference

DUS Beijing

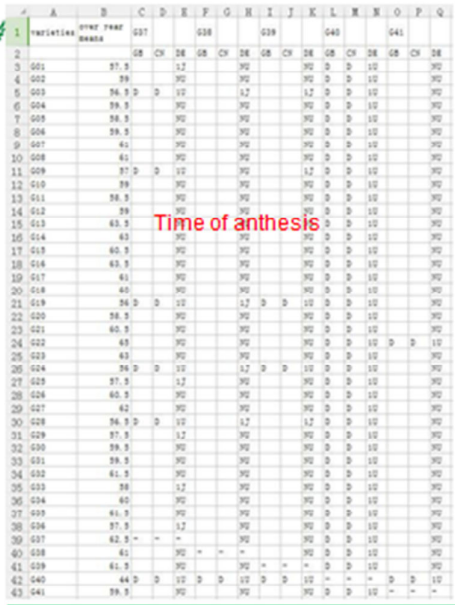
Results

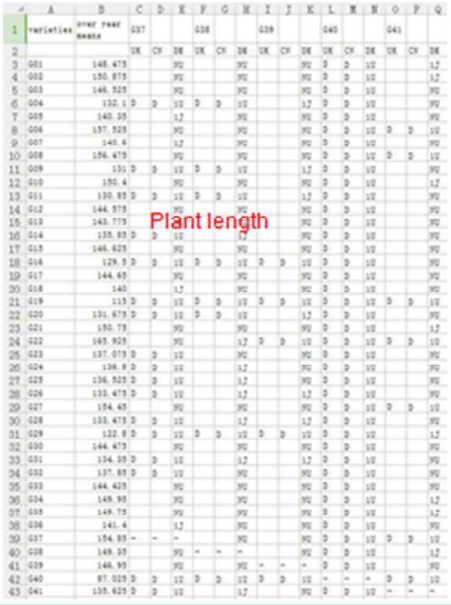
1% COYD criterion (LSD)	GB	CN	DE
Time of Anthesis	5.40	5.40	5.40
Plant Length	16.65	16.65	16.65

Perfect

- GB, CN and DE have the same result of criterion.
- DE produces a integrated result which is different from GB and CN.

DUS Beijing





[End of Annex and of document]