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COMPARISON OF RESULTS OBTAINED FOR COYD AND COYU PROCEDURES USING DIFFERENT SOFTWARE

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1. The Technical Working Party on Automation and Computer Programs (TWC), at its thirty-seventh session, held in Hanghzou, China, from October 14 to 16, 2020, considered document TWC/37/8 and received a presentation on "A statistical analysis Software - DUS EXCEL". A copy of the presentation is provided in the Annex to document TWC/37/8 (see document TWC/37/12 "Report", paragraphs 104 and 105).

2. The TWC considered the validation of the software presented. It recalled the previous exercise comparing results between the software of China and other software used by TWC participants. The TWC noted the offer by the United Kingdom to provide a common data set to China, France and Kenya for comparing results obtained for COYD and COYU procedures using different software.

3. The Annexes to this document contain the following:

- Annex I: Document on "A common data set for comparison of software for COYD and COYU", prepared by an expert from the United Kingdom

- Annex II: Presentation on "A common data set for comparison of software for COYD and COYU", prepared by an expert from China

- Annex III: Common data set provided by the United Kingdom (Excel file)

- Annex IV: Excel file containing the results from China

[Annexes follow]

ANNEX I

A COMMON DATA SET FOR COMPARISON OF SOFTWARE FOR COYD AND COYU

Document prepared by experts from the United Kingdom

BACKGROUND

4. The combined-over-year distinctness and uniformity criteria (COYD and COYU) are statistical techniques for assessing distinctness and uniformity with measured quantitative characteristics. These methods are described in document TGP/8 “Trial Design and Techniques Used in the Examination of Distinctness, Uniformity and Stability”.

5. Members use a range of software packages to apply COYD and COYU on DUS data. At the thirty-fourth session of the TWC, a presentation was made on a ring test of software for COYD. The session report TWC/34/32 stated:

> “95. 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 document TWC/34/30. 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.”

6. At the thirty-seventh session of the TWC, it was proposed that further comparisons of software could be made for both COYD and COYU. The session report TWC/37/12 stated that:

> “105. The TWC considered the validation of the software presented. It recalled the previous exercise comparing results between the software of China and other software used by TWC participants. The TWC noted the offer by the United Kingdom to provide a common data set to China, France and Kenya for comparing results obtained for COYD and COYU procedures using different software.”

A COMMON DATA SET FOR COMPARING SOFTWARE FOR COYD AND COYU

7. Experts from the United Kingdom have compiled a common data set to allow comparisons of software. The data set is suitable for both COYD and COYU. The data set is available in an Excel file in the Annex to this document.

8. The data set consists of means and pooled within-plot standard deviations for 33 varieties in each of three years. There are 22 characteristics. Eight of the varieties are candidates with the remainder to be treated as reference varieties.

9. For the purposes of the ring test, it is suggested that three-year COYD and COYU tests should be carried out by participants. The probabilities levels should be 0.01 for COYD and 0.001 for COYU. If the new revised version of COYU is being applied, then the probability level of 0.003 should be used.

10. The experts from the United Kingdom have supplied the data set. In order to encourage participation and involvement in the work of the TWC, the experts from the United Kingdom propose that another expert coordinates the ring test. The experts from the United Kingdom offer to provide results using the DUSTNT software.

[Annex II follows]

A COMMON DATA SET FOR COMPARISON OF SOFTWARE FOR COYD AND COYU

YANG KUN FROM CHINA

TWC 38, SEPTEMBER 21-23, USA

DATA SET PROVIDED BY THE UNITED KINGDOM

Varieties A-AG : 33
Candidates : 8
Years : 3
Characteristics : 22

char_1	HEAD YOS
char_4	ANGL YOS
char_9	SPR.ANGL
char_60	NAT.SPHT
char_70	SPRWIDTH
char_5	SPR.HGHT
char_8	DATE EE
char_10	HGHT.EE
char_11	WIDTH EE
char_14	LGTH.FL
char_15	WIDTH FL
char_17	LLSEE+30
char_39	LEAFAREA
char_40	LEAFSHPE
char_24	EAR LGTH
char_31	SPKLT NO
char_33	LGHBSP+A
char_35	LGHBSP-A
char_34	GLUMELGH
char_38	LGTH AWN
char_41	SPKDENS
char_50	WTD/HTEE

RESULT OF COYD CALCULATED BY DUSCEL2.0

Delete

Chr.	$LSD_{0.05}$		
1	0.36187 5	0.36423 9	0.36755
4 9	3.70593		
9	5.0967		
60	3.23448 8		
70	4.05675 3		
5	3.44748 7		
8	2.13418 9		
10	4.94587 3		
11	3.25281 1		
14	1.62234 2		
15	0.51245 7		
39	0.80472 6		
40	0.15867 4		
	1.38408		

COYD	VARIETY A	VARIETY B	VARIETY C	VARIETY D	VARIETY E	VARIETY F	VARIETY G	VARIETY H
VARIETY A	0	10	9	7	6	13	12	10
VARIETY B	10	0	6	8	7	6	18	8
VARIETY C	9	6	0	2	6	5	16	11
VARIETY D	7	8	2	0	7	9	18	7
VARIETY E	6	7	6	7	0	7	18	9
VARIETY F	13	6	5	9	7	0	19	9
VARIETY G	12	18	16	18	18	19	0	13
VARIETY H	10	8	11	7	9	9	13	0
VARIETY I	12	14	7	5	13	15	13	10
VARIETY J	7	13	14	12	12	11	7	4
VARIETY K	5	8	6	6	5	6	15	7
VARIETY L	7	10	12	9	10	10	14	8
VARIETY M	12	10	12	8	13	12	16	7
VARIETY N	1	12	11	12	5	6	14	8
VARIETY O	4	14	14	11	11	13	12	13
VARIETY P	5	11	13	11	7	12	10	9
VARIETY Q	5	13	14	12	8	15	13	9
VARIETY R	11	14	18	15	15	15	6	12
VARIETY S	8	18	16	16	12	17	13	13
VARIETY T	9	9	9	9	10	9	13	6
VARIETY U	11	4	4	1	2	3	18	6
VARIETY V	9	11	7	4	7	9	15	5
VARIETY W	9	6	4	1	2	5	18	6
VARIETY X	6	10	6	0	10	12	16	10
VARIETY Y	6	11	7	6	4	7	13	3
VARIETY Z	13	14	10	11	16	14	19	16
VARIETY AA	3	11	9	7	8	10	12	10
VARIETY AB	7	11	10	8	7	10	15	7
VARIETY AC	4	9	5	1	8	10	15	8
VARIETY AD	4	11	6	6	6	11	17	8
VARIETY AE	13	11	3	6	10	9	20	14
VARIETY AF	10	8	10	8	8	10	11	4
VARIETY AG	9	15	11	10	10	14	16	11

Test is over 3 years

Probability level is 0.001 (0.1%) for old COYU

Probability level is 0.003 (0.3%) for revised COYU

Candidate are:	
658	VARIETY A
9928	VARIETY B
493	VARIETY C
9929	VARIETY D
9931	VARIETY E
109	VARIETY F
9932	VARIETY G
814	VARIETY H

UC P0.001 AND P0.003

Chr.	UCp0.001	UCp0.003
1	0.445824008	0.44414554
4	2.360403217	2.359003122
9	2.358280701	2.356508317
60	2.16693281	2.165217286
70	2.233122214	2.231657091
5	2.29789532	2.296372906
8	1.70045198	1.698603096
10	2.548480811	2.547048975
11	2.414924287	2.413300628
14	1.766770571	1.765488898
15	0.989339181	0.988261864
39	1.251096535	1.249946008
40	0.376644819	0.376028211
24	1.67632472	1.675008735
31	1.578337689	1.576908002
33	1.54087189	1.539550566
35	1.525964647	1.52479799
50	0.166308447	0.165975703
41	0.151812324	0.151585518
38	1.000995488	0.999559964
34	1.078703532	1.077598471
17	2.522140412	2.520412758

RESULT OF COYU CALCULATED BY DUSCEL2.0

$p_{0.001}$

0.001	ANOVA	1	4	9	60	70	5	8	10	11	14	15	39	40	24	31	33
	trial df	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
	trial MS	1.254118	0.164088	0.02093	0.557314	0.614409	0.501532	1.862897	0.25902	0.558185	0.075616	0.034173	0.067199	0.008955	0.13807	0.092095	0.012846
	error df	72	72	72	72	72	72	72	72	72	72	72	72	72	72	72	72
	error MS	0.848995	0.590736	0.946662	0.886896	0.646886	0.698465	1.030146	0.617826	0.794454	0.495032	0.349757	0.398908	0.114577	0.521893	0.615972	0.526136
	total df	74	74	74	74	74	74	74	74	74	74	74	74	74	74	74	74
	total MS	2.103113	0.754825	0.967591	1.444211	1.261295	1.199997	2.893043	0.876846	1.352639	0.570649	0.38393	0.466107	0.123532	0.659963	0.708067	0.538982
Result	UCp	0.445824	2.360403	2.358281	2.166933	2.233122	2.297895	1.700452	2.548481	2.414924	1.766771	0.989339	1.251097	0.376645	1.676325	1.578338	1.540872
NU	VARIETY A	0.410258	2.405217	2.328164	2.048093	2.144199	2.265852	1.715872	2.577358	2.307367	1.864022	1.086853	1.337244	0.482979	1.706441	1.617405	1.540409
NU	VARIETY B	0.390872	2.382122	2.486722	2.208737	2.359941	2.289493	1.751349	2.646671	2.297469	1.899842	1.067493	1.346211	0.411756	1.740235	1.581769	1.637425
NU	VARIETY C	0.482274	2.291186	2.377541	2.122976	2.236544	2.269657	1.729794	2.596154	2.320206	1.735798	1.001467	1.246825	0.368977	1.697189	1.603501	1.596433
NU	VARIETY D	0.304291	2.316769	2.29788	2.222379	2.237166	2.395807	1.568836	2.526899	2.370406	1.710789	0.930132	1.187613	0.375874	1.700964	1.440455	1.566414
NU	VARIETY E	0.633174	2.381519	2.421668	2.220155	2.274413	2.36097	1.687698	2.527193	2.329043	1.856985	1.091668	1.341072	0.41412	1.771463	1.56805	1.651256
NU	VARIETY F	0.422825	2.33755	2.401126	2.287196	2.165287	2.271249	1.683245	2.500133	2.36464	1.670214	1.046304	1.226576	0.346302	1.665469	1.503124	1.539949
NU	VARIETY G	0.430756	2.34669	2.286043	2.167582	2.211253	2.338832	1.638418	2.356977	2.375822	1.828764	0.975737	1.251198	0.436094	1.708055	1.720446	1.63143
NU	VARIETY H	0.453331	2.442029	2.471894	2.292189	2.261798	2.320585	1.651976	2.710579	2.295844	1.832982	1.06683	1.312399	0.427746	1.685681	1.669334	1.430218
NU	VARIETY I	0.437513	2.291792	2.256385	2.147364	2.23189	2.312287	1.709045	2.507989	2.505396	1.806245	1.032624	1.309669	0.364907	1.723308	1.58381	1.553674
NU	VARIETY J	0.452595	2.394139	2.401702	2.3126	2.261393	2.372097	1.545082	2.507921	2.401768	1.775384	0.969283	1.203265	0.387348	1.722567	1.607964	1.575874
NU	VARIETY K	0.445659	2.391946	2.312451	2.161841	2.217723	2.311076	1.703939	2.551968	2.42226	1.811203	0.946604	1.266887	0.328544	1.687109	1.488013	1.520074
NU	VARIETY L	0.196051	2.39297	2.377773	2.203588	2.231067	2.304509	1.68318	2.509016	2.387404	1.745341	0.966252	1.22553	0.363851	1.627373	1.532798	1.557134
NU	VARIETY M	0.401475	2.404045	2.354633	2.123722	2.200868	2.184508	1.712521	2.531029	2.419547	1.763551	0.910964	1.187563	0.366166	1.568984	1.585678	1.488946
NU	VARIETY N	0.315479	2.320836	2.396494	2.092299	2.263775	2.202934	1.718511	2.568383	2.312832	1.814536	1.04355	1.303507	0.39573	1.708357	1.616473	1.535395
NU	VARIETY C	0.332773	2.394917	2.30396	2.048446	2.224781	2.272989	1.76229	2.583509	2.338607	1.769799	1.029138	1.283867	0.364379	1.68984	1.703201	1.44205

RESULT OF COYU CALCULATED BY DUSCEL2.0

$p_{0.003}$

0.003	ANOVA	1	4	9	60	70	5	8	10	11	14	15	39	40	24	31	33
	trial df	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
	trial MS	1.254118	0.164088	0.02093	0.557314	0.614409	0.501532	1.862897	0.25902	0.558185	0.075616	0.034173	0.067199	0.008955	0.13807	0.092095	0.012846
	error df	72	72	72	72	72	72	72	72	72	72	72	72	72	72	72	72
	error MS	0.848995	0.590736	0.946662	0.886896	0.646886	0.698465	1.030146	0.617826	0.794454	0.495032	0.349757	0.398908	0.114577	0.521893	0.615972	0.526136
	total df	74	74	74	74	74	74	74	74	74	74	74	74	74	74	74	74
	total MS	2.103113	0.754825	0.967591	1.444211	1.261295	1.199997	2.893043	0.876846	1.352639	0.570649	0.38393	0.466107	0.123532	0.659963	0.708067	0.538982
Result	UCp	0.444146	2.359003	2.356508	2.165217	2.231657	2.296373	1.698603	2.547049	2.413301	1.765489	0.988262	1.249946	0.376028	1.675009	1.576908	1.539551
NU	VARIETY A	0.410258	2.405217	2.328164	2.048093	2.144199	2.265852	1.715872	2.577358	2.307367	1.864022	1.086853	1.337244	0.482979	1.706441	1.617405	1.540409
NU	VARIETY B	0.390872	2.382122	2.486722	2.208737	2.359941	2.289493	1.751349	2.646671	2.297469	1.899842	1.067493	1.346211	0.411756	1.740235	1.581769	1.637425
NU	VARIETY C	0.482274	2.291186	2.377541	2.122976	2.236544	2.269657	1.729794	2.596154	2.320206	1.735798	1.001467	1.246825	0.368977	1.697189	1.603501	1.596433
NU	VARIETY D	0.304291	2.316769	2.29788	2.222379	2.237166	2.395807	1.568836	2.526899	2.370406	1.710789	0.930132	1.187613	0.375874	1.700964	1.440455	1.566414
NU	VARIETY E	0.633174	2.381519	2.421668	2.220155	2.274413	2.36097	1.687698	2.527193	2.329043	1.856985	1.091668	1.341072	0.41412	1.771463	1.56805	1.651256
NU	VARIETY F	0.422825	2.33755	2.401126	2.287196	2.165287	2.271249	1.683245	2.500133	2.36464	1.670214	1.046304	1.226576	0.346302	1.665469	1.503124	1.539949
NU	VARIETY G	0.430756	2.34669	2.286043	2.167582	2.211253	2.338832	1.638418	2.356977	2.375822	1.828764	0.975737	1.251198	0.436094	1.708055	1.720446	1.63143
NU	VARIETY H	0.453331	2.442029	2.471894	2.292189	2.261798	2.320585	1.651976	2.710579	2.295844	1.832982	1.06683	1.312399	0.427746	1.685681	1.669334	1.430218
NU	VARIETY I	0.437513	2.291792	2.256385	2.147364	2.23189	2.312287	1.709045	2.507989	2.505396	1.806245	1.032624	1.309669	0.364907	1.723308	1.58381	1.553674
NU	VARIETY J	0.452595	2.394139	2.401702	2.3126	2.261393	2.372097	1.545082	2.507921	2.401768	1.775384	0.969283	1.203265	0.387348	1.722567	1.607964	1.575874
NU	VARIETY K	0.445659	2.391946	2.312451	2.161841	2.217723	2.311076	1.703939	2.551968	2.42226	1.811203	0.946604	1.266887	0.328544	1.687109	1.488013	1.520074
NU	VARIETY L	0.196051	2.39297	2.377773	2.203588	2.231067	2.304509	1.68318	2.509016	2.387404	1.745341	0.966252	1.22553	0.363851	1.627373	1.532798	1.557134
NU	VARIETY M	0.401475	2.404045	2.354633	2.123722	2.200868	2.184508	1.712521	2.531029	2.419547	1.763551	0.910964	1.187563	0.366166	1.568984	1.585678	1.488946
NU	VARIETY N	0.315479	2.320836	2.396494	2.092299	2.263775	2.202934	1.718511	2.568383	2.312832	1.814536	1.04355	1.303507	0.39573	1.708357	1.616473	1.535395
NU	VARIETY O	0.332773	2.394917	2.30396	2.048446	2.224781	2.272989	1.76229	2.583509	2.338607	1.769799	1.029138	1.283867	0.364379	1.68984	1.703201	1.44205

[Annex III follows]

ANNEX III

Please see the Excel file

ANNEX IV

Please see the Excel file

[End of Annexes and of document]