

Technical Working Party on Automation and Computer Programs TWC/38/9

**Thirty-Eighth Session
Alexandria, United States of America, September 21 to 23, 2020**

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STATISTICAL ANALYSIS SOFTWARE “DUS EXCEL”

Document prepared by an expert from China

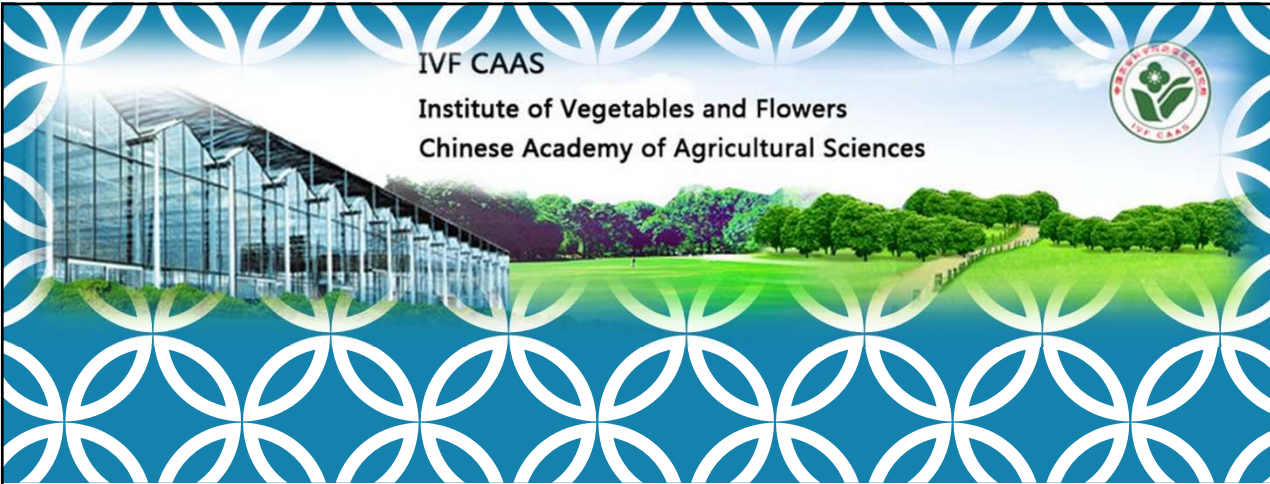
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This document contains a copy of a presentation “A statistical analysis software DUSCEL 2.0” prepared by an expert from China, to be made at the thirty-eighth session of the Technical Working Party on Automation and Computer Programs (TWC).


[Annex follows]



IVF CAAS
Institute of Vegetables and Flowers
Chinese Academy of Agricultural Sciences



A STATISTICAL ANALYSIS SOFTWARE
——DUSCEL2.0

 Yang Kun, China

38th session of TWC
Alexandria, USA
Sep.21-23, 2020

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- Analysis of Uniformity and Distinctness
- Check and Rename photo files
- Verification of Characteristics and trial

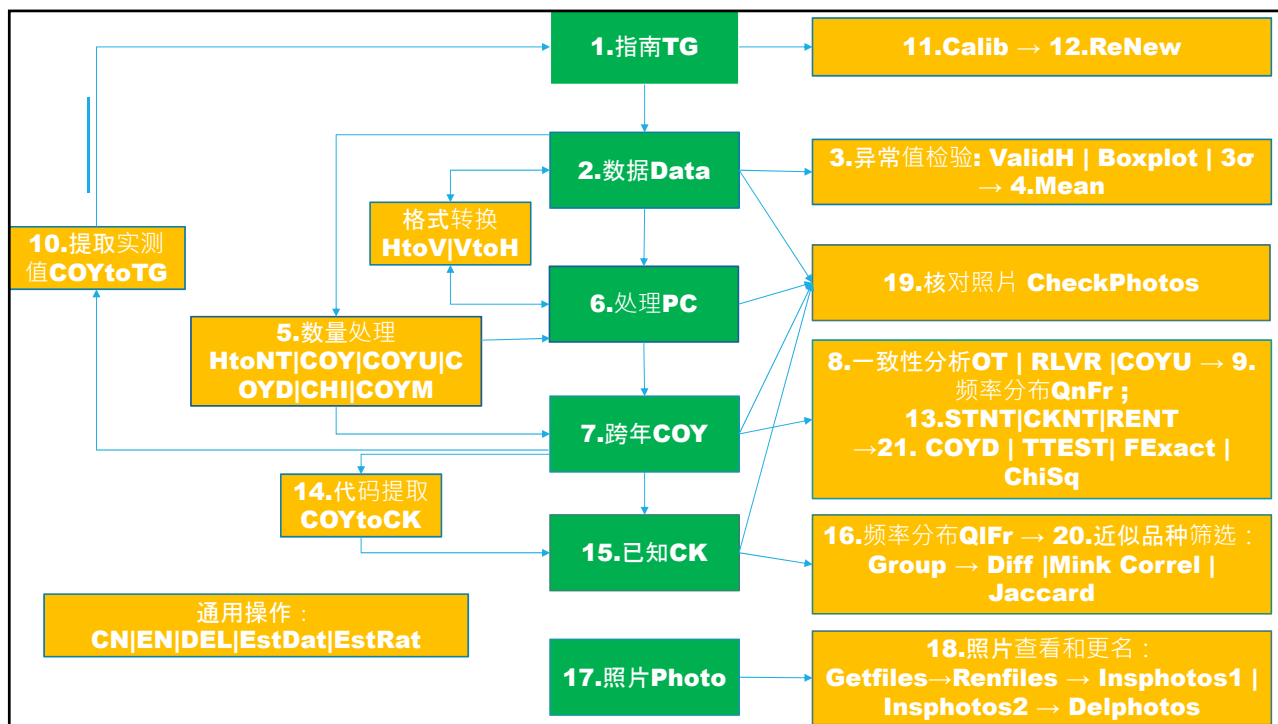
UPDATES: FROM DUS EXCEL 1.0 TO DUSCEL 2.0

1. Reduce worksheets from 12 to 6.
2. All analysis based on horizontal data format.
3. More efficient functions on checking photo.
4. More efficient functions on DUS analysis.

Figure 1: A screenshot of the DUSCEL 2.0 20200729 - Excel interface. The interface is divided into several sections:

- Top Bar:** Contains the application name "DUSCEL 2.0 20200729 - Excel", a "登录" (Login) button, and standard window controls.
- Menu Bar:** Includes "文件" (File), "开始" (Home), "插入" (Insert), "页面布局" (Layout), "公式" (Formulas), "数据" (Data), "审阅" (Review), "视图" (View), "开发工具" (Developer), "帮助" (Help), "DUS" (highlighted), and "操作说明搜索" (Search for instructions).
- Toolbars:**
 - Left Toolbar:** Contains buttons for "Calib", "Valid", "Mean", "DatatoCOY", "DatatoCHI", "VtoH", "QnFrDis", "CKNT", "OffTp", "COVD", "FExact", "Renew", "BxPlt", "HtoV", "DatatoCOYU", "DatatoCOYM", "StDev", "DatatoNT", "DatatoCOYD", and "TG".
 - Right Toolbar:** Contains buttons for "Group", "DistMink", "Jaccard", "GetFiles", "InsPhotos2", "CN", "EstDat", "Different", "CorrelVr", "QJFrDis", "RenFiles", "DelPhotos", "EN", "EstRat", "Threshold", "CorrelCh", "ComPhotos", "InsPhotos1", "Del", "DistEdit", and "Tool".
- Worksheet Area:**
 - Columns:** Labeled A through P. Column A is "IsCandidate", B is "Variety", C is "Trial", and F through P contain numerical data.
 - Rows:** Row 1 is the header. Rows 2 through 10 contain data. Row 10 is highlighted in blue.
 - Data:**

	A	B	C	F	G	H	I	J	K	L	M	N	O	P
1	IsCandidate	Variety	Trial	3	4	5	6	7	8	9	10	11	12	
2	是	2018-0432A	2020	9	3	4	9	3	7	5	1	1	1	
3	是	2018-0777A	2020	9	3	5	9	3	6	5	3	1	1	
4	是	2018-0798A	2020	9	3	5	9	3	6	5	3	1	2	
5	是	2018-2190A	2020	9	3	5	9	3	6	5	1	1	1	
6	是	2018-2191A	2020	9	3	3	9	3	3	7	1	1	1	
7	是	2018-2666A	2020	9	3	5	9	3	6	5	3	1	1	
8	是	2018-2808A	2020	9	2	4	9	2	3	5	1	1	1	
9	否	2018-2808B/	2020	9	3	3	9	3	2	5	3	1	2	
10	是	2018-2809A	2020	9	3	3	9	3	4	7	3	1	1	
- Bottom Bar:** Contains tabs for "TG", "表格SHEETS" (highlighted), "COY", "CK", and "Photo".



SETTING UP PARAMETERS

[illegible]

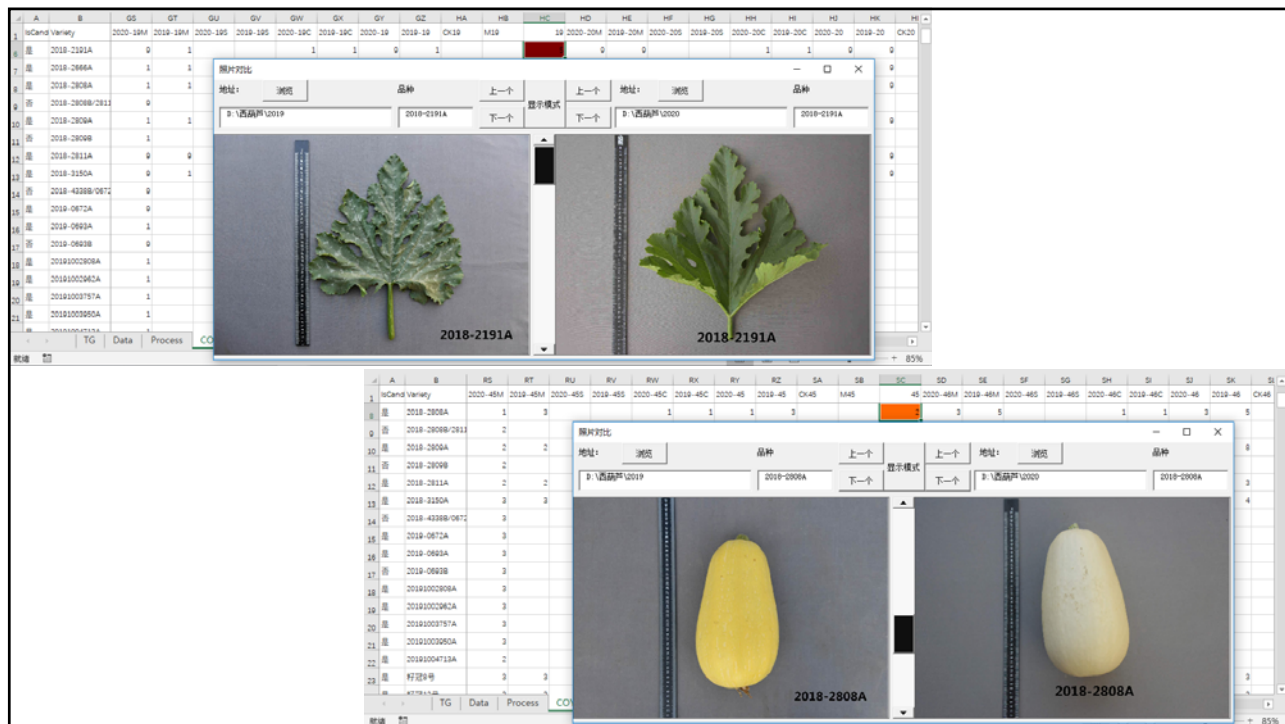
WHOLE SOLUTION FOR CHECKING ABNORMAL DATA

VALID | BXPLT | STDEV

#	A	B	C	BW	BX	BY	BZ	CA	CB	CC	CD	CE	CF	CG	CH	CI	CJ	CK	CL	CM	CN	CO	CP	CQ	CR	CS	CT	CU	CV	CW	CX	CY	CZ	DA	DB	DC		
1	IsCar	Variety	Trial	39	39	39	39	39	39	40	41	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42
2	是	2018-0432A	2020	7.8	8.1	8.6	9.8	7.5	9.8	1	9	43	40	43	40	41	39	44	38	41	43	39	40.5	41	40.5	41	38	41	41.5	41	38	15	14	15	13	14		
3	是	2018-0777A	2020	3.5	4	3.3	3.2	3.5	3.7	4	9	39	37.5	39	38.5	38	39	38	36	40	39	36	38.5	37	38	37.5	38.5	37	37	39	37	15.5	13.5	16	15	14.5		
4	是	2018-0798A	2020	4.8	5.2	5.2	5	4.5	6	4	9	37	39	40	37	40	40.5	41.5	41.5	42	41	37	38.5	39	40	38.5	40	41.5	41	39.5	41	14.5	14.5	15.5	15.5	14.5		
5	是	2018-2190A	2020	8	4.6	6	7	3.5	6.5	4	9	40	40.5	38	38	40	38	40.5	39	43	38.5	38.5	36.5	41	38	41	41	39.5	38	38	39.5	14.5	13	12	12.5	14		
6	是	2018-2191A	2020	6.1	4.7	2.6	5.5	4	3.2	4	9	38	40	38.5	41	40.5	39	38	40	39	36.5	38	38	37.5	38	40	40	37.5	41.5	39.5	38	13	13	13.5	12.5	13		
7	是	2018-2666A	2020	5.2	4.8	4	4	7.5	5.6	4	9	41	40.5	40.5	43	40	38	39	52	47	43.5	44	37	41	45.5	40.5	44.5	38.5	41.5	41	39.5	13	13.5	13	13	12.5		
8	是	2018-2808A	2020	3	6	2.8	4	4.6	6	4	7	27.5	29.5	29.5	29.5	30	32	30	31	30.5	30.5	26	28	29	29.5	30.5	31.5	29.5	28.5	30.5	33	17	18.5	18.5	18.5	18		
9	否	2018-2808B/28	2020	6.5	6.5	5.5	5.5	5	6	4	7	34	30	29	30	30.5	30.5	32	35	32	34	31	36	30	32	31	32	34	34	30	31	14.8	13	13	14	12		
10	是	2018-2809A	2020	3.8	4.5	5	3	4.4	4.2	4	9	38.5	37	34	36.5	37	38	38.5	39	38	34.5	38.5	36	37.5	38	36.5	37	36	35.5	38	36	11	10.5	10	12.5	12		
11	否	2018-2809B	2020	9.1	9	7	6	5.5	6.6	4	6	21	21	19.5	20.5	20.5	20	21	21	20.5	20	23	22	20.5	19.5	21	22	23	21	21	21.5	12.5	13.5	11	13.5	15		
12	是	2018-2811A	2020	3.4	4	3.6	3	3.8	3	1	12	36	35	34.5	35	36	32.5	33	34.5	35	36.5	36.5	34	33.5	31	33	36	36.5	34	36	34.5	12.5	11.5	13	12	12.5		
13	是	2018-3150A	2020	4.6	4.4	6	4.4	4.5	5.7	4	9	37	37.5	36.5	36	39	38	35	39	40	38	36	40	33	35	35	37.5	37	38.5	38.5	39	13	13	13.5	14	14		
14	否	2018-4338B/06	2020	4.5	5.5	6	5.8	6	4.7	4	8	37	33	30	34	37	35.5	32.5	33	38	38.5	36	36.5	32.5	36	38	38	37	35.5	32	35	14	13	13.5	13	12.5		
15	是	2019-0672A	2020	9.2	8	8	9.5	10.5	9.8	4	6	24	23.5	22	22.5	24	22	23	23	21.5	23	24.5	21	21.5	22.5	20	21	22	21.5	22	22.5	18.5	18	17	18.5	18.5		
16	是	2019-0693A	2020	3.8	4	6.2	11	8	7.5	4	9	41	40.5	35.5	39.5	41.5	40.5	38	38.5	39	39	40	38.5	41	39.5	39	42.5	42	40.5	38.5	40	15	12	12.5	13	14		
17	否	2019-0693B	2020	5.4	4	6	4.9	8.5	6.4	4	9	38	39.5	35	41	39.5	38	37.5	39	40.5	39	37	40.5	39.5	38	39.5	37.5	34.5	40.5	34	34	15	15	14.5	14	15		
18	是	20191002808A	2020	10.3	6.5	10.7	9.5	10.5	11	4	9	38.5	36	38	39.5	36	38.5	39	39.5	35	38	39	39	38.5	40	39	40	40.5	37	38	38	14	13	14	14	14.5		
19	是	20191002962A	2020	5.5	7.5	9	7	9	8.3	1	4	27	22	25	24	23	23	21	25.5	22	25.7	20	23.5	24.8	22.5	21.5	23	22.5	21	23	23.5	21.5	21	23	20.5	21.5		
20	是	20191003757A	2020	8.5	9.5	12.5	9.7	6.8	9.6	1	6	25	26	24.5	25.5	25	26	24.5	24.5	25	24	24	24	25	23.5	23	22.5	24	23	23	17	19	19	17.5	16			
21	是	20191003950A	2020	10.5	10.8	10.3	10.7	13	14	4	9	36	33	39.5	34.5	38	36.5	38	37	33	36	35.5	35	34	38.5	37	39.5	36	35	35	33	11	11	11	11.5	10.5		
22	是	20191004713A	2020	5.3	6.5	6.5	4.6	6	5.4	4	9	37.5	33	34	34.5	36.5	37	40.5	41	41	38	38	37.5	34.5	37	39.5	36	37.5	38	36	36.5	11.5	11	11	10.5	12.5		

WHOLE SOLUTION FOR GENERATING NOTES

1. DatatoNt: calculate mean, st, sample size, note
2. COYtoTG: sent mean of st variety. TG
3. Calib: check whether trial mean is exceed 10% of st mean.
4. Renew: if no doubt then update lookupvalueID of each note of each Chr.
5. STNT: generate st. note.
6. CKNT: cite CK note if have.
7. RENT: calculate regression note if possible.
8. CheckPhotos: check photos if there is big difference between trials.
9. COYtoCK: send final note to CK.



ANALYSIS OF UNIFORMITY AND DISTINCTNESS

COYU : get results by two steps

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R
1	待测	品种	30	30	30	30	42	42	42	42	43	43	43	43	44	44	44	44
2	是	2018-0432A	8.315	4.825	1.7584	0.6095	40.675	41.1	1.7265	3.3348	13.8	10.7	0.9652	0.5712	2.9601	3.8486	0.2236	0.3411
3	是	2018-0777A	3.805	5.89	0.8060	0.6086	37.075	35.225	1.0818	1.8009	14.4	12.7	0.8367	1.1286	2.6437	2.7035	0.1368	0.2751
4	是	2018-0798A	5.145	5.89	1.0506	0.6086	39.775	35.225	1.5684	1.8009	14.6	12.7	0.9403	1.1286	2.7369	2.7935	0.2316	0.2751
5	是	2018-2190A	6.81	3.99	1.6622	0.6008	39.325	36.35	1.5408	1.3485	12.425	12.275	0.9072	1.0447	3.1748	2.9806	0.1672	0.264
6	是	2018-2191A	3.815	3.99	0.9538	0.6008	38.925	36.35	1.3306	1.3485	12.65	12.275	0.8204	1.0447	3.0844	2.9806	0.1875	0.264
7	是	2018-2666A	4.735	3.605	1.3374	0.4174	41.875	37.305	3.5014	1.7524	13.3	12.975	1.105	1.3905	3.1517	2.8088	0.1415	0.2574
8	是	2018-2808A	3.95	3.605	1.0329	0.4174	29.8	37.305	1.5781	1.7524	17.25	12.975	1.1062	1.3905	1.7318	2.8088	0.1087	0.2574
9	否	2018-2808B/2811B	5.74	4.67	2.5128	0.9073	31.9	38.35	1.9642	2.2775	13.565	11.975	0.8916	1.4732	2.3551	3.2495	0.12	0.449
10	是	2018-2809A	4.02	4.67	0.4927	0.9073	37	38.35	1.3785	2.2775	11.275	11.975	0.8025	1.4732	3.294	3.2495	0.2126	0.449
11	否	2018-2809B	6.36	5.265	1.5598	1.1132	20.975	39.175	0.9662	2.5302	12.775	12.05	0.9388	1.5035	1.6485	3.2915	0.1168	0.3973
12	是	2018-2811A	3.32	5.265	0.3778	1.1132	34.65	39.175	1.514	2.5302	11.525	12.05	0.6073	1.5035	3.014	3.2915	0.1704	0.3973
13	是	2018-3150A	4.475	6.735	0.9716	0.2943	37.275	35.45	1.8601	1.9324	13.3	11.9	0.6050	1.2937	2.8061	3.0029	0.1373	0.2639
14	否	2018-4338B/0672B	5.77	6.735	0.7692	0.2943	35.25	35.45	2.4089	1.9324	13.5	11.9	1.0513	1.2937	2.6187	3.0029	0.1838	0.2639
15	是	2019-0672A	9.70	4.395	1.3118	0.3634	22.35	37.65	1.1367	2.0072	16.3	13.5	2.0989	1.469	1.3897	2.8157	0.166	0.2091
16	是	2019-0693A	7.965	4.395	2.089	0.3634	39.725	37.65	1.5934	2.0072	12.9	13.5	0.7363	1.469	3.0857	2.8157	0.1597	0.2091
17	否	2019-0693B	5.4	2.365	1.3936	0.2796	38.1	37.15	2.216	1.6944	14.55	13.3	0.6469	1.9222	2.6191	2.8417	0.1156	0.3778

结果Result	方差分析ANOVA	30	42	43	44
试验df		1	1	1	1
试验MS		0.4218	0.0160	0.1764	0.0712
误差df		8	8	8	8
误差MS		0.4376	0.0331	0.0267	0.0159
总df		9	9	9	9
总MS		0.8594	0.05	0.2031	0.087
UCp		1.0507	1.1931	0.8417	0.2863
2018-0432A		0.6673	1.0017	0.704	0.2274
2018-0777A		0.5777	0.8514	0.6611	0.1844
2018-0798A		0.6005	0.9274	0.6949	0.2226
2018-2190A		0.7033	0.8111	0.6351	0.1804
2018-2191A		0.6391	0.7726	0.5639	0.1808
2018-2666A		0.6452	1.1079	0.7275	0.1681
2018-2808A		0.5991	1.0232	0.8531	0.1818
2018-2808B/2811B		0.9529	1.1188	0.7895	0.2412







ANALYSIS OF UNIFORMITY AND DISTINCTNESS

COYD : get results by two steps

	A	B	C	D	E	F	G	H	I	J
1	待测	品种	39	39	42	42	43	43	44	44
2	是	2018-0432A	8.315	4.825	40.675	41.1	13.8	10.7	2.0601	3.8486
3	是	2018-0777A	3.805	5.89	37.975	35.225	14.4	12.7	2.6437	2.7935
4	是	2018-0798A	5.145	5.89	39.775	35.225	14.6	12.7	2.7369	2.7935
5	是	2018-2190A	6.81	3.99	39.325	36.35	12.425	12.275	3.1748	2.9806
6	是	2018-2191A	3.815	3.99	38.925	36.35	12.65	12.275	3.0844	2.9806
7	是	2018-2666A	4.735	3.605	41.875	37.305	13.3	12.075	3.1517	2.8988
8	是	2018-2808A	3.95	3.605	29.8	37.305	17.25	12.075	1.7318	2.8988
9	否	2018-2809B/2811B	5.74	4.67	31.9	38.35	13.565	11.075	2.3551	3.2495
10	是	2018-2809A	4.02	4.67	37	38.35	11.275	11.075	3.204	3.2495
11	否	2018-2809B	6.36	5.265	20.975	39.175	12.775	12.05	1.6485	3.2915
12	是	2018-2811A	3.32	5.265	34.65	39.175	11.525	12.05	3.014	3.2915
13	是	2018-3150A	4.475	6.735	37.275	35.45	13.3	11.9	2.8061	3.0029
14	否	2018-4338B/0672B	5.77	6.735	35.25	35.45	13.5	11.9	2.6187	3.0029

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P
1	待测	品种	39	39	42	42	43	43	44	44		39	42	43	44	
21	行数: 20		198.93	121.4	944.73	1018.5	380.35	354.7	72.074	82.296		317.03	1063.2	738.05	154.33	
32	列数: 10											6.2800	11.789	4.2189	1.2823	
33	品种数: 20 COYD		2018-04	2018-07	2018-07	2018-21	2018-21	2018-21	2018-21	2018-21	2018-21	2018-21	2018-21	2018-21	2018-21	2018-21
34	待测数: 23	2018-0432A	0	0	0	0	0	0	0	0	0	0	0	0	0	0
35	样本数: 2	2018-0777A	0	0	0	0	0	0	0	0	0	0	0	0	0	0
36	性状数: 4	2018-0798A	0	0	0	0	0	0	0	0	0	0	0	0	0	0
37		2018-2190A	0	0	0	0	0	0	0	0	0	0	0	0	0	0
38		2018-2191A	0	0	0	0	0	0	0	0	0	0	0	0	0	0
39		2018-2666A	0	0	0	0	0	0	0	0	0	0	0	0	0	0
40		2018-2808A	0	0	0	0	0	0	0	0	0	0	0	0	0	0
41		2018-2809B/2811B	0	0	0	0	0	0	0	0	0	0	0	0	0	0
42		2018-2809A	0	0	0	0	0	0	0	0	0	0	0	0	0	0
43		2018-2809B	0	0	0	0	0	0	0	0	0	0	0	0	0	0
44		2018-2811A	0	0	0	0	0	0	0	0	0	0	0	0	0	0
45		2018-3150A	0	0	0	0	0	0	0	0	0	0	0	0	0	0
46		2018-4338B/0672B	0	0	0	0	0	0	0	0	0	0	0	0	0	0

CHECK AND RENAME PHOTO FILES

	A	B	C	D	E	F
	OldName	Type	Address	NewName	Photo1	Photo2
1						
2	1.jpg	文件	D:\西葫芦\2020\2017-0971A			
3	2.jpg	文件	D:\西葫芦\2020\2017-0971A			
4	3.jpg	文件	D:\西葫芦\2020\2017-0971A			
5	4.jpg	文件	D:\西葫芦\2020\2017-0971A			

VERIFICATION OF CHARACTERISTICS AND TRIAL

Estimate sample size by normal data

常规数据样本含量估计

显著水平 α

0.05

标准差 σ

5

均值差 Δ

5

☒ 错误 β

0.1

默认值

☒ 总体均值估计

☐ 两样本均值差估算

☐ 总体均值带功效估计

☐ 两样本均值带功效估计

最小样本容量 n

6

Estimate sample size by rate data

百分率数据样本容量估计

显著水平 α

0.05

处理1百分率 p_1

0.03

处理2百分率 p_2

0.1

百分率差 Δ

0.03

☒ 错误 β

0.2

默认值

☒ 总体百分率估算

☐ 总体百分率带功效估计

最小样本容量 n

531

VERIFICATION OF CHARACTERISTICS AND TRIAL

	1	2	3	4	5	6	7	8	9	10	11	12	13
1	1	0		0.12	-0.2		0.25	-0.3	-0.1	0.09		-0	0.06
2	-0.1	1		-0.1	0.08		0.08	0.04	-0.1	0.12		-0.1	-0.1
3													
4	0.12	0		1	0.03		0.19	0.03	-0.2	0.35		0.17	0.38
5	-0.2	0		0.03	1		0.04	0.52	-0.3	0.15		0.06	-0.1
6													
7	0.25	0		0.19	0.04		1	-0.4	-0.5	0.39		0.2	0.26
8	-0.3	0		0.03	0.52		-0.4	1	0.09	-0.1		-0.3	-0
9	-0.1	0		-0.2	-0.3		-0.5	0.09	1	-0.5		-0.3	-0.2
10	0.09	0		0.35	0.15		0.39	-0.1	-0.5	1		0.3	0.47
11													
12	-0	0		0.17	0.06		0.2	-0.3	-0.3	0.3		1	0.1
13	0.06	0		0.38	-0.1		0.26	-0	-0.2	0.47		0.1	1

Correlation analysis between characteristics

VERIFICATION OF CHARACTERISTICS AND TRIAL

#	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	AA
1	IsCandidate	Variety	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
48	结果区	品种数	45	性状数	61																						
49	数量	1	27	8		2						15	45	34		45	36		34		35		4	1			
50		2	18	8		20	1		11	1		14		11				8	11				24	44			
51		3		29		23	12		34	3		16			12					5			1		2	21	
52		4					17			10					15					2			16		12	10	
53		5					9			8	20				7		3				1	2			21	20	
54		6					6			15	8				5					17					8	1	
55		7								7	8				4					20					2	3	
56		8								1					2												
57		9			45			45									6				8	45					
58																											
59	频率	1	0.59	0		0.04						0.33	0.98	0.74		0.98	0.78		0.74		0.76		0.09	0.02			
60		2	0.39	0		0.43	0.02		0.24	0.02		0.3		0.24				0.8	0.24				0.52	0.98			
61		3		1		0.5	0.26	0.74	0.07		0.35				0.36			0.1		0.11			0.02		0.04	0.46	
62		4					0.37		0.22						0.33					0.04		0.35		0.26	0.22		
63		5					0.2		0.17	0.63					0.15		0.07			0.02	0.04			0.46	0.43	0.39	
64		6					0.13		0.33	0.17					0.11					0.37				0.17	0.02	0.11	
65		7							0.15	0.17					0.09					0.43				0.04	0.07	0.04	
66		8								0.02					0.04												
67		9			0.98			0.98									0.13				0.17	0.98					
68																											
69	遗传多样性指数		-0.7	-1	-0	-0.8	-1.4	-0	-0.6	-1.6	-0.9	-1.1	-0	-0.6	-1.6	-0	-0.6	-0.4	-0.6	-1.2	-0.6	-0	-1	-0.1	-1.3	-1	-1.4
70	最大多样性指数		-0.7	-1	0	-1.1	-1.6	0	-0.7	-1.9	-1.1	-1.1	0	-0.7	-1.8	0	-1.1	-0.7	-0.7	-1.6	-1.1	0	-1.4	-0.7	-1.6	-1.4	-1.6
71	遗传均匀度		0.98	1	null	0.77	0.86	null	0.82	0.84	0.82	1	null	0.82	0.89	null	0.58	0.59	0.82	0.74	0.59	null	0.72	0.18	0.8	0.71	0.87

Frequency analysis for each characteristics

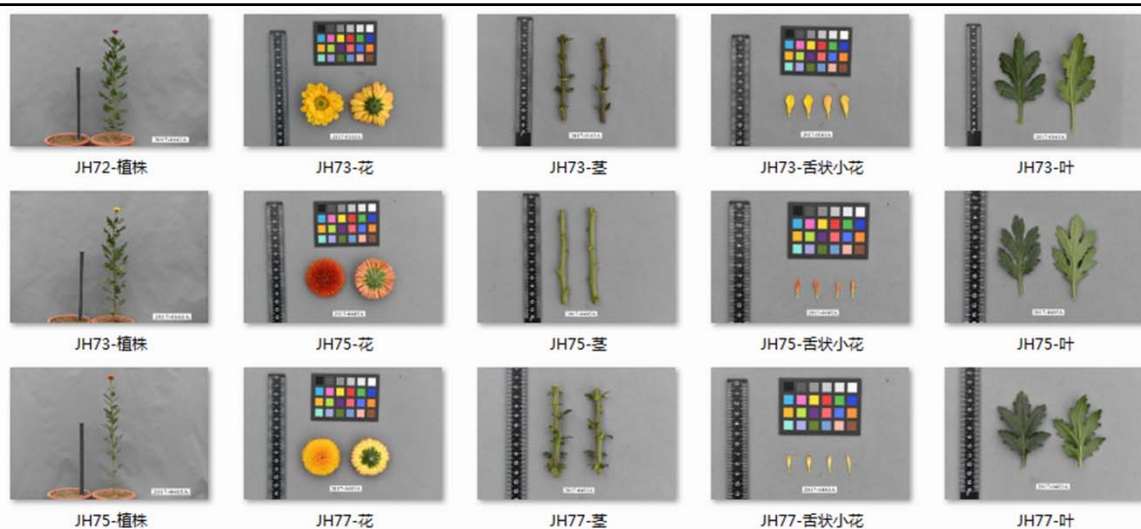
VERIFICATION OF CHARACTERISTICS AND TRIAL

样本数	20					
性状数	4	性状	2000-39	2000-42	2000-43	2000-44
		总均值	6.098444444	34.83244444	13.165	2.731945592
		总和	5488.6	31350.1	11848.5	2458.751032
		总方差	7.613479214	32.88923618	4.706037264	0.424272828
		总平方和	40316.44	1121599.39	160216.23	7098.595317
		LSD0.05	0.862010596	1.20826666	0.68421261	0.144661129
		最小值	2.365	20.975	10.7	1.101507982
		极大值	11.915	41.875	21.11	3.848566253
		2000-39	中间值	最小值	数距	频率
		1				
		2				
		3	2.650402059	1.788391463	3	0.066666667
		4	4.374423252	3.512412655	17	0.377777778
		5	6.098444444	5.236433848	12	0.266666667
		6	7.822465637	6.960455041	4	0.088888889
		7	9.54648663	8.684476232	7	0.155555556
		8	11.27050802	10.40849743	2	0.044444444
		9				
		2000-42	中间值	最小值	数距	频率

Frequency analysis for each MS characteristics

FUTURE PLAN

- ◆ Make an online version of DUS analysis software by java and python.
- ◆ Make data analysis and image analysis together.



THANK YOU FOR YOUR
ATTENTION!

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