UPOV

International Union for the Protection of New Varieties of Plants

E

Technical Working Party on Automation and Computer Programs **TWC/37/8 Rev.**

Thirty-Seventh Session
Hangzhou, China, October 14 to 16, 2019

Original: English
Date: November 16, 2019

VARIETY DESCRIPTION DATABASES

Document prepared by an expert from China

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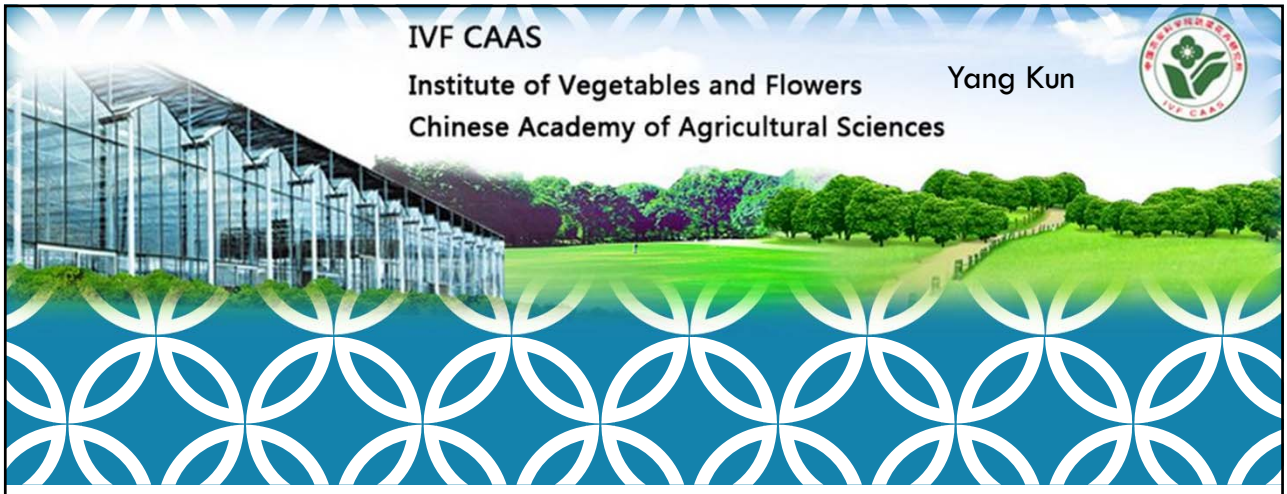
The annex to this document contains a copy of a presentation on “A statistical analysis Software - DUS EXCEL”, made at the thirty-seventh session of the TWC.

[Annex follows]



A STATISTICAL ANALYSIS SOFTWARE ——DUS EXCEL

37th session of TWC
Hangzhou, China
Oct.14-16, 2019

DUS Beijing

CONTENTS

- Development
- Main functions
- Applications
- Future plan

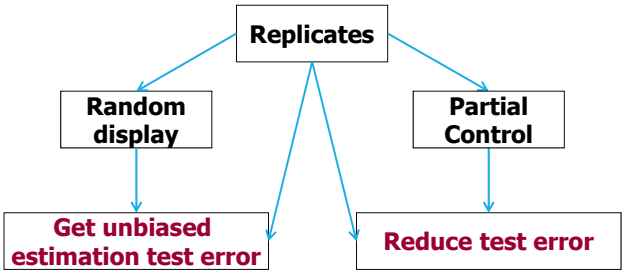
DEVELOPMENT

DUSTC

2009 develop DUSTC

2012 apply DUSTC in China

2018 stop using DUSTC in Beijing



DUS Excel

2004 develop a Excel DUS report template

2006 apply the template in China

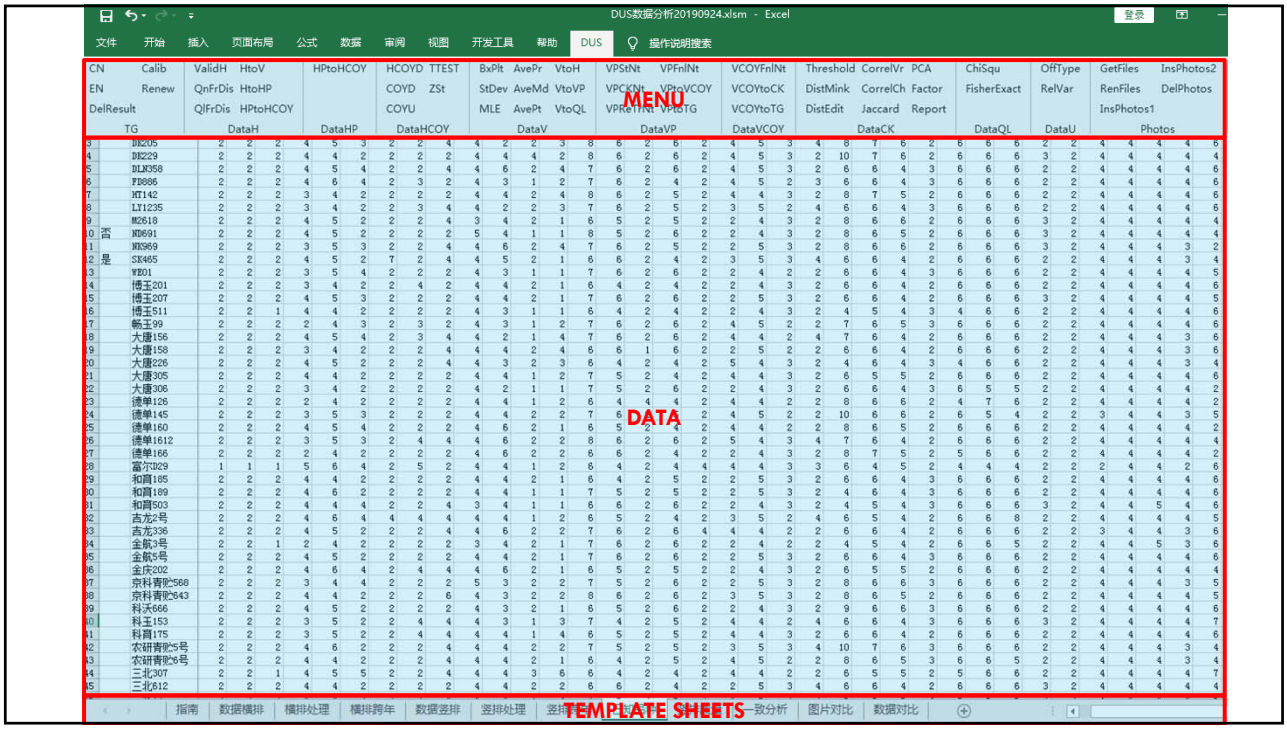
2012 stop using the template in China

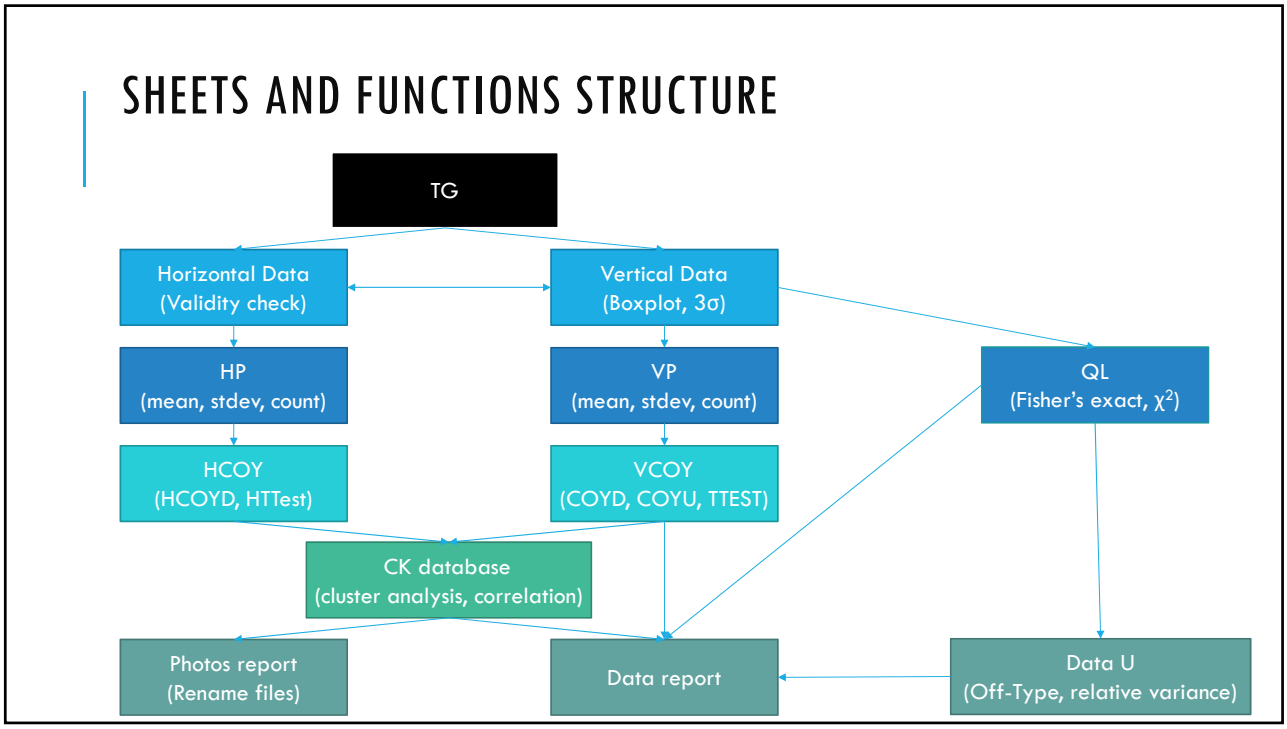
2017 develop DUS Excel

2018 apply DUS Excel in maize, tomato, cucumber, etc. in Beijing

DUS EXCEL

- 55 functions written by VBA covering all analysis methods in TGP/8.
- UI Menu easy to operate.
- Excel interface easy to handle data.
- A closed-loop solution for note producing and DUS analysis.


MENU
DATA
TEMPLATE SHEETS


SHEETS AND FUNCTIONS STRUCTURE
TG
Horizontal Data
(Validity check)
Vertical Data
(Boxplot, 3σ)
HP
(mean, stdev, count)
VP
(mean, stdev, count)
QL
(Fisher's exact, χ2)
HCOY
(HCOYD, HTTest)
VCOY
(COYD, COYU, TTEST)
CK database
(cluster analysis, correlation)
Photos report
(Rename files)
Data report
Data U
(Off-Type, relative variance)

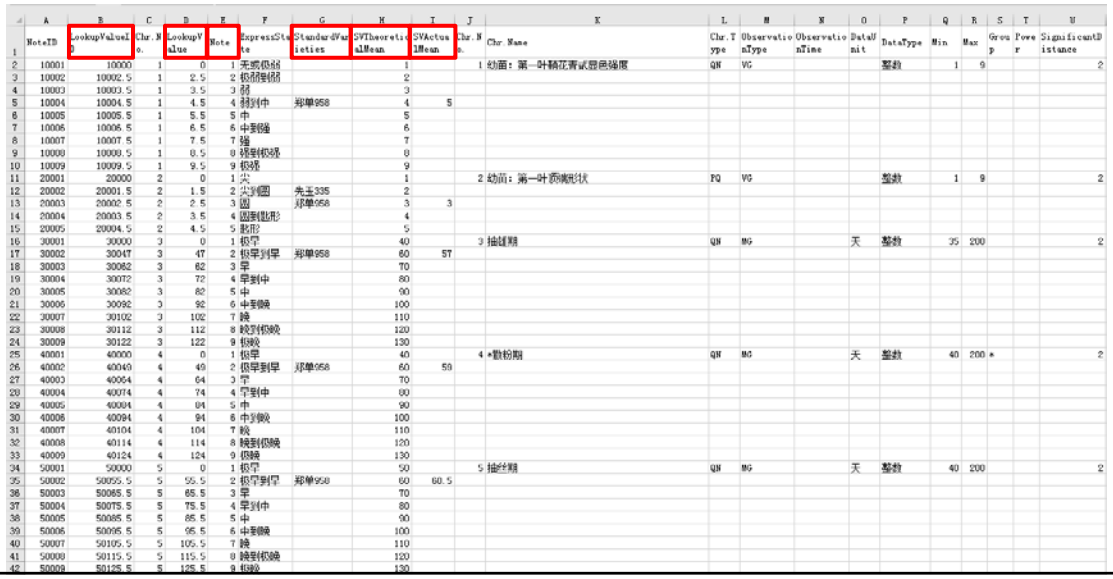
CHECKING ABNORMAL DATA

1. click ValidH→mark red for all data out of type and range setting in TG.
2. click BxPlt (Boxplot) → 1.5 <mark yellow <3, 3<mark red
3. click StDev (Standard Deviation): 2 <mark yellow <3, 3<mark red

RESULT OF BOXPLOT

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X
1	申请	品种	试验	性状	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
421	否	2016-0098B	2016	16	42	42	37	47	43	42	42	33	40.5	46	42	42	44.5	40.5	39.5	43	37	39.5	40.5	40.5
422	是	2016-0098B	2017	16	42	48	45	42	45	47	49	46.5	48	47	42.5	44	46	48	46	46	46.5	45.5	44.5	47
423	是	2016-0099A	2016	16	32	33	37	37	40	36	38	37	33	32	40	38	34	40	33	35	39	36	38	27
424	是	2016-0099A	2017	16	36.5	32	38	37	37	36.5	39	37	34	36	35	39	35.5	36.5	30.5	38.5	36	37	39	38
425	否	2016-0099B	2016	16	39.5	38	34.5	43	37	39.5	40.5	44.5	33	35.5	38	38	37.5	33	42	37	40.5	38	38	38
426	否	2016-0099B	2017	16	37	38	39	35.5	41	35.5	41	32	41.5	35.5	42	42.5	38	43	38.5	40	39.5	38	38	39
427	是	2016-0100A	2016	16	33	35	32	31	38	40	36	36	35	35	39	36	36	39	32	33	32	45	30	31
428	是	2016-0100A	2017	16	35.5	36.5	34.5	37.5	34.5	33	42	37	39.4	39.5	40	31.5	34.5	39.5	32	33	40	35	39.5	41
429	否	2016-0100B	2016	16	36	39	38	34	36	39	39	38	32	33	37	31	26	37	26	35	37	35	33	34
430	否	2016-0100B	2017	16	39	38.5	39	41	36	42	40.5	37.5	40	38.5	39	41	43	41	37	42.5	35.5	42	37.5	36
431	是	2016-0101A	2016	16	28	31	29	32	38	41	33	38	44	36	39	34	45	36	31	40	46	38	31	35
432	是	2016-0248A	2016	16	25	27	25	30	24	24	25	23	25	25	25	24	22	26	23	26	23	24	21	23
433	否	2016-0248B	2016	16	26	27.5	29	29	30	28	29	31	30	28	30	26	29	27	26	28	24	27	30	28
434	是	2015-0374A	2016	17	21	19	16	18	20	18	19	18	21	18	16	20	21	22	24	19	18	18	16	18
435	是	2015-0374A	2017	17	27	26	38	24	25	26.5	26.3	22.5	24	26	29	24.5	26	20.3	18	24	23	23.5	24	23.5
436	否	2015-0374B	2016	17	19	23	24	24	20.5	19	24	20.5	22	23	20.5	20.5	19	22	19	19	19	18	19	18
437	否	2015-0374B	2017	17	22.5	20	21	24	24	22	22.5	22.5	23	19	21	22.5	21.5	24	21	21	17	17	18	13
438	是	2015-0375A	2016	17	21	23	22	24	23	21	22	23	25	24	19	20	21	22	23	24	21	23	22	21
439	是	2015-0375A	2017	17	21	27	27	25.5	28	28.5	26	26	26	28	24	26	26	23	25	26	24	28	27	26
440	否	2015-0375B	2016	17	19.5	23	28	24.25	20.5	24.5	24.5	21.5	20.5	25.5	23	23	19.5	20.5	2105	20.5	23	21.5	23	23
441	否	2015-0375B	2017	17	29	28	31.5	26	32	27	27.5	33	30	30	28	28	30	28	27	28	24	29	34	26
442	是	2016-0096A	2016	17	22	28	26	26	28	26	26	25	25	28	26	20	25	26	33	25	25	29	27	29
443	是	2016-0096A	2017	17	34	30	32	32	32	27	3	36	30.8	34	35	35	29	36.8	35	31	33	36	34	35
444	是	2016-0097A	2016	17	27	27	27	26	27	24	25	29	27	25	25	24	25	28	24	25	26	26	22	19
445	是	2016-0097A	2017	17	26	26	18	28	28	28	30	29	33	30	22	28	28	27	27	32	33.5	29	32	30
446	是	2016-0098A	2016	17	29	28	29	33	33	30	25	33	33	25	23	31	34	27	27	30	34	28	36	33

SETTING UP TG PARAMETERS



	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U
1	NoteID	LookupValueID	Chr.No.	LookupValue	Note	ExpressSta te	StandardVarieties	SVTheoreticalMean	SVActualMean	Chr.No.	Chr. Name	Chr.Type	ObservationType	ObservationTime	DataUnit	DataType	Min	Max	Group	Power	SignificantDistance
2	10001	10000	1	0	1	无或极弱		1		1	幼苗：第一叶精花青试显色强度	QN	VG			整数	1	9			2
3	10002	10002.5	1	2.5	2	极弱到弱		2													
4	10003	10003.5	1	3.5	3	弱		3													
5	10004	10004.5	1	4.5	4	弱到中	郑单958	4	5												
6	10005	10005.5	1	5.5	5	中		5													
7	10006	10006.5	1	6.5	6	中到强		6													
8	10007	10007.5	1	7.5	7	强		7													
9	10008	10008.5	1	8.5	8	强到极强		8													
10	10009	10009.5	1	9.5	9	极强		9													
11	20001	20000	2	0	1	尖		1		2	幼苗：第一叶质感状状	PQ	VG			整数	1	9			2
12	20002	20001.5	2	1.5	2	尖到圆	先玉335	2													
13	20003	20002.5	2	2.5	3	圆	郑单958	3	3												
14	20004	20003.5	2	3.5	4	圆到扁形		4													
15	20005	20004.5	2	4.5	5	扁形		5													
16	30001	30000	3	0	1	极早		40		3	抽雄期	QN	MG		天	整数	35	200			2
17	30002	30047	3	47	2	极早到早	郑单958	60	57												
18	30003	30062	3	62	3	早		70													
19	30004	30072	3	72	4	早到中		80													
20	30005	30082	3	82	5	中		90													
21	30006	30092	3	92	6	中到晚		100													
22	30007	30102	3	102	7	晚		110													
23	30008	30112	3	112	8	晚到极晚		120													
24	30009	30122	3	122	9	极晚		130													
25	40001	40000	4	0	1	极早		40		4	*散粉期	QN	MG		天	整数	40	200	*		2
26	40002	40049	4	49	2	极早到早	郑单958	60	59												
27	40003	40064	4	64	3	早		70													
28	40004	40074	4	74	4	早到中		80													
29	40005	40084	4	84	5	中		90													
30	40006	40094	4	94	6	中到晚		100													
31	40007	40104	4	104	7	晚		110													
32	40008	40114	4	114	8	晚到极晚		120													
33	40009	40124	4	124	9	极晚		130													
34	50001	50000	5	0	1	极早		50		5	抽丝期	QN	MG		天	整数	40	200			2
35	50002	50055.5	5	55.5	2	极早到早	郑单958	60	60.5												
36	50003	50065.5	5	65.5	3	早		70													
37	50004	50075.5	5	75.5	4	早到中		80													
38	50005	50085.5	5	85.5	5	中		90													
39	50006	50095.5	5	95.5	6	中到晚		100													
40	50007	50105.5	5	105.5	7	晚		110													
41	50008	50115.5	5	115.5	8	晚到极晚		120													
42	50009	50125.5	5	125.5	9	极晚		130													

PRODUCING NOTE

Set standard mean value for each note

↓

Input standard varieties

↓

Check mean values according to trial

↓

Produce minimum values for each note of each Characteristics

↓

Produce variety trial note | cite CK note | calculate retression note→final trial note

↓

Compare different trial notes → CK note

Level 3

SELECT SIMILAR VARIETIES BY NOTES

correlation analysis
minimum distance analysis
threshold distance analysis

similar varieties

correlation

申请	品种	36	37	38	39	40	41	42	43	44	45	46.1	46.2	46.3	近似品种
是	2016-0339A	1	2	3	2	3	7	5	7	1	1	4			
	2016-0339B	1	2	3	2	3	5	3	7	1	1	4			
是	2016-0490A	2	3	2	2	2	7	5	5	1	3	4			.91:2017-0144B;
	2016-0490B	2	3	2	2	3	5	4	7	1	1	4			
是	2016-0491A	1	2	2	2	3	5	8	7	1	4	4			
是	2016-0492A	2	1	3	2	3	5	7	9	1	4	4			
	2016-0492B	3	1	3	3	3	4	3	7	1	4	4			
是	2016-0558A	1	2	4	1	3	4	5	9	1	1	4			
是	2017-0562A	1	2	2	1	3	3	3	9	1	3	4			
	2016-0558B	1	2	1	2	3	3	5	9	1	3	4			
是	2016-0559A	1	2	3	2	3	3	3	9	1	3	4			.9:2016-1207B,.9:2017-2135A;
	2016-0559B	2	2	2	2	3	3	4	9	1	3	4			
是	2016-1206A	1	2	3	2	3	5	5	9	1	3	4			.9:2016-0559B;
	2016-1206B	2	3	5	2	2	7	7	5	1	3	4			
是	2016-1207A	2	3	2	2	2	5	5	5	1	3	4			
	2016-1207B	1	2	1	1	3	4	3	9	1	3	4			
是	2016-1610A	1	2	2	1	3	5	3	9	1	3	4			.93:2016-1207B;
是	2016-2087A	2	3	2	2	3	6	5	5	1	3	4			
是	2017-0561A	1	2	3	1	3	5	6	7	1	3	4			
是	2017-0581A	1	2	2	2	3	3	3	7	1	3	4			
是	2017-0582A	2	3	2	2	3	3	4	7	1	3	4			.96:2016-1610B;
	2016-1610B	2	3	2	2	3	3	4	5	1	3	4			
	2016-1611B	2	2	3	2	3	5	5	5	1	3	4			
是	2017-0143A	1	1	3	2	3	4	7	7	1	4	4			
	2017-0143B	2	2	3	3	3	3	5	9	1	4	4			
是	2017-0144A	2	2	2	2	3	3	3	7	1	3	4			.91:2016-0559B;
	2017-0144B	2	3	3	2	3	7	5	7	1	3	4			
是	2017-0557A	2	1	3	2	3	3	6	7	1	4	4			.92:2017-0143B;
是	2017-0563A	2	3	4	2	3	3	4	7	1	3	4			
	2017-0563B	2	3	5	2	3	3	5	7	1	3	4			
是	2017-0637A	2	3	2	2	3	3	2	7	1	3	4			
是	2017-2605A	3	2	5	2	3	3	5	5	1	4	4			
是	2017-2606A	2	3	3	2	3	3	3	7	1	3	4			.92:2016-0490B;.9:2017-2607A;
是	2017-2607A	2	3	2	3	3	5	3	7	1	3	4			.92:2016-0490B;.9:2017-2606A;

是	2	1	4	3	2	2	5	2
是	2	4	4	2	2	2	4	2
是	2	5	4	2	2	2	4	2

相关系数	2016-0339A	2016-0490A	2016-0491A	2016-0492A	2016-0558A	2017-0562A	2016-0559A	2016-1206A
2016-0339A	1	0.828767403	0.812380545	0.775430236	0.762151477	0.74899907	0.806863136	0.800782596
2016-0339B	0.779375428	0.548905146	0.529337486	0.501580793	0.74431723	0.718155079	0.726077028	0.612266642
2016-0490A	0.828767403	1	0.851167041	0.759597436	0.561909267	0.603648614	0.661438023	0.670680462
2016-0490B	0.897496092	0.79321857	0.786745493	0.807759286	0.696594176	0.788573259	0.80388447	0.806395719
2016-0491A	0.812380545	0.851167041	1	0.838644065	0.66788182	0.733337237	0.738368383	0.829025287
2016-0492A	0.775430236	0.759597436	0.838644065	1	0.696743434	0.749802972	0.655703003	0.816267444
2016-0492B	0.763897608	0.670582276	0.64323162	0.802240913	0.553972031	0.66505187	0.705167738	0.698911873
2016-0558A	0.762151477	0.561909267	0.66788182	0.696743434	1	0.777509949	0.810968832	0.738668192
2017-0562A	0.74899907	0.603648614	0.733337237	0.749802972	0.777509949	1	0.806424033	0.827294055
2016-0558B	0.732173808	0.634875828	0.770483821	0.827512121	0.808586384	0.841838167	0.792494312	0.869825335
2016-0559A	0.806863136	0.661438023	0.738368383	0.655703003	0.810968832	0.806424033	1	0.799361585
2016-0559B	0.760219417	0.595130874	0.768039538	0.742762349	0.763035328	0.809005821	0.858619367	0.903369589
2016-1206A	0.800782596	0.670680462	0.829025287	0.816267444	0.738668192	0.827294055	0.799361585	1
2016-1206B	0.764569925	0.777703525	0.758326721	0.752301179	0.638027754	0.701311897	0.67464856	0.688473169
2016-1207A	0.752225172	0.719866506	0.700665197	0.619542964	0.657912977	0.603372955	0.778154242	0.623677573
2016-1207B	0.760585878	0.620637314	0.720943711	0.661378434	0.823339873	0.832540812	0.902511167	0.81263473
2016-1610A	0.781468116	0.647790069	0.701980844	0.649003877	0.82376351	0.77811092	0.894438746	0.721119898
2016-2087A	0.797004383	0.781610962	0.78034836	0.782583215	0.645776312	0.705897107	0.652133758	0.799493361
2017-0561A	0.773771023	0.63970944	0.799740806	0.641567565	0.745242765	0.739662624	0.799081775	0.851562971
2017-0581A	0.803170214	0.723984223	0.763539165	0.696179125	0.763438814	0.802369334	0.895707154	0.779217429
2017-0582A	0.718485132	0.577861727	0.740809452	0.743455532	0.713373623	0.832704165	0.751967236	0.899323811
2016-1610B	0.702260656	0.610622244	0.7237325	0.731288461	0.639733431	0.783099227	0.685045935	0.855604794
2016-1611B	0.734970285	0.568383084	0.685142209	0.689188941	0.765849925	0.732468894	0.660283653	0.824725839
2017-0143A	0.765150357	0.769500487	0.860475175	0.852806882	0.767354655	0.713276594	0.72210316	0.792403119
2017-0143B	0.723732306	0.655346164	0.706914538	0.821422671	0.722911133	0.680492687	0.746331032	0.781202132
2017-0144A	0.651335991	0.55134224	0.687475517	0.674888952	0.61128257	0.816169174	0.755843935	0.891162451
2017-0144B	0.895124686	0.905439935	0.876743021	0.802784724	0.67066154	0.73484606	0.807913719	0.778178389

Level 2

ANALYZEDISTINCTNESS BY STATISTICAL WAY

1. trial by trial

——LSD, T test, Fisher's Exact | χ^2

2.Combine trials

——COYD

ANALYSIS OF COYD

申请	品种	2015	2016	2017					
苗	R1	38	41	35					
苗	R2	63	68	61					
苗	R3	69	71	64					
苗	R4	71	75	67					
苗	R5	69	78	69					
苗	R6	74	77	71					
苗	R7	76	79	70					
苗	R8	75	80	73					
苗	R9	78	81	75					
苗	R10	79	80	75					
苗	R11	76	85	79					
成	C1	52	56	48					
成	C2	72	79	68					
成	C3	85	88	85					
无重复双因素方差分析									
品种	求和	平均	方差	C1	C2	C3	C1	C2	C3
R1	114	38	9	-14	-35	-48	D	D	D
R2	192	64	13	12	-9	-22	D	D	D
R3	204	68	13	16	-5	-18	D	D	D
R4	213	71	16	19		-15	D		D
R5	216	72	27	20		-14	D		D
R6	222	74	9	22		-12	D		D
R7	225	75	21	23		-11	D		D
R8	228	76	13	24		-10	D		D
R9	234	78	9	26	5	-8	D	D	D
R10	234	78	7	26	5	-8	D	D	D
R11	240	80	21	28	7	-6	D	D	D
C1	156	52	16		-21	-34		D	D
C2	219	73	31	21		-13	D		D
C3	258	86	3	34	13		D	D	
年度	求和	平均	方差						
2015	977	69.785714	145.1044						
2016	1038	74.142857	151.67033						
2017	940	67.142857	160.90109						
方差分析									
差异源	SS	df	F	P value	F crit				
品种	5883.64286	13	452.58791						
年份	349.857143	2	174.92857						
误差	66.1428571	26	2.543956						
总和	6299.64286	41							
LSD0.01=	3.61870437								

Level 1

SIDE BY SIDE: RENAME AND COMPARE PHOTO FILES

	A	B	C	D	E	F
1	旧版名称	文件类型	所在位置	新版名称	图片1	图片2
2	186 (2).JPG	文件	E:\PhotoDatabase\y186_BJ20171021A			
3	186 (3).JPG	文件	E:\PhotoDatabase\y186_BJ20171021A			
4	186 (4).JPG	文件	E:\PhotoDatabase\y186_BJ20171021A			
5	186 (5).JPG	文件	E:\PhotoDatabase\y186_BJ20171021A			

ANALYSIS OF UNIFORMITY

Trial by trial

1.Off-type

2.Relative variance

Combine trials

3.COYU

ANALYSIS OF OFF-TYPE AND RELATIVE VARIANCE

	A	B	C	D	E	F	G	H	I	J	K	L	M	N
1	Cand.	Var.	Trial	Chr.	N	N. Off-ty.	P	StDev		Off-type P	Result	Rel-Var	Allowed-Var	Result
2	否	R01	2017-北京-玉米-1	1	40	3	0.03	4.1		0.882171133	U	2.266332	1.592268494	NU
3	否	R02	2017-北京-玉米-1	1	100	3	0.01	3.2		0.920626798	U	1.768844	1.358067233	NU
4	否	R03	2017-北京-玉米-1	1	200	6	0.03	2.3		0.443229212	U	1.271357	1.247225615	NU
5	否	R04	2017-北京-玉米-1	1	200	10	0.03	1.4		0.919220641	U	0.773869	1.247225615	U
6	否	R05	2017-北京-玉米-1	1	200	6	0.03	0.5		0.443229212	U	0.276382	1.247225615	U
7	否	R06	2017-北京-玉米-1	1	200	6	0.03	1.4		0.443229212	U	0.773869	1.247225615	U
8	否	R07	2017-北京-玉米-1	1	200	6	0.03	1.4		0.443229212	U	0.773869	1.247225615	U
9	否	R08	2017-北京-玉米-1	1	200	6	0.03	1.4		0.443229212	U	0.773869	1.247225615	U
10	否	R09	2017-北京-玉米-1	1	200	6	0.03	1.4		0.443229212	U	0.773869	1.247225615	U
11	否	R10	2017-北京-玉米-1	1	200	6	0.03	1.4		0.443229212	U	0.773869	1.247225615	U
12	否	R11	2017-北京-玉米-1	1	200	6	0.03	1.4		0.443229212	U	0.773869	1.247225615	U
13	是	C01	2017-北京-玉米-1	1	200	6	0.03	1.7		0.443229212	U	0.939698	1.247225615	U
14	是	C02	2017-北京-玉米-1	1	200	6	0.03	1.59		0.443229212	U	0.878894	1.247225615	U
15	是	C03	2017-北京-玉米-1	1	200	6	0.03	1.53		0.443229212	U	0.845729	1.247225615	U
16	是	C04	2017-北京-玉米-1	1	200	6	0.03	1.47		0.443229212	U	0.812563	1.247225615	U
17	是	C05	2017-北京-玉米-1	1	200	6	0.03	1.41		0.443229212	U	0.779397	1.247225615	U
18	是	C06	2017-北京-玉米-1	1	200	6	0.03	10		0.443229212	U	5.527638	1.247225615	NU
19	是	C07	2017-北京-玉米-1	1	200	6	0.03	1.29		0.443229212	U	0.713065	1.247225615	U
20	是	C08	2017-北京-玉米-2	1	200	6	0.03	1.25		0.443229212	U	0.690955	1.247225615	U

ANALYSIS OF COYU

	A	B	C	D	E	F
1	申请	品种	M1	M2	S1	S2
2	否	2015-0374B	20.65	20.825	2.07174	2.815722
3	否	2015-0375B	22.5125	28.8	2.161985	2.478327
4	否	2016-0099B	28.425	30.575	2.556081	1.921314
5	否	2016-0100B	24.575	31.8	1.583426	2.307881
6	是	2015-0374A	19	24.555	2.077448	2.534701
7	是	2015-0375A	22.2	25.9	1.507874	1.839622
8	是	2016-0096A	26.25	32.88	2.672964	2.645672
9	是	2016-0097A	25.4	28.225	2.210025	3.599982
10	是	2016-0098A	30.05	13.9	3.56112	8.823712
11	是	2016-0099A	25.6	29.45	2.909151	2.569559
12	是	2016-0100A	28.5	29.715	2.685242	3.07935
13						
14	变异来源	自由度	平方和	均方		
15	年份间	1	0.007622	0.007622		
16	年份内	6	0.09634	0.016057		
17	总和	7	0.103962	0.014852		
18	UCp	1.773402538				
19	申请	品种	均值	修正SD	一致性	
20	否	2015-0374B	20.7375	1.25213		
21	否	2015-0375B	25.65625	1.220318		
22	否	2016-0099B	29.5	1.16714		
23	否	2016-0100B	28.1875	1.075488		
24	是	2015-0374A	21.7775	1.214807	U	
25	是	2015-0375A	24.05	1.002996	U	
26	是	2016-0096A	29.565	1.301083	U	
27	是	2016-0097A	26.8125	1.344612	U	
28	是	2016-0098A	21.975	1.900023	NU	
29	是	2016-0099A	27.525	1.314935	U	
30	是	2016-0100A	29.1075	1.352985	U	

APPLICATIONS

Crops:

Maize	Tomato	Cucumber
Cabbage	Pepper	French bean
Squash	Water melon	Chinese cabbage

Stations:

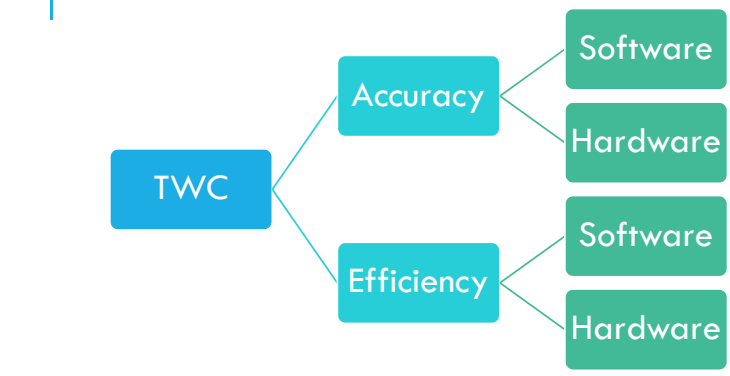
Bayannaoer	Chengdu	Gongzhuling
Jingzhou	Yueyang	Kunming
Fuzhou		

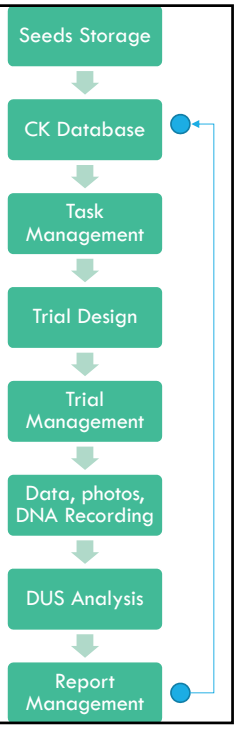
FUTURE PLAN

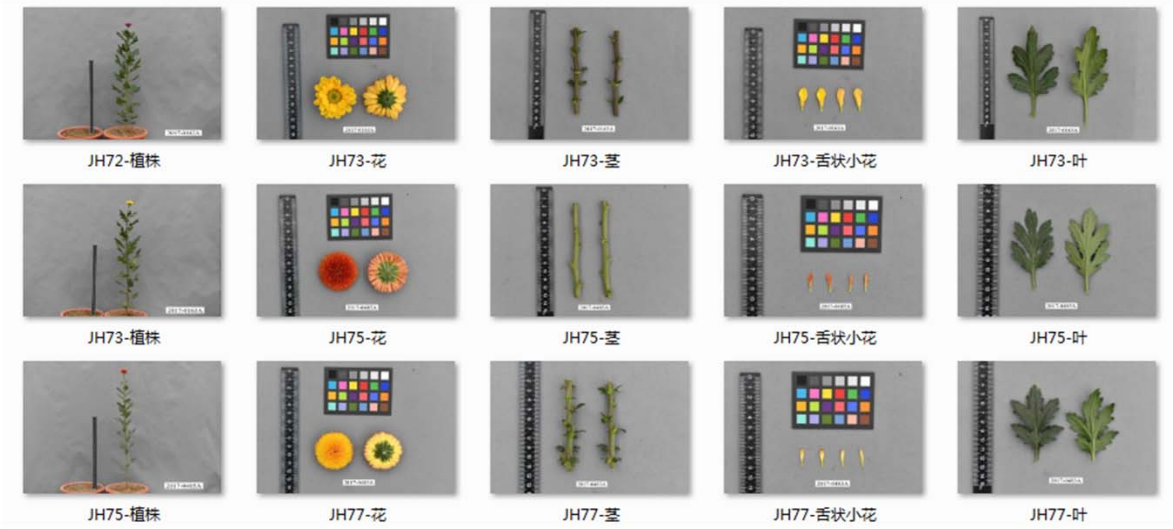
Improve DUS EXCEL →make it more efficient

Improve TGP/8 →make it more practical

SUGGESTIONS ON TWC







THANK YOU FOR YOUR ATTENTION!

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[End of Annex and of document]