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UPOV

TWC/32/6
ORIGINAL: English
DATE: May 22, 2014

INTERNATIONAL UNION FOR THE PROTECTION OF NEW VARIETIES OF PLANTS

Geneva

TECHNICAL WORKING PARTY ON AUTOMATION AND COMPUTER PROGRAMS

Thirty-Second Session
Helsinki, Finland, June 3 to 6, 2014

VARIETY DESCRIPTION DATABASES

Document prepared by the Office of the Union

Disclaimer: this document does not represent UPOV policies or guidance

1. The purpose of this document is to report on developments concerning variety description databases.

2. The following abbreviations are used in this document:

TC:	Technical Committee
TC-EDC:	Enlarged Editorial Committee
TWA:	Technical Working Party for Agricultural Crops
TWC:	Technical Working Party on Automation and Computer Programs
TWF:	Technical Working Party for Fruit Crops
TWO:	Technical Working Party for Ornamental Plants and Forest Trees
TWPs:	Technical Working Parties
TWV:	Technical Working Party for Vegetables

3. The structure of this document is as follows:

BACKGROUND

4. At its forty-fifth session, held in Geneva from March 30 to April 1, 2009, the Technical Committee (TC) noted from the developments reported in document TC/45/9 “Publication of Variety Descriptions” that

members of the Union were developing databases containing morphological and/or molecular data and, where considered appropriate, were collaborating in the development of databases for the management of variety collections, particularly on a regional basis. The TC agreed that it could be beneficial to offer the possibility for members of the Union to report on that work in a coherent way to the TC, the Technical Working Parties (TWPs) and the Working Group on Biochemical and Molecular Techniques and DNA Profiling in Particular (BMT). On that basis, the TC agreed to replace the agenda item "Publication of variety descriptions" with an item for "Variety description databases" on the agendas of the forthcoming sessions of the TC, TWPs and the BMT. In that respect, it recalled the importance of the list of criteria for consideration for the use of descriptions obtained from different locations and sources as set out in document TC/45/9, paragraph 3. The TC also agreed that the information presented would not need to be related to the publication of descriptions (see document TC/45/16 "Report", paragraph 173).

DEVELOPMENTS IN 2013

Technical Committee

5. The TC, at its forty-ninth session in Geneva from March 18 to 20, 2013, considered document TC/49/9 "Variety Description Databases" and received a presentation by Mr. François Boulineau (France) (see document TC/49/41 "Report on the Conclusions", paragraphs 100 to 103).

6. The TC noted the developments on variety description databases, as set out in document TC/49/9.

7. The TC noted that the results of the study on Pea would be presented to the TWA and the TWV in order to:

(i) select characteristics to be used as grouping characteristics according to their qualities (discriminating power, distortion, use);

(ii) develop a procedure to improve the pea database; and

(iii) consider making the pea database available to all examination offices.

8. The TC agreed that the results of the study should be presented to other TWPs for their comments on the approach for managing variety collections and noted that the TWF would consider the results of the model study on Apple, as presented in document TC/41/9 "Publication of Variety Descriptions" (see document TC/49/41 "Report on the Conclusions", paragraphs 100 to 103).

Technical Working Parties

9. The TWO, at its forty-sixth session, held in Melbourne, Australia, from April 22 to 26, 2013, considered document TWO/46/6 "Variety description databases" and document TWO/46/25 "Pea database study". The TWO noted the developments on variety description databases.

10. The TWO agreed that the approach for managing variety collections as used in the Pea database provided a useful tool for the development of Test Guidelines, selection of grouping characteristics and identifying varieties that would be used in the DUS trials. The TWO noted the approach for managing variety collections as presented in the Annex to document TWO/46/25 (see document TWO46/29 "Report" paragraphs 94 and 95).

11. The TWO requested an expert from Australia to lead an initial study on the viability of the development of a database for a crop of interest to the TWO, in a similar way to the database being developed for Pea, which would be presented at the forty-seventh session of the TWO. The TWO recognized the need to clearly define the scope and objectives in developing such a database. Experts from the European Union and the Netherlands would participate in the initial study (see document TWO46/29 "Report" paragraph 92).

12. The TWF, at its forty-fourth session, held in Napier, New Zealand, from April 29 to May 3, 2013, considered document TWF/44/6 "Variety description databases" and document TWF/44/25 "Pea database study". The TWF noted the report on the Pea Database study as presented in document TWF/44/25 and the approach for managing variety collections as presented in the Annex to document TWF/44/25.

13. The TWF noted that an expert from the European Union would prepare a document on the development of a database for Peach, in a similar way to the database being developed for Pea, which

would be presented at the forty-fifth session of the TWF in 2014. The TWF noted that it would be necessary to clarify in the study the different objectives of creating databases, in order to identify the characteristics for which information was required, with a view to limiting costs and work load (see document TWF/44/31 "Report" paragraphs 94 to 97).

14. The TWV, at its forty-seventh session, held in Nagasaki, Japan, from May 20 to 24, 2013 considered document TWV/47/6 "Variety description databases" and document TWV/47/25 "Pea database study". The TWV noted the report on the Pea Database study as presented in document TWV/47/25 and the approach for managing variety collections of pea as presented in the Annex to document TWV/47/25.

15. The TWV requested the expert from France to make a presentation, at its forty-eighth session, on the GEMMA software being used by the Group for Study and Control of Varieties and Seeds (GEVES) in a Community Plant Variety Office of the European Union (CPVO) Research and Development project. This software is seen as being adapted for the development of such a common database (see document TWV/47/34 "Report" paragraphs 109 to 112).

16. The TWC, at its thirty-first session, held in Seoul, from June 4 to 7, 2013 considered document TWC/31/6 "Variety description databases" and document TWC/31/25 "Pea database study". The TWC noted the developments on variety description databases and congratulated the experts from France on the study on the Pea Database. The TWC agreed on the possible use of image analysis for reducing distortion in some characteristics, while noting that image analysis had its own sources of distortion (see document TWC/31/32 "Report" paragraph 64).

17. The TWC welcomed the offer from China to make a presentation on variation of variety descriptions over years in different locations, to be presented the TWC at its thirty-second session (see document TWC/31/32 "Report" paragraph 65).

18. The TWC also considered document TWC/31/2 "Molecular Techniques" and received a presentation from experts from China on the research on the construction of DNA fingerprint database in Maize and suggested that the information be made available to the BMT. A copy of the presentation is provided in document TWC/31/2 Add. (see document TWC/31/32 "Report" paragraph 12).

19. The TWA, at its forty-second session, held in Kyiv, Ukraine, from June 17 to 21, 2013 considered document TWA/42/6 "Variety description databases" and document TWA/42/25 "Pea database study". The TWA noted the report on the Pea Database study as presented in document TWA/42/25 and the approach for managing variety collections of Pea as presented in the Annex to document TWA/42/25.

20. The TWA welcomed the results of the study on the Pea Database and noted that it presented a good method for improvement of Test Guidelines (see document TWA/42/31 "Report" paragraphs 105 to 108).

DEVELOPMENTS IN 2014

Technical Committee

Variety description databases

21. The TC at its fiftieth session, held in Geneva from April 7 to 9, 2014 considered document TC/50/7 "Variety description databases" and noted the developments on variety description databases (see document TC/50/36 "Report on the Conclusions", paragraphs 102 and 103).

22. The TC noted that:

(a) the TWV had requested an expert from France to make a presentation, at its forty-eighth session, on the GEMMA software being used by the Group for Study and Control of Varieties and Seeds (GEVES) in a Community Plant Variety Office of the European Union (CPVO) Research and Development project. In that regard, it noted the report from France that the presentation would not be possible for 2014 (see document TC/50/36 "Report on the Conclusions", paragraph 104);

(b) the TWC had invited an expert from China to make a presentation on variation of variety descriptions over years in different locations, at its thirty-second session. The TC agreed that it would be beneficial to make a presentation to the TWA (see document TC/50/36 "Report on the Conclusions", paragraph 105);

(c) the TWC had suggested that the information presented by experts from China, at its thirty-first session, on the research on the construction of DNA fingerprint database in Maize, should be made available to the BMT (see document TC/50/36 "Report on the Conclusions", paragraph 106);

(d) the TWF had invited an expert from the European Union to present the development of a database for Peach and noted the report that this presentation would now be made in 2015 (see document TC/50/36 "Report on the Conclusions", paragraph 107);

(e) the TWO had requested an expert from Australia to lead an initial study on the viability of the development of a database, in a similar way to the database being developed for Pea, at its forty-seventh session (see document TC/50/36 "Report on the Conclusions", paragraph 108).

23. The TWC is invited to note the developments on variety description databases, as set out in this document.

Matters raised by the International Seed Federation (ISF)

24. The Consultative Committee, at its eighty-sixth session, held in Geneva on October 23 and 24, 2013, discussed the letter of the International Seed Federation (ISF) of January 21, 2013, on the subject "Application, examination and granting aspects of PBR applications" and invited ISF to present its views at the relevant part of that item (see document C/47/15 Rev. "Report by the President on the work of the eighty-sixth session of the Consultative Committee; adoption of recommendations, if any, prepared by that Committee", paragraphs 62 to 66).

25. The TC invited ISF to consider the relevant UPOV materials and to explain where it considered that further guidance might be developed in relation to the following matters, as set out in document TC/50/10, paragraph 46 (see document TC/50/36 "Report on the Conclusions", paragraph 12):

(a) Photographs
(b) Minimum sample size
(c) Reference collections
(d) Length of examination
(e) Variety description of most similar variety

[Extract from ISF letter]
"Variety description of most similar variety: In some countries the applicant is requested to provide the full variety description of the most similar variety(ies), whereas in the spirit of UPOV only the differences between the candidate variety and the most similar variety need to be provided. ISF members in general feel that providing a full description of the candidate and the comparison varieties is overly burdensome for the applicant. It is time consuming and causes delays in the application process. In most cases a special observational trial has to be set up to make such variety descriptions. In case of a priority claim this can be a big disadvantage for the applicant. Providing a full variety description of the most similar varieties is an even larger problem if these are competitor varieties.

"The applicant should only be requested to provide the differences between the candidate and the most similar varieties. In other words only the TQ as set up by UPOV should have to be filled out.

"Breeding techniques change fast and so do varieties. New characteristics are being added to the current list all the time. So there is a need for timely introduction of new characteristics into TQ's and variety descriptions, to ensure enough distinguishing power between varieties."

Relevant UPOV Materials:

- *TGP/7, Section 4 "Development of Individual Authorities' Test Guidelines"*
- *TGP/7 "Development of Test Guidelines", Section 2 "Procedure for the Introduction and Revision of UPOV Test Guidelines"*

(f) Variety description by applicant

[Extract from ISF letter]
"Variety description by applicant: In certain countries varieties are described entirely by the applicant. This means that the same variety as a result of different influential factors (sowing period, growth environment and applicant-examiner) may be described entirely differently. In those cases where the applicant makes the variety description there need to be more harmonized rules and supervision by the PBR authorities. Proper calibration according to UPOV standards is a way to overcome the problems. As a general rule it can be stated that having a central testing office allows for a better and more complete reference collection and provides for a better examination of the candidate varieties.

"Creating a variety description including statistical data is a heavy burden on the applicant which is a reason for seed companies not to apply for PBR in that country. Example: the same corn varieties have been described in so many different ways that a number of characteristics can no longer be used to distinguish the varieties."

Relevant UPOV Materials:

- *TGP/6 "Arrangements for DUS Testing", Section 3 "Declaration on the Conditions for the Examination of a Variety Based Upon Trials Carried out by or on Behalf of the Breeder"*

(g) Variety description databases

[Extract from ISF letter]
"Variety description database: A variety description database including the TQ information should be available to all interested parties. This would improve the management of reference collections and would allow for a better basis of selection of the comparison varieties."

26. The TC noted that ISF was invited to express its views to the TC with regard to databases of variety descriptions and the criteria identified by the TC for the publication of variety descriptions, as set out in document TC/45/9 "Publication of Variety Descriptions" (see document TC/50/36 "Report on the Conclusions", paragraph 13).

27. The TWC is invited to note the matters raised by the ISF in relation to variety descriptions.

Administrative and Legal Committee

28. The Administrative and Legal Committee (CAJ) at its sixty-ninth session in Geneva on April 10, 2014, in accordance with the proposal by the CAJ-AG, agreed to invite the TC to (see document CAJ/69/12 "Report on the conclusions" paragraphs 17):

(a) consider the development of guidance on certain matters concerning variety descriptions, as reproduced below:

i. use of information, documents or material provided by the breeder for verifying the maintenance of the variety, as set out in paragraph 15 of document CAJ-AG/13/8/4 "Matters concerning cancellation of the breeder's right", with an explanation that the information, documents or material could be maintained in a different country; and

ii. use of Test Guidelines for verifying the maintenance of the variety that were different from the Test Guidelines used for the examination of Distinctness, Uniformity and Stability ("DUS").

(b) Consider the following matters in document CAJ-AG/13/8/7, paragraph 4, and reproduced below:

"[…]

"(b) the status of the original variety description in relation to the verification of the conformity of plant material to a protected variety for the purposes of:

"(i) verifying the maintenance of the variety (Article 22 of the 1991 Act, Article 10 of the 1978 Act);

"(ii) the examination of distinctness, uniformity and stability ("DUS") of candidate varieties; and

"[…]

"(c) the status of a modified variety description in relation to (a) and (b) above produced, for example, as a result of:

"(i) a recalibration of the scale in the Test Guidelines (particularly for non asterisked characteristics);

"(ii) variation due to the environmental conditions of the years of testing for characteristics that are influenced by the environment;

"(iii) variation due to observation by different experts; or

"(iv) the use of different versions of scales (e.g. different versions of the RHS Color Chart).

"(d) situations where an error is subsequently discovered in the initial variety description."

29. The TWC is invited to note the conclusion of the CAJ on matters concerning variety descriptions, as set out in paragraph 29 of this document.

Consideration by the Technical Working Party on Automation and Computer Programs

30. In relation to paragraph 22 (b) of this document, Annex I presents "Variation of variety descriptions over years in different locations", prepared by an expert from China.

31. In relation to paragraph 22 (e) of this document, the expert from Australia has informed the Office that the development of a database does not appear to be relevant for the TWO.

32. Annex II to this document presents "PVP Database in China", prepared by an expert from China.

33. The TWC is invited to:

(a) note the proposal of the expert from Australia, not to develop a database to the TWO;

(b) consider the presentation to be made by China on "Variation of variety descriptions over years in different locations", as presented in Annex I of this document; and

(c) consider the presentation to be made by China on "PVP Database in China", as presented in Annex II of this document.

[Annexes follow]

VARIATION OF VARIETY DESCRIPTIONS OVER YEARS IN DIFFERENT LOCATIONS
(Information provided by China on May 10, 2014)

UPOV TWC
Thirty-Second Session
Helsinki, Finland, June 3 to 6, 2014

Variation of variety descriptions over years in different locations

Experts from China

Premise

- **Suitable location according to different varieties**

  - e.g.:15 varieties of 29 rice example varieties can not heading normally in Gongzhuling, otherwise heading normally in Hangzhou and Guangzhou. (*YANG et al. 2010*);

- **All the data provided by the office of PVP, MOA, P. R. China;**

Contents

- **Variation of a variety full-characteristics descriptions in 6 different locations in China;**
- **Variation of 10 measured quantitative characteristics of 5 varieties in 6 different locations in China;**
- **Conclusion.**

Variation of variety descriptions

-one variety in different locations over 2 years

- **Variety:** Zhengdan 958 (hybrids, *Zea mays* L.);
- **Locations:** Nanjing(NJ), Jinan(JN), Yangling(YL), Urumchi(UR), Gongzhuling(GZL), Harbin(HB);
- **Years:** 2012 and 2013.
- **Description:** on the basis of all the characteristics used in national Maize DUS testing guideline;

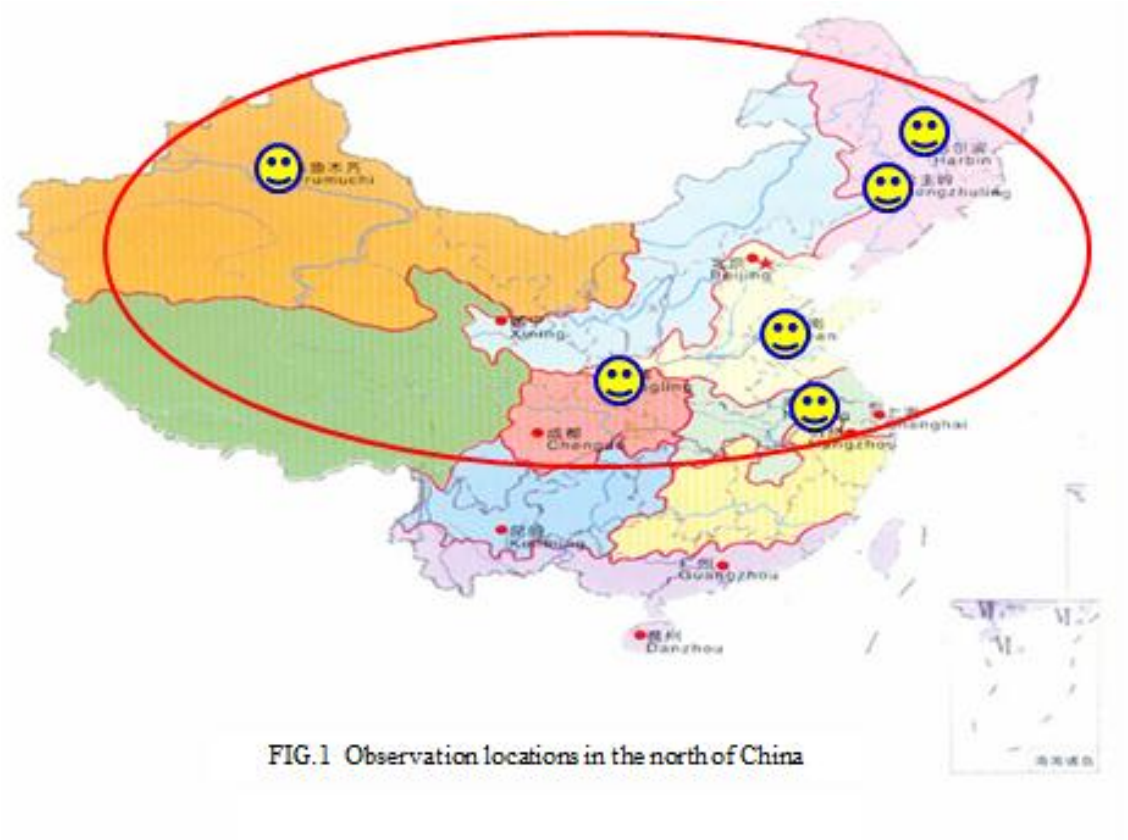


FIG.1 Observation locations in the north of China

Variation of variety descriptions
-one variety in different locations over 2 years

- **Type of characteristics(Ch.):** QL/PQ/QN;
- **Qualitative characteristic(QL)**:

  Ch.33: Ear： number of colors of grains

TAB 1. Description note of number of colors of grains in six places

Location	NJ	JN	YL	UR	GZL	HB	Description
Note(2012)	1	1	1	1	1	1	one color
Note(2013)	1	1	1	1	1	1	one color

No variation in QL

Variation of variety descriptions
-one variety in different locations over 2 years

◆ Pseudo-Qualitative Characteristics(PQ):

TAB 2. Description note of pseudo-qualitative characteristics in six places

Ch. \ Location		NJ	JN	YL	UR	GZL	HB	Description
Ch.2 First leaf: shape of apex	2012	3	3	3	3	3	3	3 rounded
	2013	3	3	3	3	3	3	
Ch.39 ear: color of top of grain	2012	3	3	3	3	3/4	3	3 yellow 4 yellow orange
	2013	3	3	3	3	3	3	
Ch.40 ear: color of dorsal side of grain	2012	3	5	4/5	4	4	3	3 yellow 4 yellow orange 5 orange
	2013	3/4	5	4/5	4	4	3	
Ch.41 Grain: shape	2012	4	4	4	4	4	4	4 nearly wedged-shaped
	2013	4	4	4	4	4	4	

No significant variation in PQ

Variation of variety descriptions
-one variety in different locations over 2 years

◆ Quantitative characteristics(QN):

TAB 3. Description note of quantitative characteristics in six places

Ch. \ Location		NJ	JN	YL	UR	GZL	HB	Description
Ch.1 First leaf: anthocyanin coloration of sheath	2012	6	6	6/7	7	7	6	6 medium to strong; 7 strong
	2013	6	7	6	6	7	7	
Ch.7 Leaf: angle between blade and stem	2012	3	2	3	3	3	2	2 very small to small; 3 small
	2013	3	3	3	3	2	2	
Ch.8 Leaf: curvature of blade	2012	3	2	3	2	3	2	2 absent to slightly recurved 3 Slightly recurved
	2013	3	3	2/3	2	2	3	
Ch.9 Tassel: anthocyanin coloration at base of glume	2012	1	1	1	1	1	1	1 Absent or very weak
	2013	1	1	1	1	1	1	

Variation of variety descriptions
-one variety in different locations over 2 years

- **Quantitative characteristics(QN):**

TAB 3. Description note of quantitative characteristics in six places

Ch. \ Location		NJ	JN	YL	UR	GZL	HB	Description
Ch.10 tassel: anthocyanin coloration of glumes excluding base	2012	2	1	1	1	2	1	1 Absent or very weak; 2 very weak to weak
	2013	2	1	1	1	2	1	
Ch.11 tassel: anthocyanin coloration of anthers	2012	3	2	3	3	3	2	1 Absent or very weak; 2 very weak to weak 3 weak
	2013	3	3	3	3	2	2	
Ch.12 Tassel: density of spikelets	2012	5	5	5	6	6	5	5 medium 6 medium to moderately dense
	2013	5	5	5	6	5	5	
Ch.13 tassel: angle between main axis and lateral branches	2012	3	3	3	4	3	3	3 small 4 small to medium
	2013	3	3	3	4	3	3	

Variation of variety descriptions
-one variety in different locations over 2 years

- **Quantitative characteristics(QN):**

TAB 3. Description note of quantitative characteristics in six places

Ch. \ Location		NJ	JN	YL	UR	GZL	HB	Description
Ch.14 tassel: curvature of lateral branches	2012	1	1	1	1	1	1	1 absent or very slightly recurved
	2013	1	1	1	1	1	1	
Ch.15 Ear: anthocyanin coloration of silks	2012	3/5	3/4	5	4	5	5	3 weak 4 weak to medium 5 medium
	2013	3/4/5	3	5	4	3/4	5	
Ch.20 Stem: degree of zig-zag	2012	1/2	2	2	1	2	2	1 absent or very slight; 2 slight
	2013	2	2	1/2	1	1/2	1	
Ch.21 stem: anthocyanin coloration of brace roots	2012	5/7	3	4	6	1/2	3	How to handle???
	2013	2/3	3	4	6	1	3	

Variation of variety descriptions
-one variety in different locations over 2 years

◆ Quantitative characteristics(QN):

TAB 3. Description note of quantitative characteristics in six places

Ch. \ Location		NJ	JN	YL	UR	GZL	HB	Description
Ch.23 Foliage: intensity of green color	2012	3	2	2	2/3	3	2	2 medium 3 dark
	2013	2/3	3	2	2	3	2	
Ch.24 Leaf: anthocyanin coloration of sheath	2012	3	1	1	1	1	3	1 Absent or very weak; 3 weak
	2013	2	1	1	1	1	1	
Ch.28 Peduncle: length	2012	3	2	1/2	3	3	3	1 very short; 2 very short to short; 3 short
	2013	1/2	1/2	1	1	2	3	
Ch.32 Ear: shape	2012	2	3	2	3	3	2	2conico-cylindrical 3 Cylindrical
	2013	2	3	2	3	3	2	

Variation of variety descriptions
-one variety in different locations over 2 years

◆ Quantitative characteristics(QN):

TAB 3. Description note of quantitative characteristics in six places

Ch. \ Location		NJ	JN	YL	UR	GZL	HB	Description
Ch.38 Ear: type of grain	2012	4	2/3	3	3	3	4	2 flint-like 3 intermediate 4 dent-like
	2013	3	2	3	3	3	3	
Ch.42 Ear: anthocyanin coloration of glumes of cob	2012	1	1	1	1	1	1	1 Absent or very weak;
	2013	1	1	1	1	1	1	

Variation of variety descriptions
-one variety in different locations over 2 years

◆ Quantitative characteristics(QN):

TAB 3. Description note of quantitative characteristics in six places

Ch. \ Location		NJ	JN	YL	UR	GZL	HB	MIN.	MAX.	RANGE	MEAN	SD	CV
Ch.4 Tassel: time of anthesis	2012	62.50	55.64	60.80	64.00	68.10	70.33	55.64	70.33	14.70	63.56	5.26	0.083
	2013	68.25	55.90	63.64	59.00	59.75	71.00	55.90	71.00	15.10	62.92	5.81	0.092
Ch.5 Ear: time of silk emergence	2012	62.50	55.30	60.80	68.00	66.70	71.00	55.30	71.00	15.70	64.05	5.66	0.088
	2013	66.75	57.70	64.36	61.00	59.25	71.67	57.70	71.67	13.97	63.46	5.21	0.082

Variation of variety descriptions
-one variety in different locations over 2 years

◆ Quantitative characteristics(QN):

TAB 3. Description note of quantitative characteristics in six places

Ch. \ Location		NJ	JN	YL	UR	GZL	HB	MIN.	MAX.	RANGE	MEAN	SD	CV
Ch.16 Tassle: length of main axis above lowest lateral branch	2012	31.07	35.04	35.44	35.05	35.81	37.82	31.07	37.82	6.75	35.04	2.20	0.063
	2013	33.79	32.24	33.90	36.55	35.61	32.21	32.21	36.55	4.34	34.05	1.76	0.052
Ch.17 Tassle: length of main axis above highest lateral branch	2012	23.10	25.81	25.29	22.80	26.13	25.75	22.80	26.13	3.33	24.81	1.47	0.059
	2013	24.82	24.65	24.02	24.85	24.76	22.74	22.74	24.85	2.11	24.31	0.85	0.034
Ch.18 Tassel: number of primary lateral branches	2012	10.85	14.10	10.06	19.25	14.81	16.47	10.06	19.25	9.19	14.26	3.45	0.242
	2013	12.91	9.42	10.57	16.35	19.38	16.88	9.42	19.38	9.96	14.25	3.91	0.274
Ch.19 tassel: length of lateral branch	2012	16.90	20.34	21.04	22.15	20.76	22.27	16.90	22.27	5.37	20.57	1.96	0.095
	2013	18.79	17.06	18.84	22.98	19.86	18.71	17.06	22.98	5.93	19.37	1.98	0.102

Variation of variety descriptions
-one variety in different locations over 2 years

- **Quantitative characteristics(QN)**:

TAB 3. Description note of quantitative characteristics in six places

Ch. \ Location		NJ	JN	YL	UR	GZL	HB	MIN.	MAX.	RANGE	MEAN	SD	CV
Ch.22 Leaf: width of blade	2012	10.62	9.87	10.08	10.13	11.40	11.07	9.87	11.40	1.52	10.53	0.61	0.058
	2013	10.62	9.06	9.51	10.30	11.17	11.35	9.06	11.35	2.29	10.34	0.91	0.088

Variation of variety descriptions
-one variety in different locations over 2 years

- **Quantitative characteristics(QN)**:

TAB 3. Description note of quantitative characteristics in six places

Ch. \ Location		NJ	JN	YL	UR	GZL	HB	MIN.	MAX.	RANGE	MEAN	SD	CV
Ch.25 Plant: height of insertion of peduncle	2012	84.18	89.58	94.89	128.25	142.26	141.27	84.18	142.26	58.08	113.40	26.81	0.236
	2013	78.00	83.29	105.52	120.00	125.67	111.70	78.00	125.67	47.67	104.03	19.45	0.187
Ch.26 Plant: length	2012	204.95	224.31	226.32	275.35	296.82	290.47	204.95	296.82	91.87	253.03	39.16	0.155
	2013	200.26	215.89	247.20	265.10	283.88	261.77	200.26	283.88	83.61	245.68	31.77	0.129
Ch.27 Plant: ratio height of insertion of peduncle of upper ear to plant length	2012	0.41	0.40	0.43	0.47	0.48	0.49	0.40	0.49	0.09	0.45	0.04	0.085
	2013	0.39	0.39	0.43	0.45	0.44	0.43	0.39	0.45	0.07	0.42	0.03	0.065

Variation of variety descriptions

-one variety in different locations over 2 years

◆ Quantitative characteristics(QN):

TAB 3. Description note of quantitative characteristics in six places

Ch. \ Location		NJ	JN	YL	UR	GZL	HB	MIN.	MAX.	RANGE	MEAN	SD	CV
Ch.29 Ear: length	2012	15.78	17.46	17.64	19.86	18.05	20.87	15.78	20.87	5.09	18.28	1.82	0.100
	2013	15.77	17.78	17.91	19.84	19.83	17.39	15.77	19.84	4.08	18.09	1.56	0.086
Ch.30 Ear: diameter	2012	4.81	5.05	4.74	5.35	5.25	5.47	4.74	5.47	0.73	5.11	0.30	0.058
	2013	4.79	4.81	4.97	5.22	5.45	5.24	4.79	5.45	0.66	5.08	0.27	0.052
Ch.31 Ear: number of rows of grain	2012	15.00	15.74	15.27	16.80	15.52	15.90	15.00	16.80	1.80	15.70	0.63	0.040
	2013	15.18	14.06	14.68	16.10	16.25	15.27	14.06	16.25	2.19	15.25	0.83	0.055

Results

-No variation in QL;

-No significant variation in PQs;

-Significant variation in some QNs in different locations;

-No significant variation of QNs observed by visual assessment between years in the same location;

-Coefficient of variation on 3 QNs by measured is more than 10%.

Variation of variety descriptions
-5 varieties in different locations with 10 QNs

- **Variety:** Mo17, Dan340, Shen137, Danyu13, Zhong451 (*Zea mays* L.);
- **Locations:** Danzhou(DZ), Guangzhou(GZ), Chengdu(CD), Jinan(JN), Gongzhuling(GZL), Harbin(HB);
- **Years:** 2012.
- **Description:** only on the basis of 10 quantitative characteristics needed to measure in national Maize DUS testing guideline;

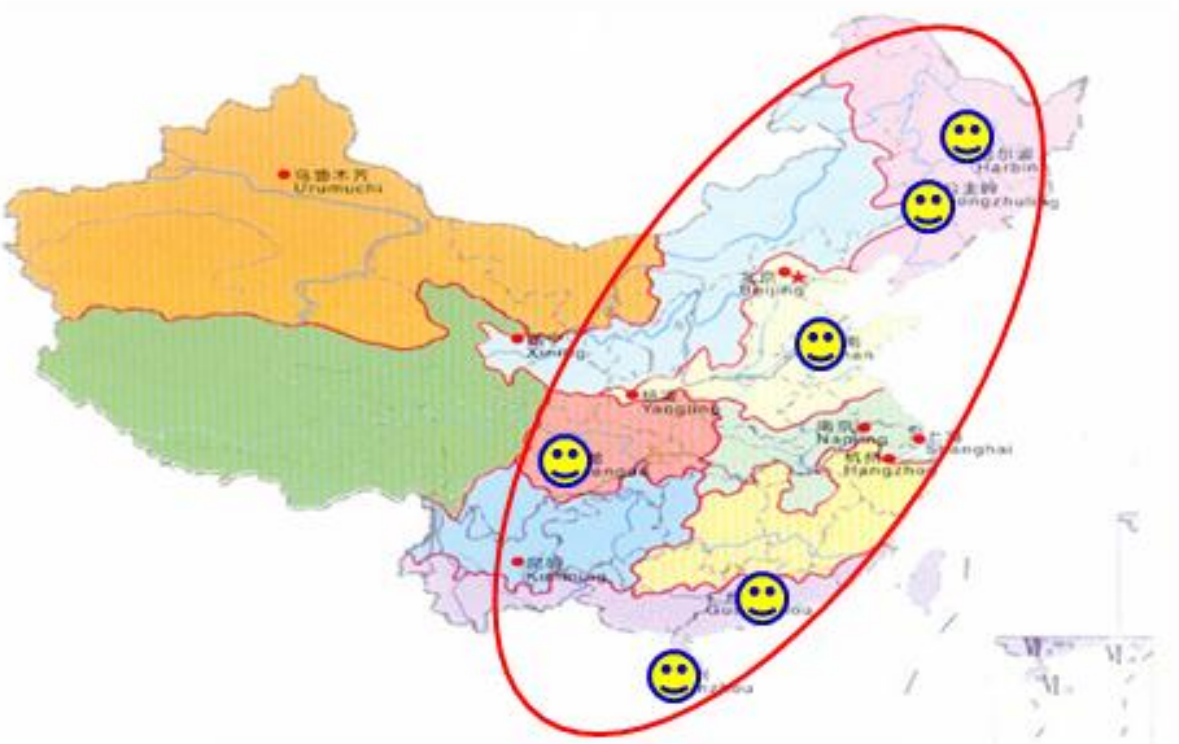


FIG.2 Observation locations

Variation of variety descriptions
-5 varieties in different locations with 10 QNs

◆ Tassel: number of primary lateral branches

TAB 4. Record of number of primary lateral branches of 5 varieties in 6different locations

Variety \ Location	DZ	GZ	CD	JN	GZL	HB	MIN.	MAX.	RANGE	MEAN	SD	CV
Mo17	7.32	3.00	5.00	4.10	7.30	7.00	3.00	7.32	4.32	5.62	1.85	0.330
Dan340	9.18	7.00	9.00	14.50	16.40	16.20	7.00	16.40	9.40	12.05	4.13	0.343
Shen137	7.52	7	11.8	11	15.4	18	7	18	11	11.787	4.322	0.367
Danyu13	9.97	9.00	20.80	19.80	17.11	15.50	9.00	20.80	11.80	15.36	4.94	0.321
Zhong451	3.87	3.00	5.60	7.30	7.44	5.00	3.00	7.44	4.44	5.37	1.79	0.334

◆ Tassel: number of primary lateral branches

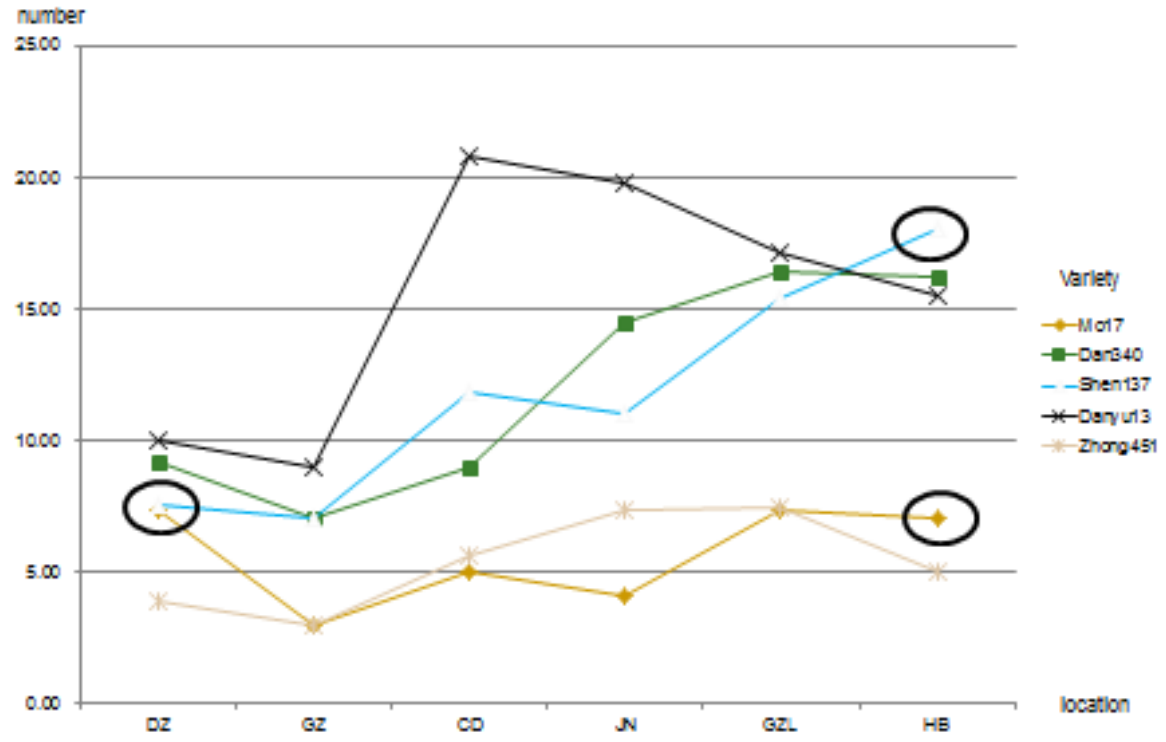


FIG.3 Record of the number of primary lateral branches in 6 different locations

Variation of variety descriptions
-5 varieties in different locations with 10 QNs

◆ Plant: height of insertion of peduncle

TAB 5. Record of height of insertion of peduncle of 5 varieties in 6different locations places

Location / Variety	DZ	GZ	CD	JN	GZL	HB	MIN.	MAX.	RANGE	MEAN	SD	CV
Mo17	56.81	48.50	43.80	49.60	88.00	79.90	43.80	88.00	44.20	61.10	18.36	0.301
Den340	34.85	32.20	48.00	69.80	83.94	82.40	32.20	83.94	51.74	58.53	23.27	0.398
Shen137	44.41	38.86	78.00	71.33	117.11	110.25	38.86	117.11	78.25	76.66	32.45	0.423
Denyu13	54.56	50.32	83.80	77.60	107.17	105.00	50.32	107.17	56.85	79.74	24.13	0.303
Zhong451	54.34	52.22	79.60	63.50	95.22	85.55	52.22	95.22	43.00	71.74	17.64	0.246

◆ Plant: height of insertion of peduncle

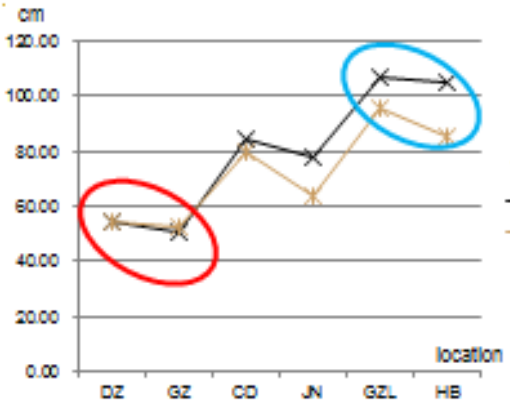


FIG.4 Record of the height of insertion of peduncle (hybrids) in 6 different locations

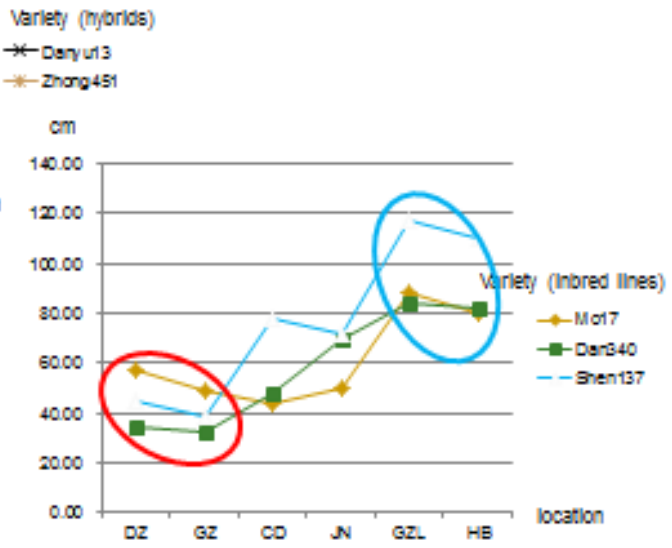


FIG.5 Record of the height of insertion of peduncle (inbred lines) in 6 different locations

Variation of variety descriptions
-5 varieties in different locations with 10 QNs

◆ Plant: length

TAB 6. Record of plant length of 5 varieties in 6different locations places

Variety \ Location	DZ	GZ	CD	JN	GZL	HB	MIN.	MAX.	RANGE	MEAN	SD	CV
Mo17	169.82	126.05	169.00	172.10	214.90	212.85	126.05	214.90	88.85	177.45	33.03	0.186
Dan340	124.42	113.76	149.00	188.90	215.89	207.60	113.76	215.89	102.13	166.59	43.56	0.261
Shen137	135.04	119.16	184.80	180.33	264.78	210.85	119.16	264.78	145.62	182.49	52.63	0.288
Danyu13	168.56	163.34	220.60	192.40	264.22	254.85	163.34	264.22	100.88	210.66	43.05	0.204
Zhong451	169.35	165.64	225.00	209.80	238.44	223.85	165.64	238.44	72.81	205.35	30.71	0.150

◆ Plant: length

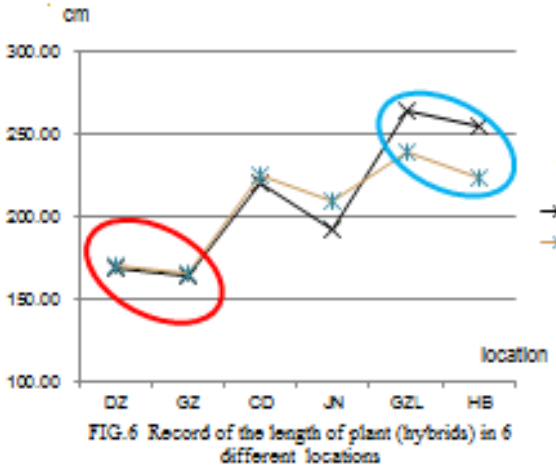


FIG.6 Record of the length of plant (hybrids) in 6 different locations

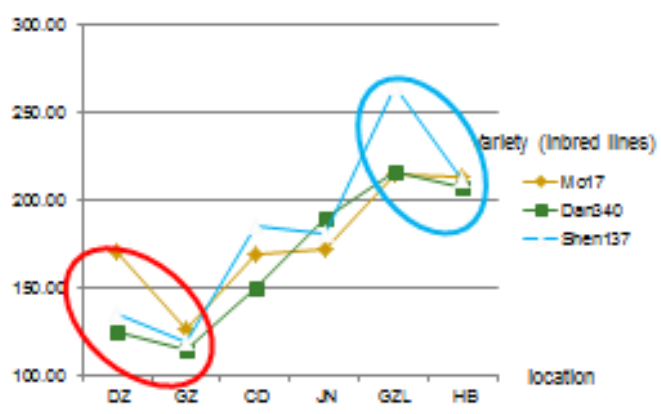


FIG.7 Record of the length of plant (inbred lines) in 6 different locations

Variation of variety descriptions
-5 varieties in different locations with 10 QNs

TAB 7. Coefficient variation of 6 varieties in 10 different QNs

Variety \ Ch.	Ch.16	Ch.17	Ch.18	Ch.19	Ch.22	Ch.25	Ch.26	Ch.29	Ch.30	Ch.31
Mo17	0.127	0.068	0.330	0.269	0.101	0.301	0.186	0.087	0.226	0.076
Den340	0.157	0.134	0.343	0.170	0.118	0.398	0.261	0.212	0.185	0.206
Shen137	0.108	0.119	0.367	0.092	0.067	0.423	0.288	0.146	0.103	0.143
Danyu13	0.112	0.062	0.321	0.205	0.075	0.303	0.204	0.118	0.114	0.061
Zhong451	0.141	0.072	0.334	0.217	0.089	0.246	0.150	0.154	0.118	0.158
Zhengdan958	0.057	0.047	0.258	0.099	0.073	0.212	0.142	0.093	0.055	0.047

Variation of variety descriptions
-5 varieties in different locations with 10 QNs

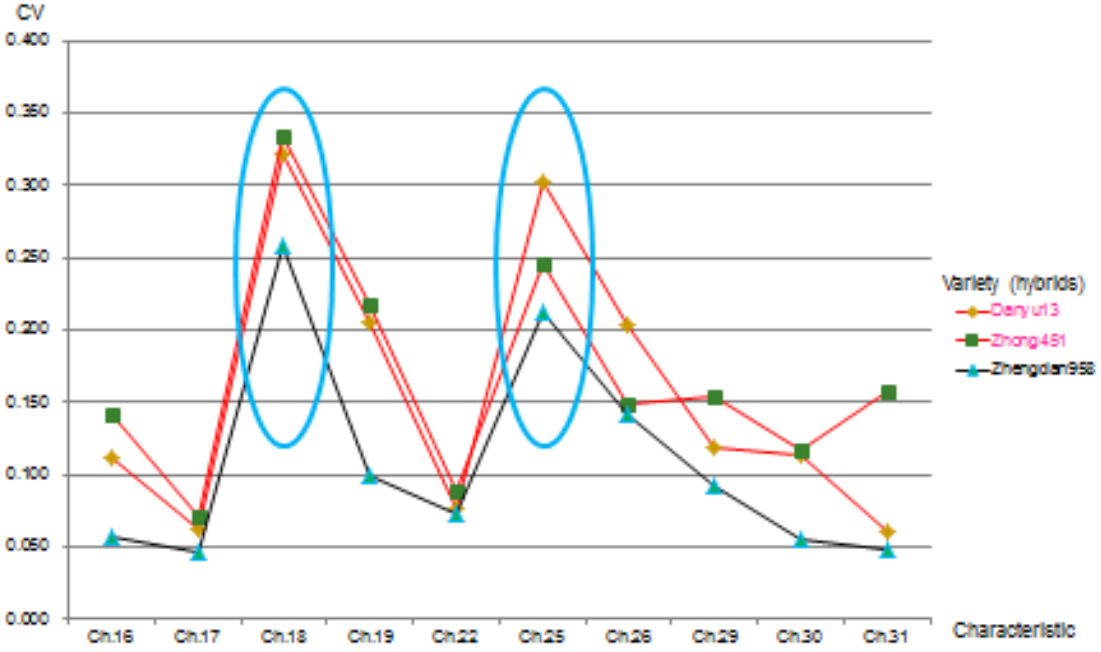


FIG.8 Coefficient Variation of 3 varieties (hybrids) in 10 measured QNs

Result

-Ch.18 and Ch.25 have more variations than the other characteristics (FIG.8);

-Value of coefficient variation of QNs is not the same, while a variety in different locations (TAB.7) ;

- Variation tendency of coefficient variation of QNs is inconsistent, according to 5 varieties in 6 different locations (TAB.7) .

Result

-Latitudinal discrepancies play more important role in variation of variety descriptions than longitudinal discrepancies (TAB.7) ;

- Descriptions of varieties could be various in different locations;

e.g. The number of primary lateral branches of Shen137 and Mo17 are 7.52 and 7.32 in DZ separately, while 18 and 7 in HB (FIG.3) .

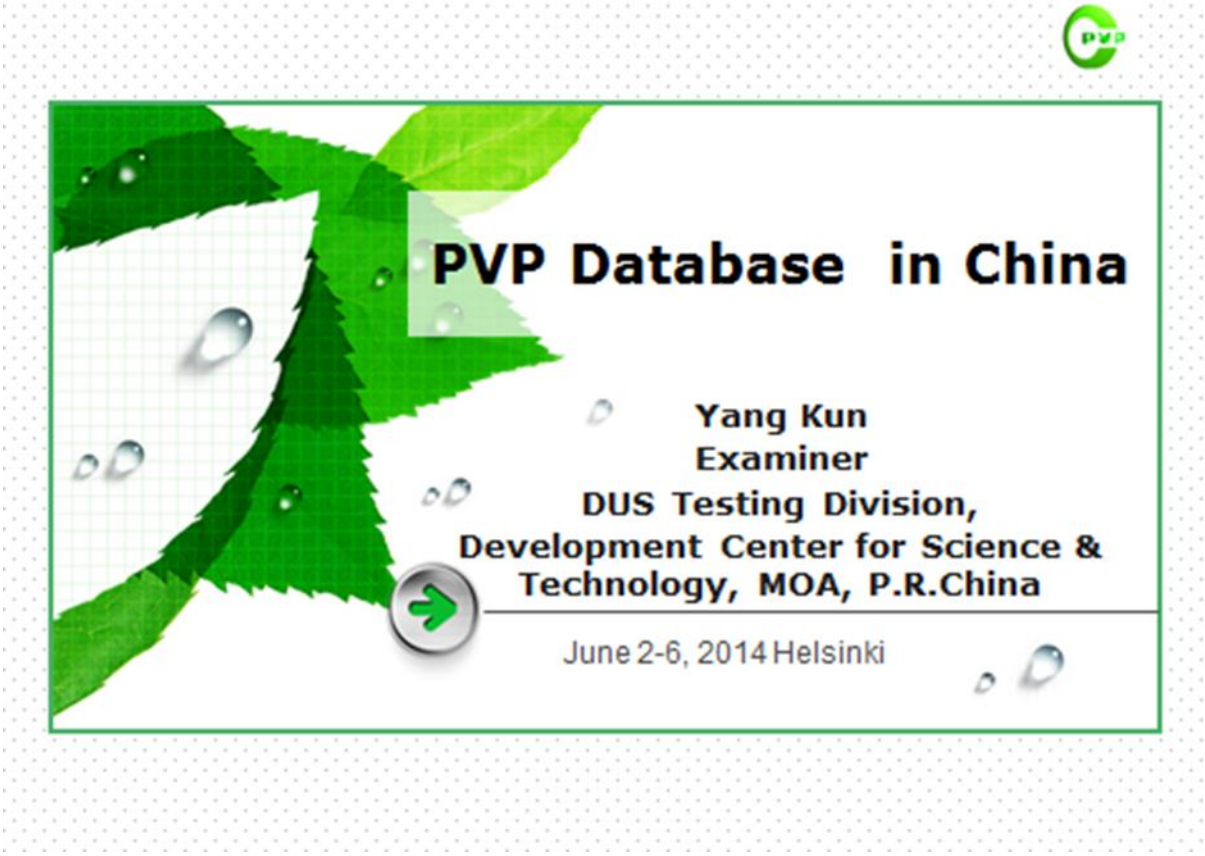
- Variation of different varieties in some locations is tend to be consistent (FIG.4,5,6,7) .

Conclusion

- Choosing QL or PQ as grouping characteristics is real and effective;
- Recently, It's very hard to give only one description for a variety in China;
- A relative permanent description of a variety is more likely to be done in very similar latitudes or ecotope in China.

Thanks for your attention!

PVP DATABASE IN CHINA
(Information provided by China on May 19, 2014)



History

- Tools used to manage and process data:
  - 1999~2004 Ms Word and Excel
  - 2004~2011 Several small tools, including Report Producing System made by Ms Excel, PVP DUS management database made by Ms Access respectively, Special programs used to generate official documents made by VB, etc.
  - 2011~2014 New Database

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New database

- Project started from 2008
- A work team composed by 20 key persons
- New database has four parts:
  - Application Management System (AMS)
  - Variety Description Database (VDD)
  - Data Analysis System (DAS)
  - Image Analysis System (IAS)

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Application Management System

- Developed by an agricultural software company
- Written by .Net and SQL
- Online operation
- Used by all relevant units of PVP

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Main functions of AMS

- Role definition
- Task reminding
- Input new data and mistake check
- Calculate or convert data automatically
- Output in batches
- Inquiring, reporting and statistical analysis
- Message exchange

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Variety Description Database

- Developed by an agricultural software company
- Written by .Net and SQL
- Online operation
- Used by DUS Testing Division and 14 sub stations
- So far, it contains 93 TGs (176 versions), 12899 Varieties

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Login interface

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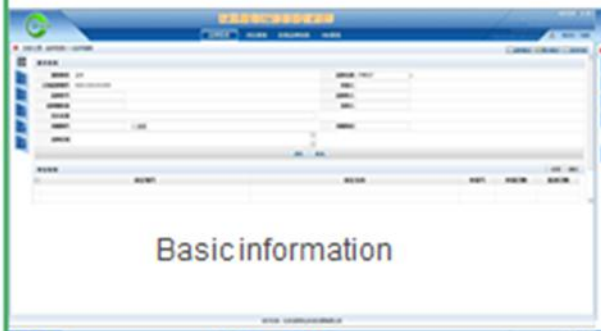
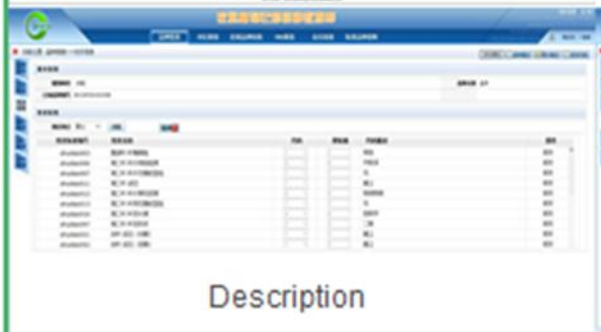
Structure of VDD


Basic information


DNA fingerprint


Description


Image

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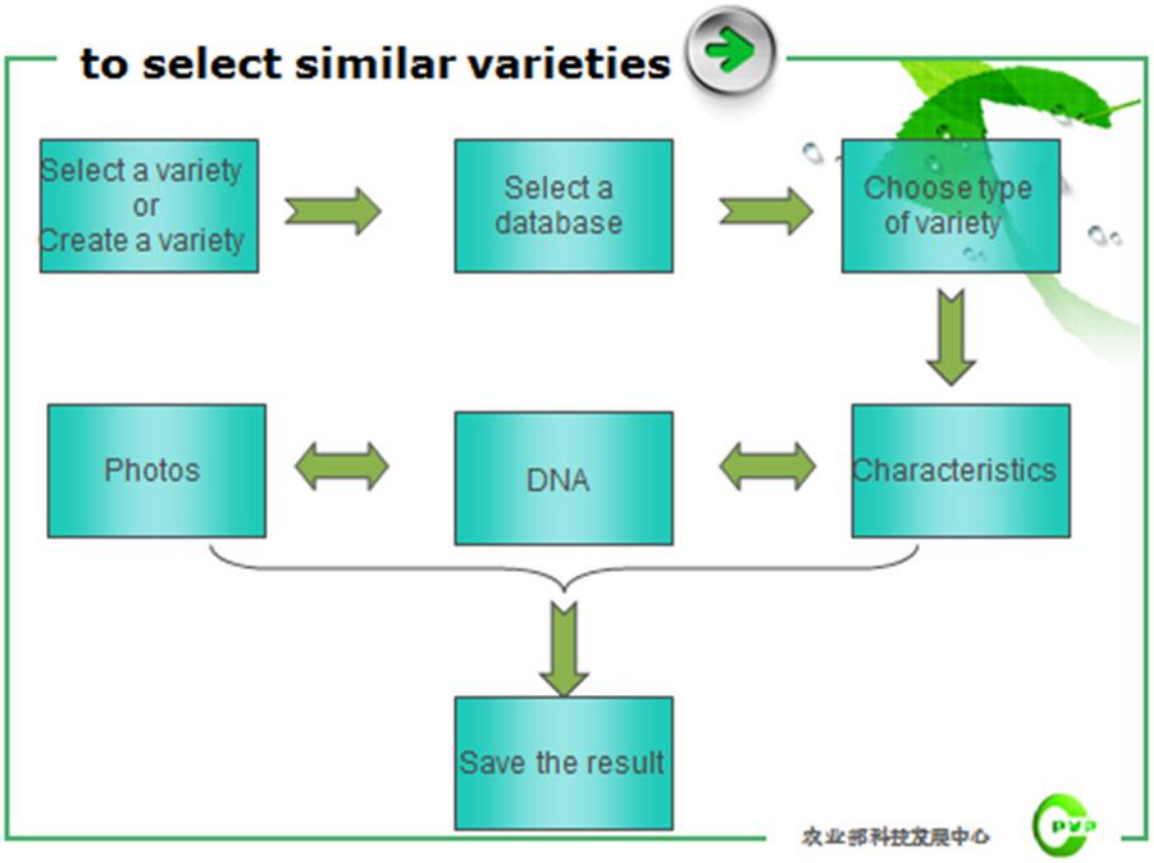
to select similar varieties
Select a variety or Create a variety
Select a database
Choose type of variety
Photos
DNA
Characteristics
Save the result
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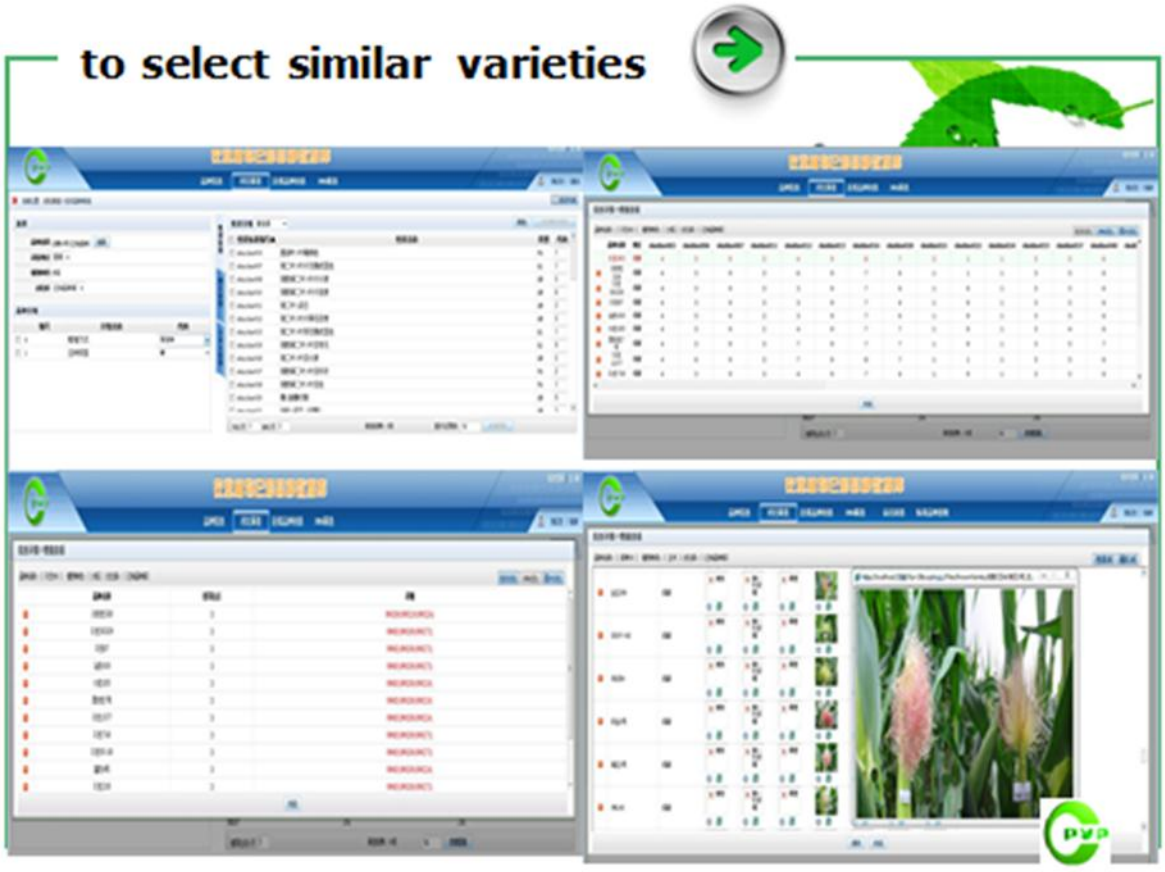
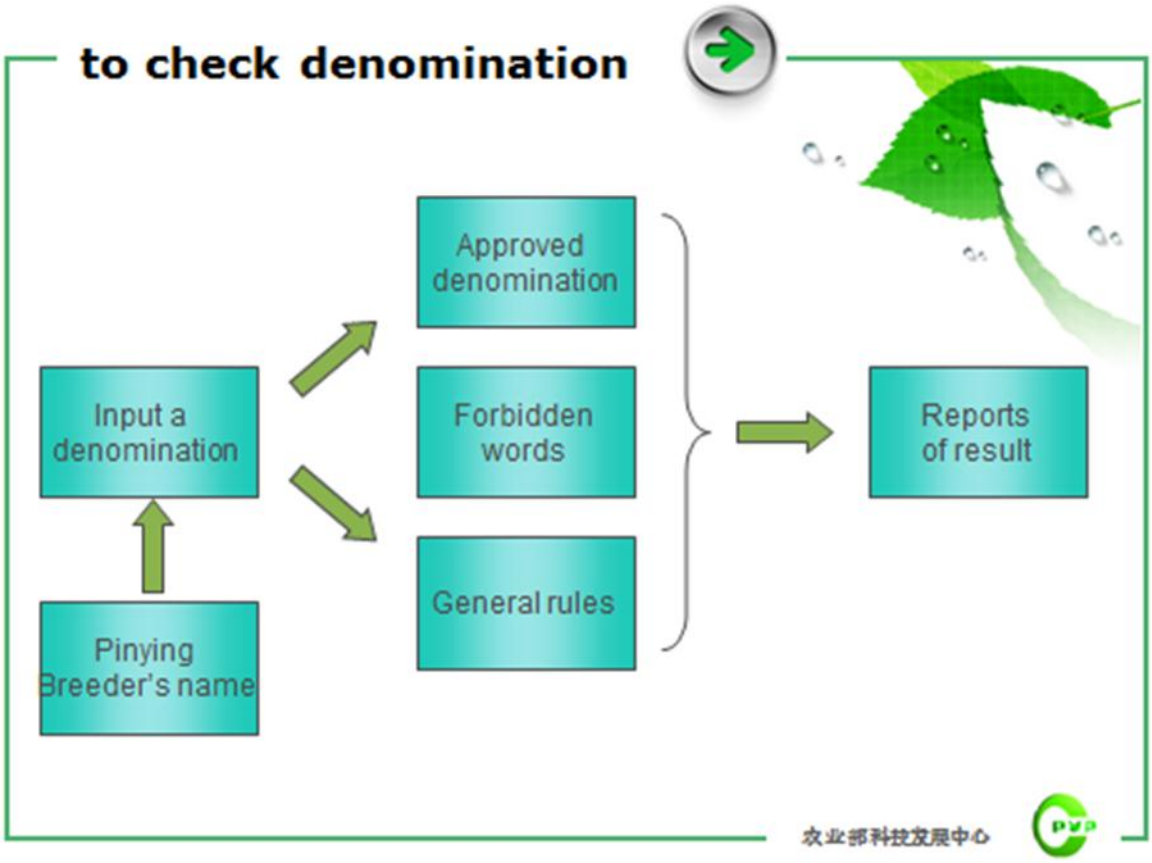

to select similar varieties


to check denomination
Approved denomination
Forbidden words
General rules
Input a denomination
Pinying Breeder's name
Reports of result
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to check denomination
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Data Analysis System

- Developed by a statistical expert
- Written by Delphi
- Green software in PC
- Used by sub-stations

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Main functions of DAS

- Converting from raw data to pre-analyzing format
- Detecting abnormal datum
- Methods for examining distinctness (F, Fisher's exact, LSD, COYD)
- Methods for examining uniformity (off-types, COYU)

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Main functions of DAS

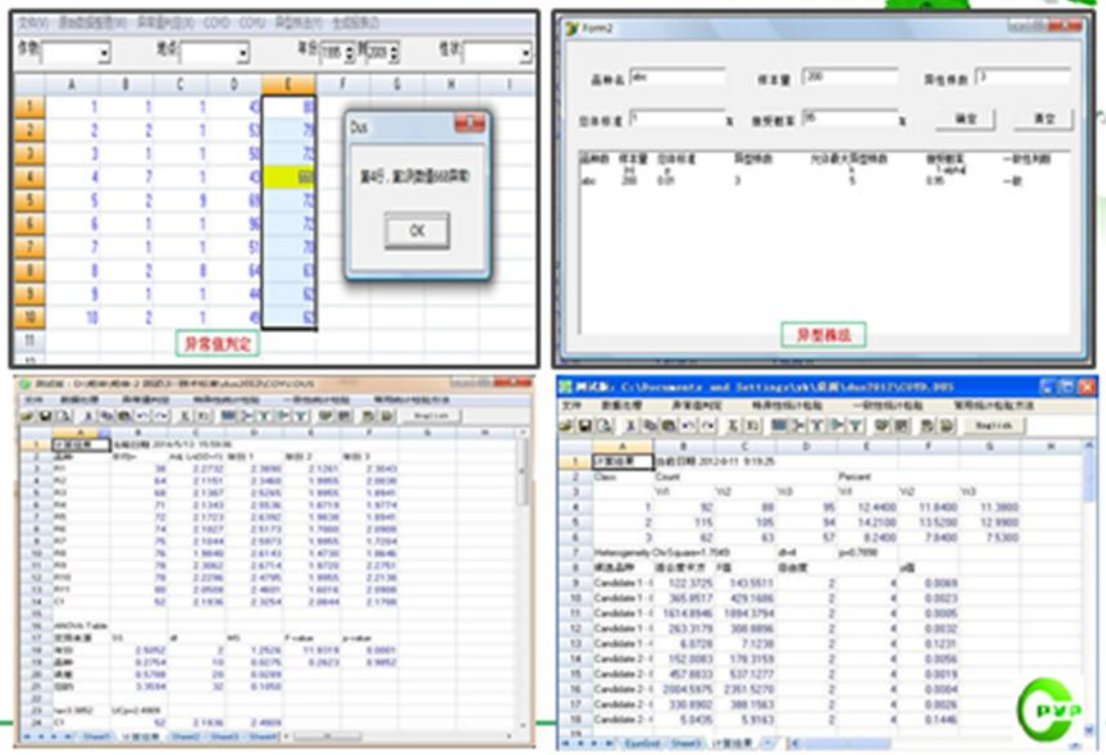


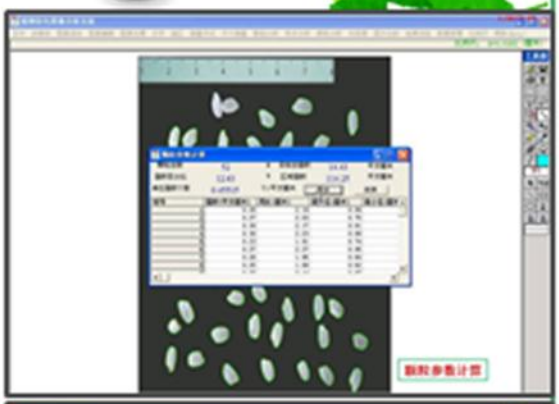
Image Analysis System

- developed by a professional company
- written by VB
- secured in PC
- used by sub-stations

Image Analysis System

Main functions of IAS

- Shape analysis
- Color analysis
- Image comparison
- Image storage
- Data storage



Hard wares of IAS

Costs

- 1. Development fee: 2,039,000 RMB
  - 1.1 AMS: 849,000 RMB
  - 1.2 VDD: 150,000 RMB
  - 1.3 DAS: 200,000 RMB
  - 1.4 IAS: 240,000 RMB
  - 1.5 Hardware of IAS 600,000RMB
- 2. Maintance fee: 300,000 RMB /year

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Benefits

- 1. Made our work transparent, accurate and efficient.
- 2. Expanded the scope of known varieties for selecting similar varieties
- 3. Harmonized the TGs
- 4. Harmonized the key data among different units and made the exchange of data much easier

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Future plan

- To enhance the speed of AMS and VDD
- To develop online application system
- To harmonize the four parts to work together
- To shorten the manual steps of IMS according to certain pictures
- To create English version of these four softwares

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[End of Annex and of document]