

**Technical Working Party on Automation and Computer Programs**    **TWC/37/6 Rev.**

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

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**BUILDING A DATABASE WITH MOLECULAR MARKER INFORMATION FOR THE MANAGEMENT OF VARIETY COLLECTIONS**

*Document prepared by an expert from China*

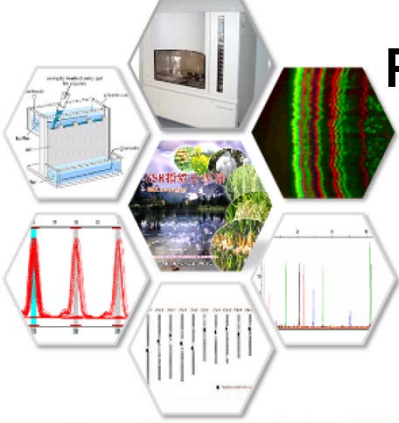
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The annex to this document contains a copy of a presentation on “Plant DNA fingerprint database management system”, made at the thirty-seventh session of the TWC.



[Annex follows]



# Plant DNA Fingerprint Database Management System





The Maize Research Center, Beijing Academy of Agriculture and Forestry Sciences, China



## OUTLINE

- 1 The problems in plant DNA detection
- 2 SSR Analyser
- 3 SSR DNA Database



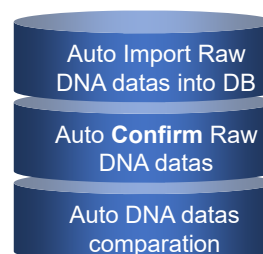
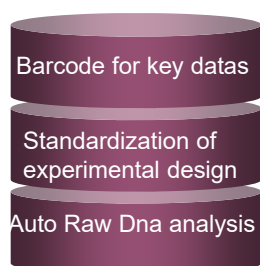


## Problems

- ① How to standardize the experimental design process ?
- ② How to analyze the DNA fingerprint efficiently and accurately?
- ③ How to import raw DNA fingerprint into database automatically?
- ④ How to audit and confirm DNA fingerprint automatically ?
- ⑤ How to match large-scale DNA fingerprint automatically?
- ⑥ How to provide experimental key data query and traceability?



## Solution



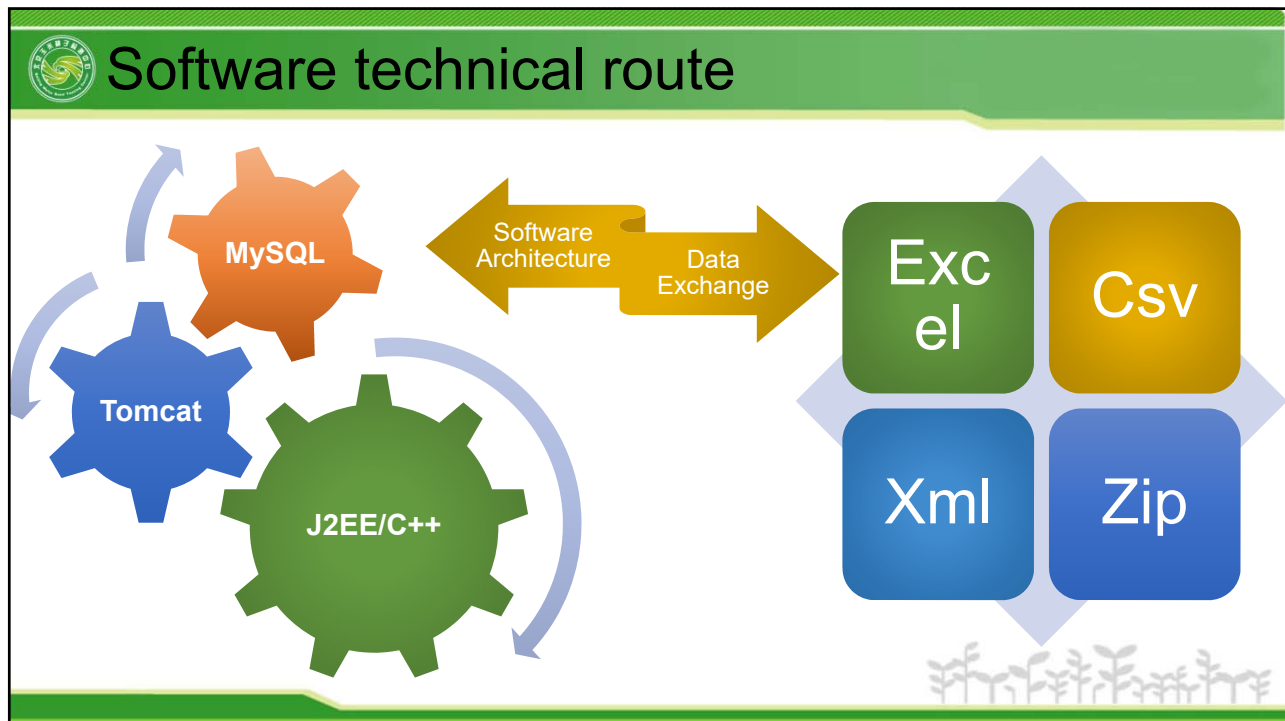
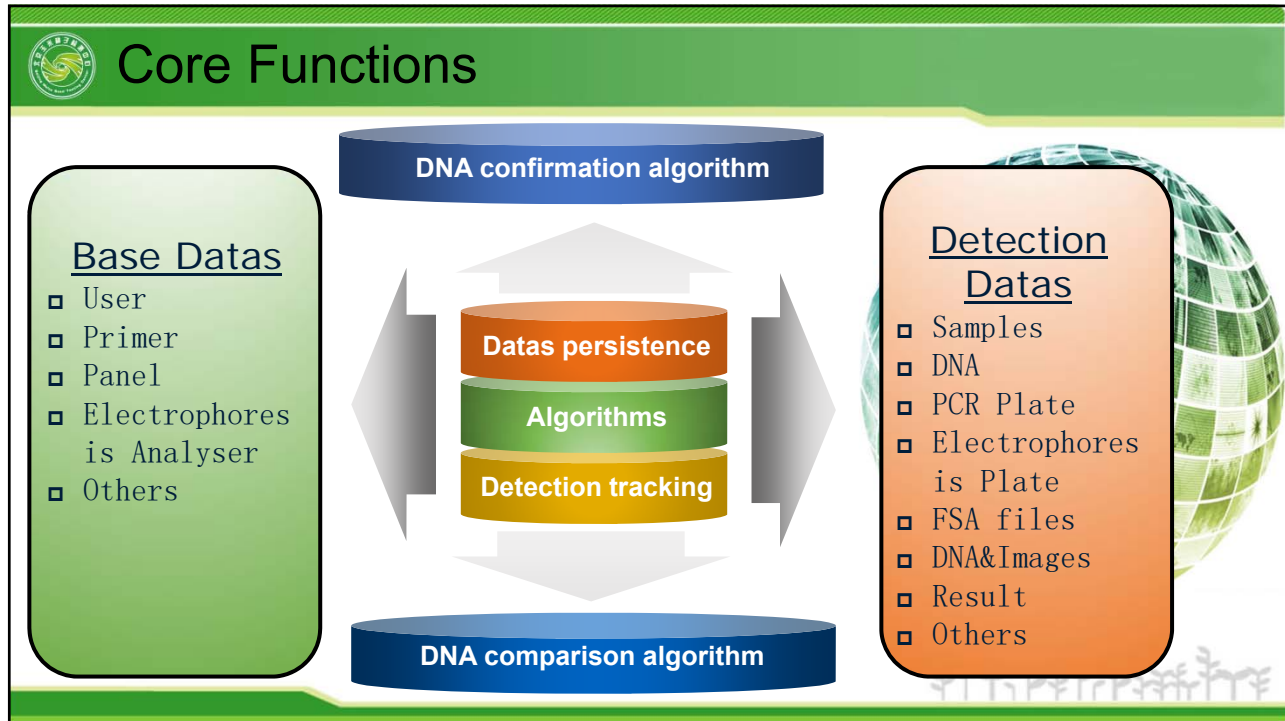
~~Solution Problem!~~

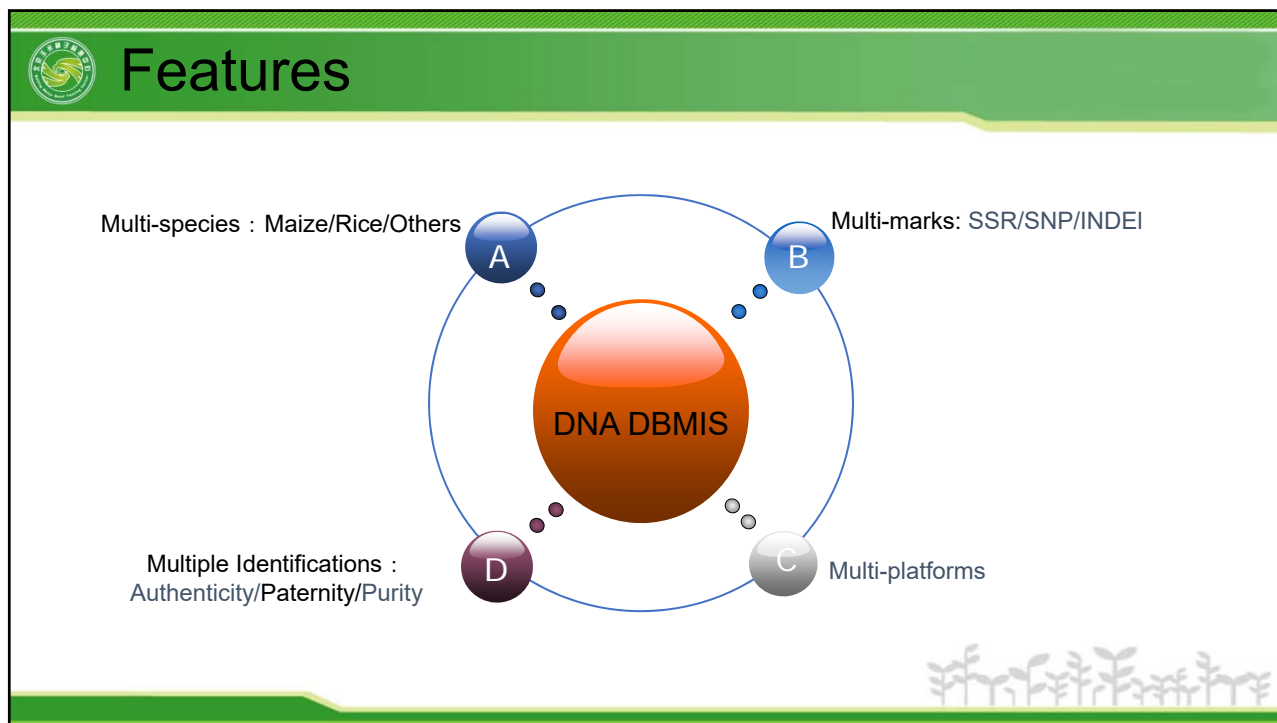
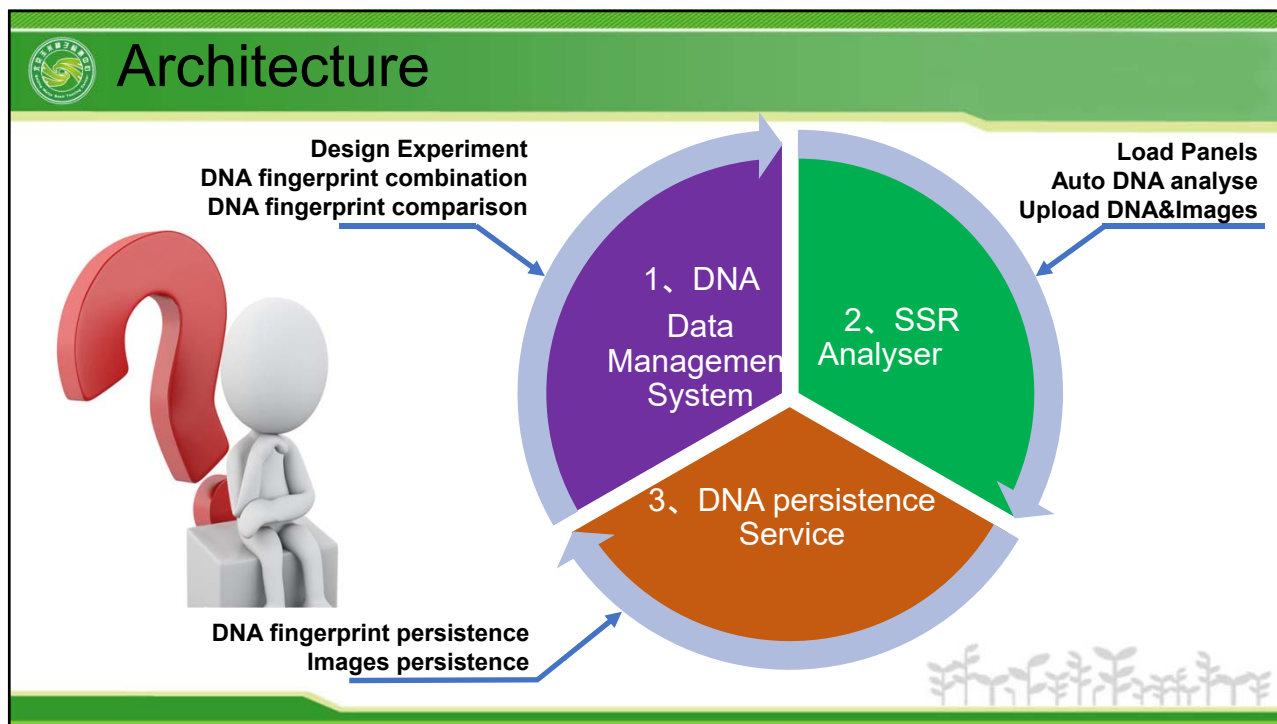
Based BMT Guidelines, expanded on domestic application characteristics

Decrease arbitrariness, improving normalization

Sacrifice flexibility, gain common sense







## Support Multi-Species

物种分类

Support Multi-species

玉米(M) maize ✓

水稻(F) rice

小麦(W) wheat

大豆(S) soya

棉花(COT) cotton

白菜(B) cabbage

西瓜(X) watermelon

黄瓜(H) cuke

番茄(F) tomato

油菜(YC) oilseed rape

棉花(C) cotton

辣椒(LJ) chili

谷子(GZ) millet

甜椒(TJ) bell pepper

甜椒(SP) bell pepper

结球甘蓝(HC) cauliflower

球茎甘蓝(KO) kohlrabi

结球白菜(HCC) cauliflower

不结球白菜(NHCC) cauliflower

序号	引物编号	引物名
1	P01	bnlg439w1
2	P02	umc13355
3	P03	umc20074
4	P04	bnlg194017
5	P05	umc2105k3
6	P06	phi053k2
7	P07	phi072k4
8	P08	bnlg2291k4
9	P09	umc1705w1
10	P10	bnlg2305k4

## Support Molecular Marker Types

SNPviewer

单位点查看

SNPviewer

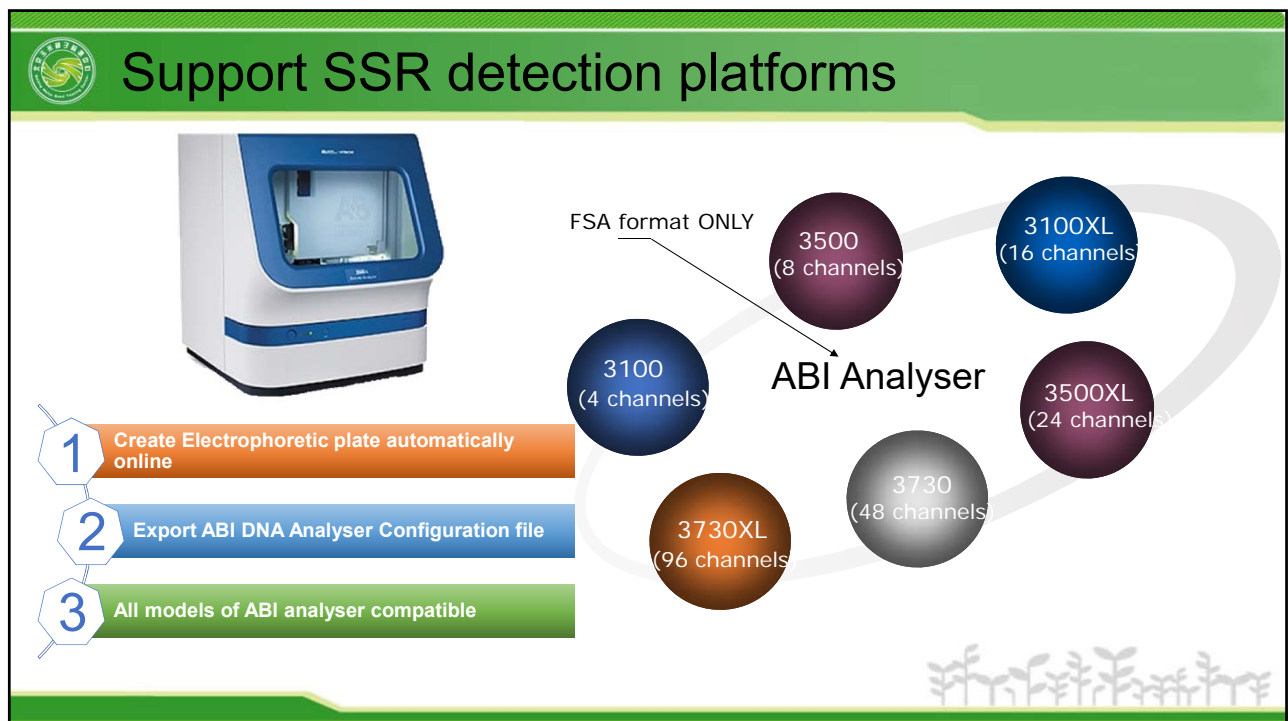
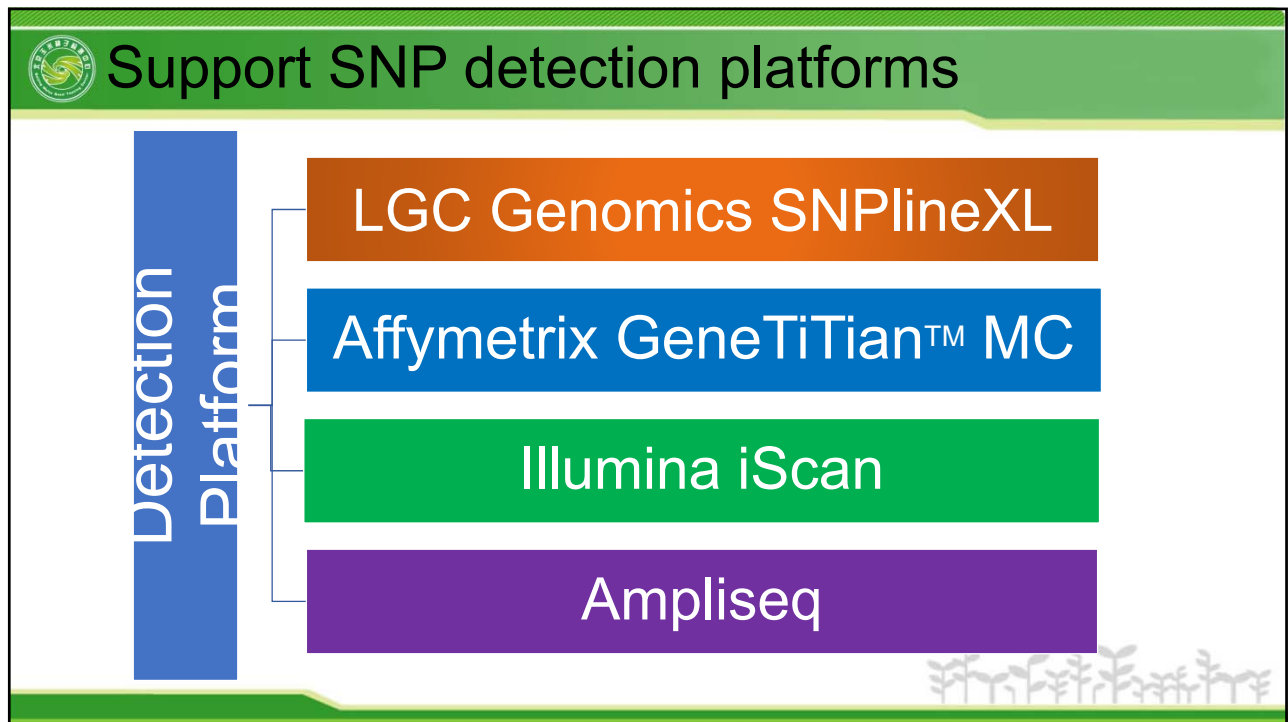
数据来源: SNP数据库系统

KWR18P00016P: MG207

SNP Marker

Plate: KWR18P00016P  
Well: D08  
X: 0.79976  
Y: 1.0922  
Call: G/A  
ID: MG207

序号	位点	源排	SNPviewer
1	1	1	KWR18P00016P
2	2	1	MG207
3	3	1	MG050
4	4	1	MG220
5	5	1	MG052
6	6	1	MG056
7	7	1	MG221
8	8	1	MG058
9	9	1	MG053
10	10	1	MG059
11	11	1	MG228
12	12	1	MG061
13	13	1	MG054
14	14	1	MG064
15	15	1	MG065
16	16	1	MG229
17	17	1	MG066
18	18	1	MG072
19	19	1	MG230
20	20	1	MG074
21	21	1	MG076
22	22	1	MG078
23	23	1	MG239
24	24	1	MG079
25	25	1	MG080
26	26	1	MG082
27	27	1	MG084
28	28	1	MG241
29	29	1	MG085
30	30	1	MG088
31	31	1	MG002





# SSR Fingerprint Analyser

The workflow starts with a DNA gel image on the left, which is processed by the 'SSR 指纹分析器' (SSR Fingerprint Analyser) software shown in the center. The software interface includes a title bar, menu options, and a main window with a landscape background and the text 'SSR 指纹分析器' and 'SSR Analyser'. A green arrow points from the gel image to the software, and another green arrow points from the software to the analysis results on the right.

The analysis results on the right consist of two stacked chromatograms. Each chromatogram shows a single prominent peak. Below each chromatogram is a table with the following data:

Allele Label	Size	Height	Score
241	241.1	1245.1	500.0
241	241.3	4057	500.0

# Standard DNA fingerprint

## Hybrid Zhengdan958

BGG299\_B08\_ghm\_P01 (WL2012-Plate31-P-Q1-0224)

Allele Label	Size	Height	Score
322	322.0	4373	500.0
354	353.7	7062	500.0

ABI 3730xl

A large grid of 40 smaller chromatograms is displayed on the right side of the slide, each showing a different DNA fingerprint pattern. A blue arrow points from this grid towards the larger chromatogram on the left.



## DNA Fingerprint Confirmation

ID	Sample Name	Value 1	Value 2	Value 3	Value 4	Value 5	Value 6
12	P12 bnlg1702k1	265/267	265/267	--	--	--	--
13	P13 umc1545y2	208/211	208/211	208/211	--	--	--
14	P14 umc1125y3	154/173	154/173	--	--	--	--
15	P15 bnlg240k1	233/235	233/235	--	--	--	--
16	P16 ph080k15	228/228	228/228	228/228	--	--	--
17	P17 ph065k9	393/408	393/408	393/408	--	--	--
18	P18 umc1492y13	278/284	278/284	--	--	--	--
19	P19 umc1432y6	230/240	230/240	--	--	--	--
20	P20 umc1506k12	178/185	178/185	--	--	--	--
21	P21 umc1147y4	154/167	154/167	--	--	--	--
22	P22 bnlg1671y17	186/186	--	186/186	--	--	--
23	P23 ph96100y1	253/253	253/253	--	--	--	--
24	P24 umc1536k9	222/232	222/232	--	--	--	--
25	P25 bnlg1520k1	165/165	165/165	--	--	--	--
26	P26 umc1489y3	232/232	232/232	--	--	--	--
27	P27 bnlg490y4	271/294	271/294	--	--	--	--
28	P28 umc1999y3	191/197	191/197	--	--	--	--
29	P29 umc2115k3	284/284	284/284	--	--	--	--
30	P30 umc1429y6	126/136	126/136	--	--	--	--
31	P31 bnlg249k2	263/263	263/263	--	--	--	--
32	P32 ph239652y2	240/240	240/240	--	--	--	--
33	P33 umc2160k3	205/244	205/244	--	--	--	--

## DNA Fingerprint Comparison

Comparison Type	Description
Whole DB	Filter the similarity within whole DB
Same Name	Filter the DNA with same sample names
Suspected	Filter DNA Fingerprint of non-namesake sample
In range	Comparison pairwise in selected range
Customized	Comparison pairwise with customized criteria

# DNA Fingerprint Comparison

玉米(M) 引物 样品 实验 指纹 置本地库 真实性鉴定 亲缘鉴定 纯度鉴定 任洁

位置: / 真实性鉴定 / 全库比对

全库比对条件

最大差异位点数: 5 (0 to 40)

杂交种: 杂交种

待比样品范围

待比库: 本地指纹库

样品条码号: 模糊查找, 格式:BGG,SFWE | BGG1

对比样品范围

对比库: 本地指纹库

样品条码号: 模糊查找, 格式:BGG,SFWE | BGG1112

对比 重置

注意: 只有已审核(正式审核或临时审核状态)指纹才能参与比对!



# Popularization and Application(China)

**Software Developer:**  
Beijing Maize Seed Testing Center

**Software Users:**

- Maize/Rice/Others → Development Center for Science and Technology, MOA
- Cotton → China Institute of Cotton Research of CAAS
- Wheat → Beijing Hybrid Wheat Engineering Technology Research Center
- Maize → Beijing Tongzhou International Seed Industry Technology Co., Ltd.
- Maize/Others → Gansu Lanzhou Seed Quality Supervision and Testing Center
- Maize/Others → Gansu Linze Seed Quality Supervision and Testing Center
- Maize/Others → Zhengzhou Seed Quality Supervision and Testing Center
- Maize/Others → Jilin Seed Quality Supervision and Testing Center
- Maize/Others → Yunnan Seed Management Station
- Maize → Taiyuan Seed Quality Supervision and Management Center
- Rice → China Rice Research Institute
- Rice → Shenzhen Agricultural Science and Technology Promotion Center



北京市农林科学院  
北京玉米种子检测中心  
Beijing Maize Seed Testing Center  
<http://www.maizedna.org/8445/msdcp>

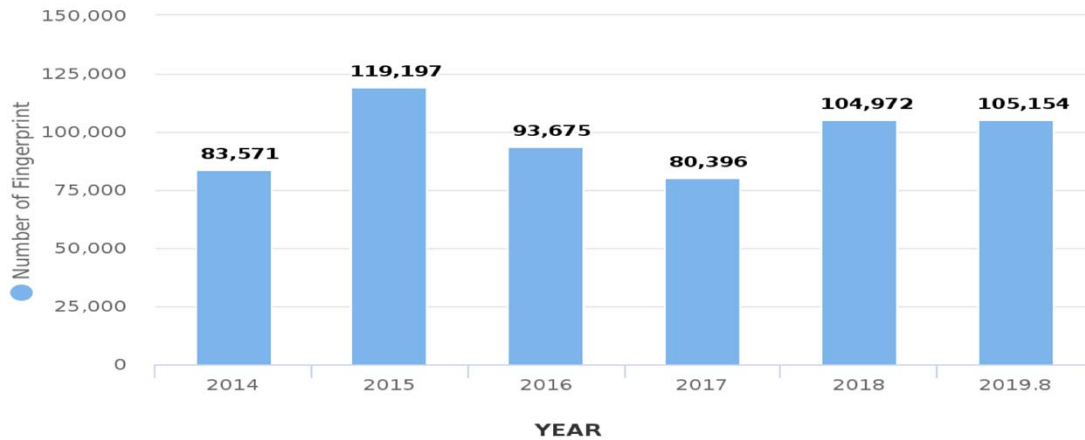




## 600,000+ DNA data been tested

### Number of DNA Fingerprints

Data Source: SSR3 Fingerprint Database Management System



...ATGAC... ACACGCCA... TCGGGGTC... GTCGACCG... TCGT...  
...GTGAC... ACACGCCA... TCGAGGTC... GTCAACCG... TCGC...  
...GTGAC... ACATGCCA... TCGGGGTC... GTCAACCG... TCGT...  
...GTGAC... ACACGCCA... TCGGGGTC... GTCGACCG... TCGT...

# Thanks for your attention!

