

[2015 UPOV/TC]



KOREA SEED & VARIETY SERVICE

Marker-Assisted Selection of 'Similar Variety' in DUS Testing

March 2015.

KOREA SEED & VARIETY SERVICE



Table of Contents



- **Use of molecular markers in KSVS**



- **Selection of similar varieties in DUS testing by molecular markers**



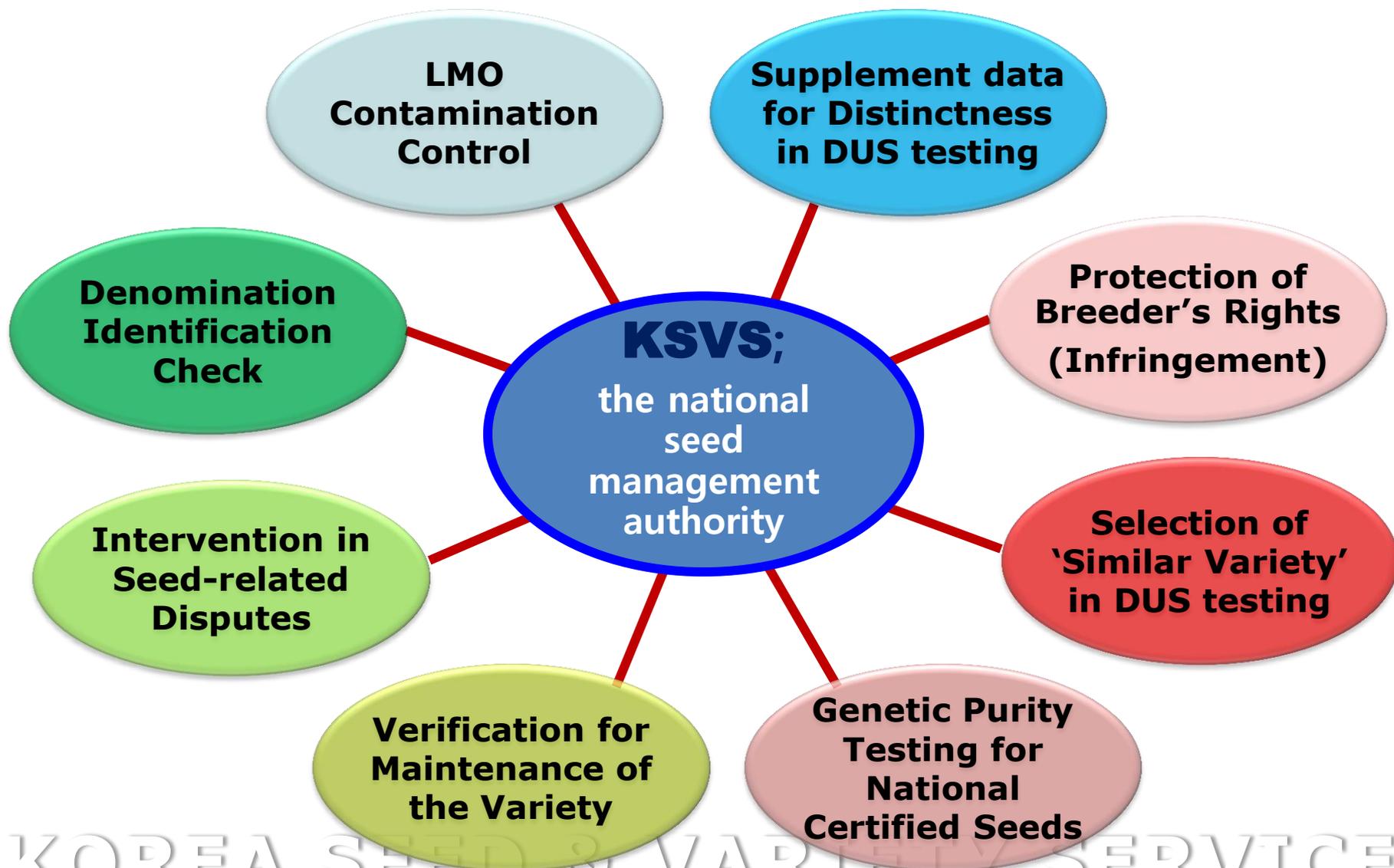
- **Cases for molecular marker selection of similar varieties**



- **Conclusions & Considerations**



Use of Molecular Markers in KSVS





Overview of Molecular Marker Database

■ List of Species and Varieties Available for MAS

(Feb. 2015)

Category	Crop	Techniques	Number of varieties	Category	Crop	Techniques	Number of varieties
Vegetables (12)	Pepper	SSR	672	Fruit trees (6)	Peach	SSR	174
	Watermelon	SSR	300		Apple	SSR	67
	Melon	SSR	180		Blueberry	SSR	40
	Tomato	SSR	122		Citrus Fruits	SSR	113
	Onion	SSR	77		Plum	SSR	160
	Strawberry	SSR	110		Pear	SSR	87
	Cabbage	SSR	435	Flowers (2)	Rose	SSR	70
	Oriental melon	SSR	108		Chrysanthemum	SSR	128
	Pumpkin	SSR	167	Grains and Oilseeds (4)	Rice	SSR	373
	Radish	SSR	288		Rice	SNP	78
	Lettuce	SSR	171		Barley	SSR	71
	Cucumber	SSR	175		Soybean	SSR	148
				Maize	SSR	90	
				Oyster mushroom	SSR	69	

Total: 25 crops / 4,473 varieties



The Selection of 'Similar Varieties' in DUS testing

■ Sources to Selecting

- Parent varieties
- Varieties bred from the same parent cross
- Varieties sharing a parental line
- A series of varieties
- Broadly distributed varieties
- Well-known varieties



■ Clues to Selecting

- Reference collection
- Image database
- Catalogues
- Googling...
- Variety descriptions
- Working references
- Applicant (in application form)
- Information providers
- Maker-assisted selection of 'similar variety'

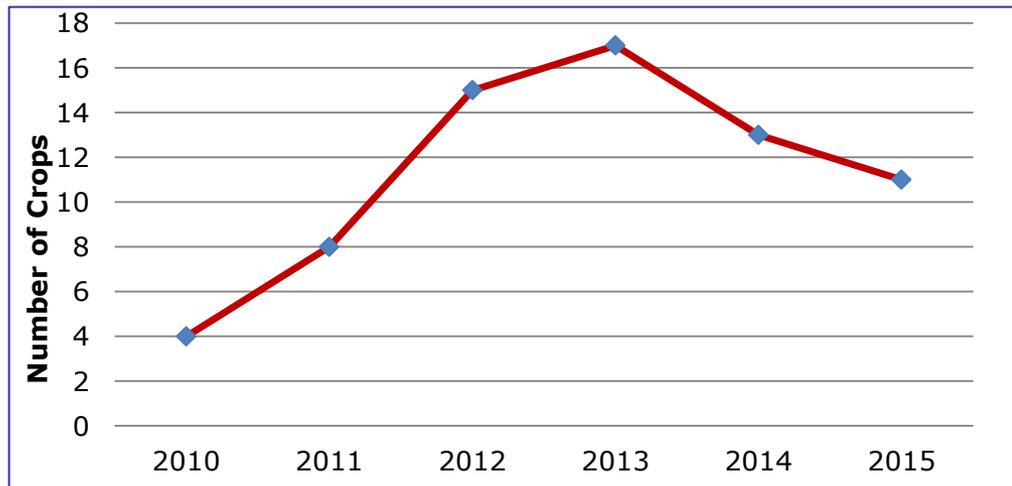




Applications of SSR Markers in Selection of 'Similar Variety'

Is molecular marker technique expensive?

- fast and accurate
- handling many varieties
- easy to compare
- flexible in applications
- information value...





Marker-assisted selection of 'Similar V.' in 2014

	crops	No. Variety (Can. Var.)	Marker-assisted selection			Availa- bility	Remarks
			Can. Var.	Sim. Var. proposed	Similarity		
1	pepper	24(19)	아탄저격수	에코스타	96	Y	
			에코스타	아탄저격수	96	Y	
2	C. cabbage	23(14)	-	None	-	-	
3	radish	24(15)	YR신청장군	전무후무	96	Y	
4	cucumber	16(16)	-	None	-	-	
5	watermelon	12(11)	원더폴꿀	메가스피드꿀	93	no	Phenotype comparison
6	melon	12(8)	소나타파워	슈퍼39, 슈퍼VIP 등 8품종	93	Y	
7	lettuce	12(12)	혜선만추대	홍풍여름치마, 여름적치마, 강하적	97	Y	
			풍부흑축면	선풍2호, 넘버원, 선홍적축면	98	Y	
			선풍골드	선풍2호, 넘버원, 선홍적축면	92	Y	
8	Oriental melon	4(2)	-	None	-	-	
9	tomato	12(9)	에스브이0339티지	Styx TY	93	Y	
10	rice	38(37)	수보	보람찬	100	Y	Share the mother line
			중모1028	중모1036	100	Y	Similarities in background of parental lines
			중모1036	중모1028	100	Y	
			서농18호	서농17, 화청	96	Y	
			중모1033	동보	92	Y	
			드리미4호	드리미3호	91	Y	
			드리미3호	드리미4호	91	Y	
			미소미	삼광	91	Y	
11	soybean	22(14)	-	None	-	-	
12	citrus	17(10)	탐나조생	하례조생 등 20품종	100	Y	
			하례조생	탐나조생 등 20품종	100	Y	
			써니트	부지화	100	Y	
13	rose	34(18)	셀리나	Korhoco(Vital)	100	Y	D



The Cases for Selecting 'Similar Varieties'

Case 1

• **Watermelon**

Case 2

• **Cucumber**

Case 3

• **Tomato**

Case 4

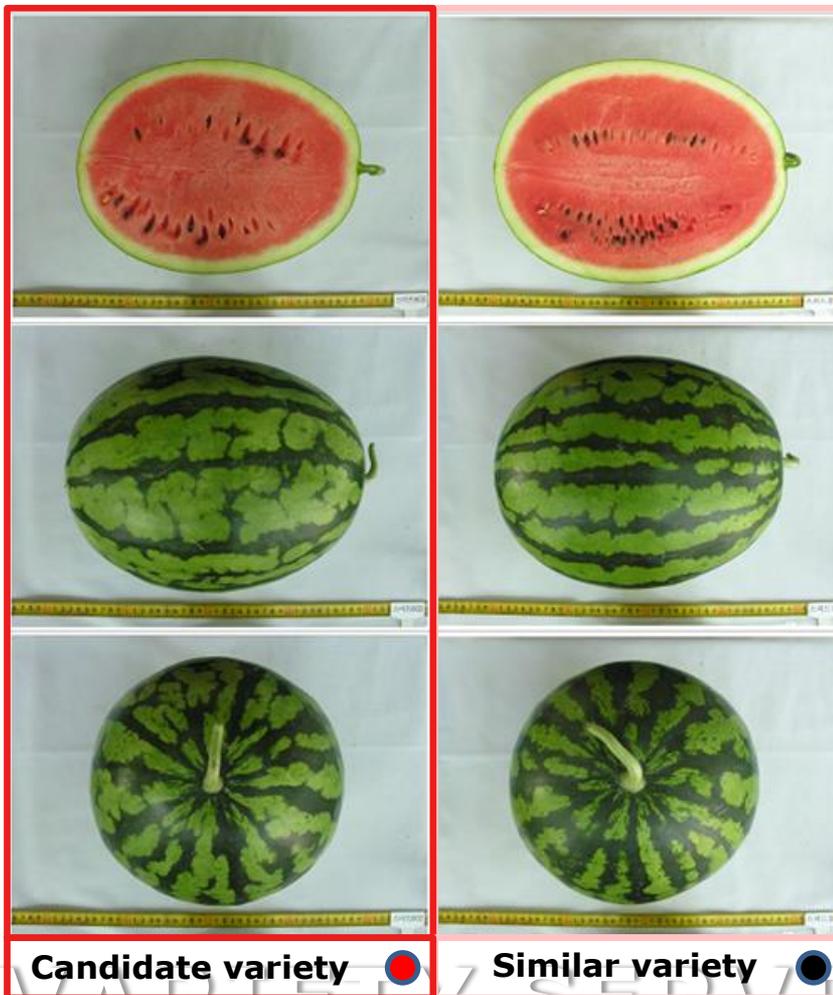
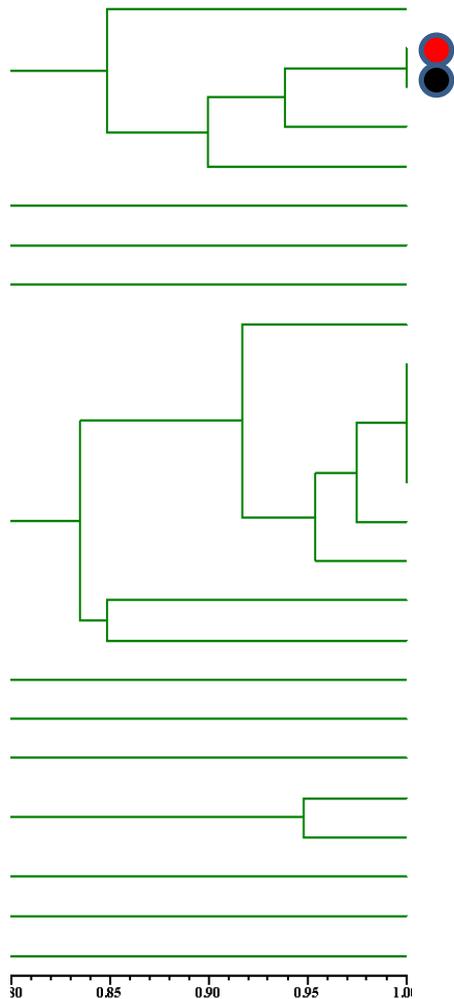
• **Rice**

Case 5

• **Rose**

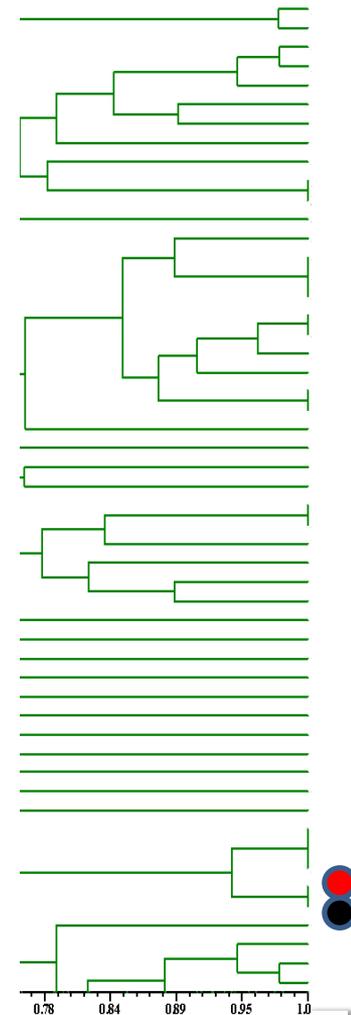
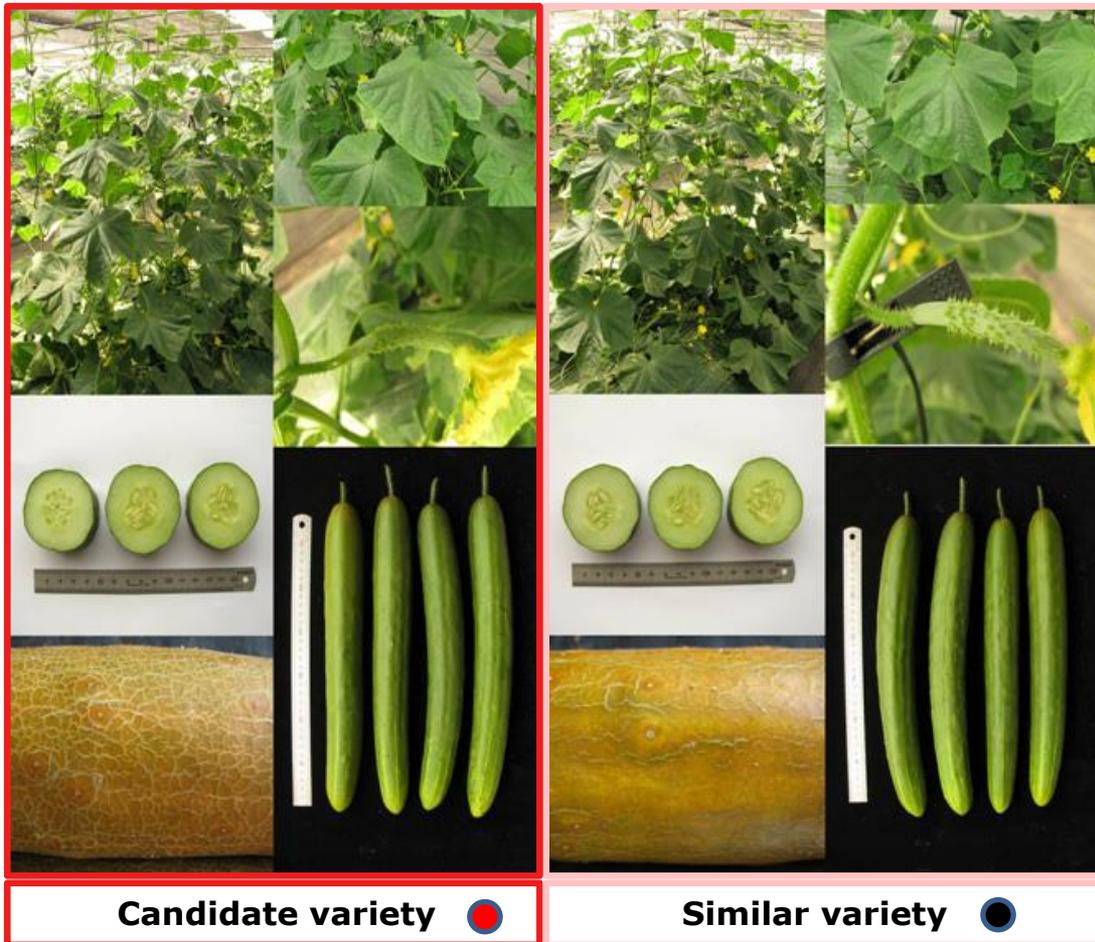
Case 1: Watermelon, 38 SSRs

Withdrawal of the application(2010)



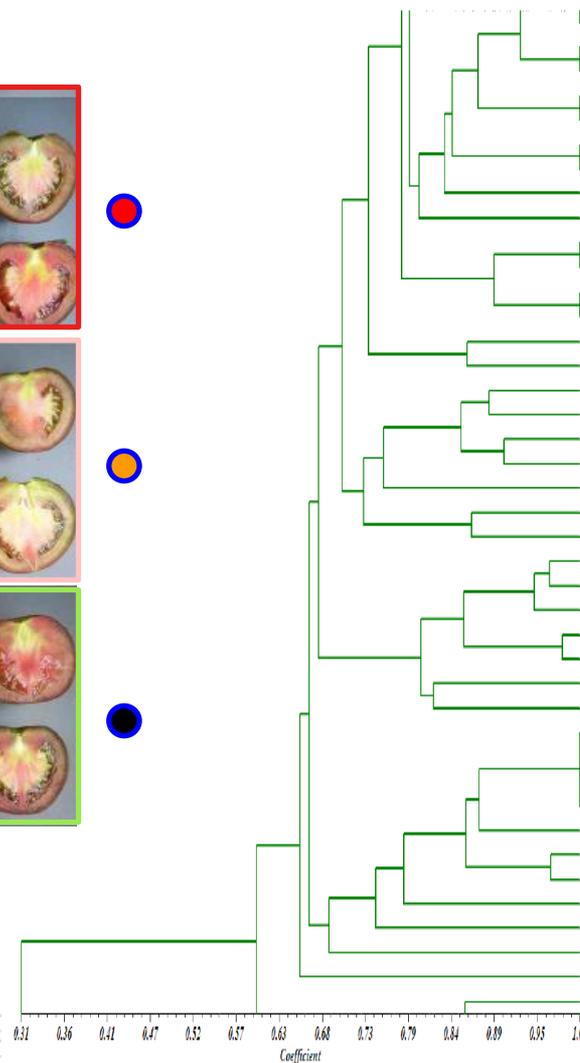
Case 2: Cucumber, 32 SSRs

No Distinctness!!! ➔ **Ruling of Rejection(2011)**

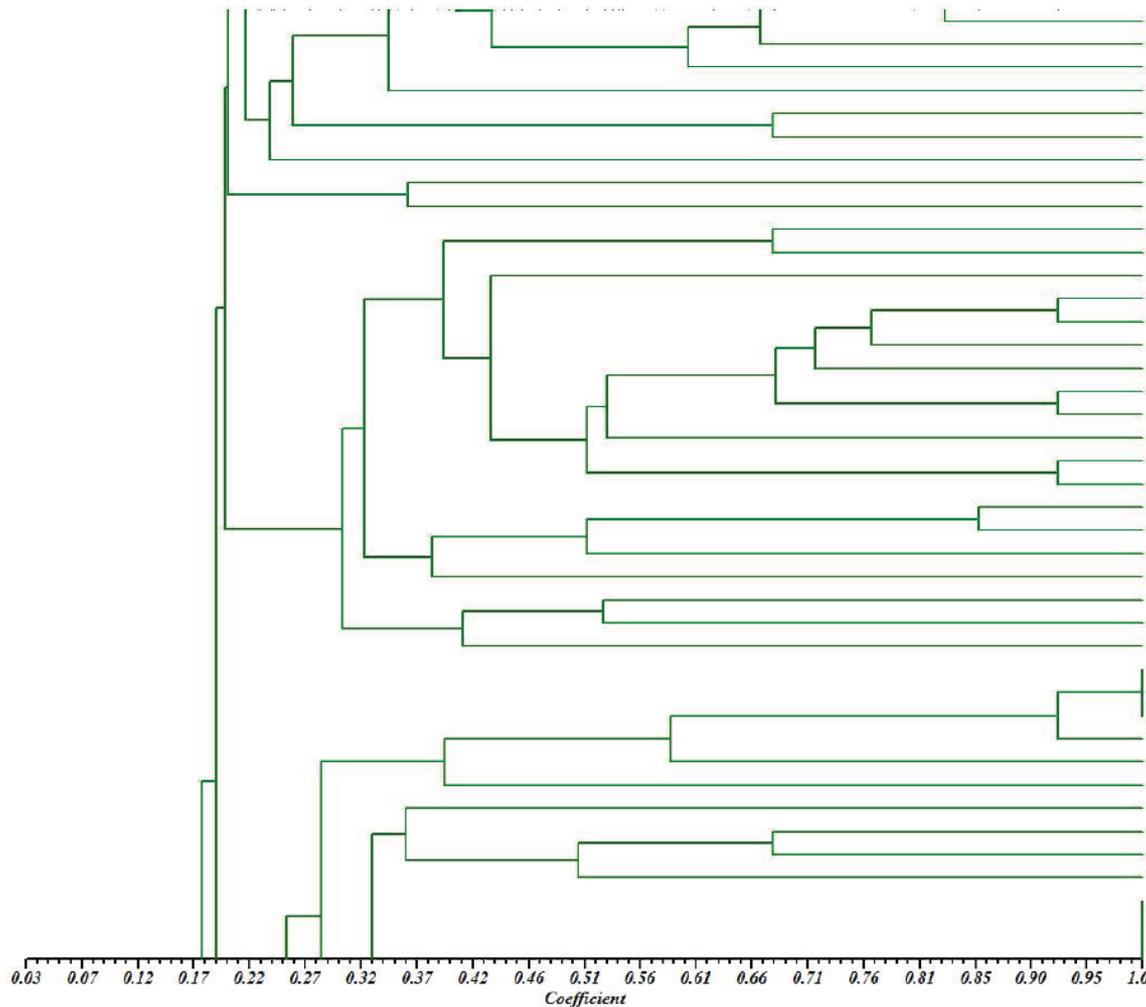


Case 3: Tomato, 30 SSRs

No Distinctness!!! → **Ruling of Rejection(2012)**



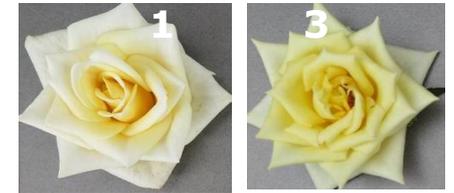
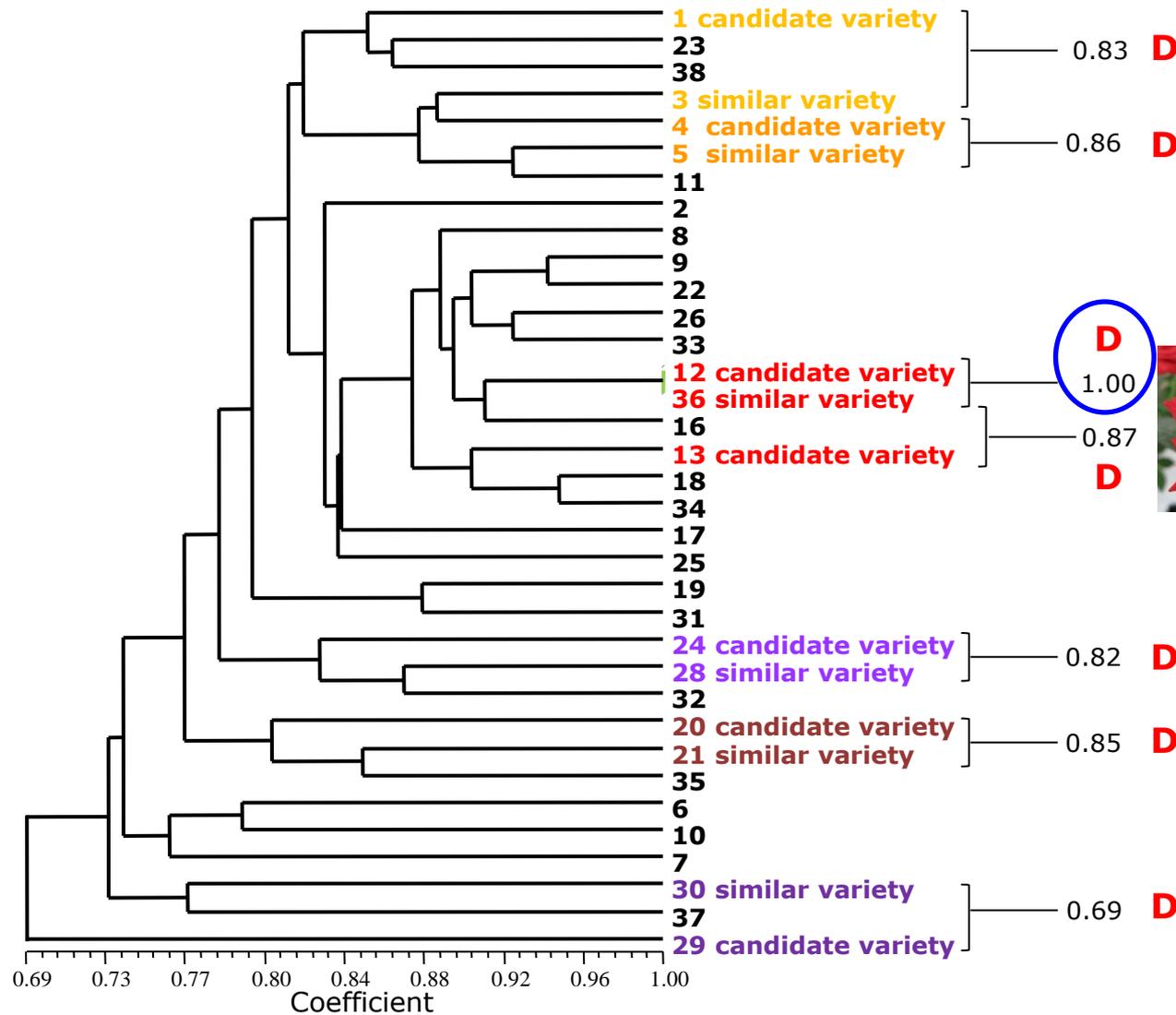
Case 4: Rice, 26 SSRs



$J=0.925$



Case 5: Rose, 17/32 SSRs





MAS Plan in 2015

**Selection of
'Similar
Variety' for
DUS testing**

Testing Stations	Crops	No. of varieties (estimated)	Schedule
PVP Div.	rice	70	Apr.
	Chinese cabbage	60	Mar./Jul.
	radish	40	Apr./Aug.
	apple	20	May
Station 1	pepper	80	Feb.
	maize	20	Mar.
	soybean	20	May
Station 2	tomato	5	Jan.
	peach	25	Oct.
Station 3	cucumber	4	Feb.
Station 4	citrus	3	Feb.
Total	11	347	



MAS Plan in 2015

**Verification
for
Maintenance
of the Variety**

Year	Crops	No. of varieties	Detection
2012	rice	164	8
2013	Soybean	121	2
	pepper	153	6
2014	Chinese cabbage	128	9
2015	radish	120(estimates)	(Jun.)
	barley	150(estimates)	(Sep.)
Total	6 crops	836(566)	25(4.4%)



Conclusions & Considerations

- **Use of MAS for 'similar variety' in DUS testing**
 - The application of MAS allows information which the Authority cannot access to without the technique, so can increase the quality of Examination.
 - Practical application of MAS techniques in DUS testing is not simple; depend on many circumstances and expertise.
 - MAS techniques should be considered together with all other clues and sources available.



KOREA SEED & VARIETY SERVICE

*Thank you for
your attentions!!!*

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