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BMT/13/25 Add.
ORIGINAL: English
DATE: December 8, 2011

INTERNATIONAL UNION FOR THE PROTECTION OF NEW VARIETIES OF PLANTS

GENEVA

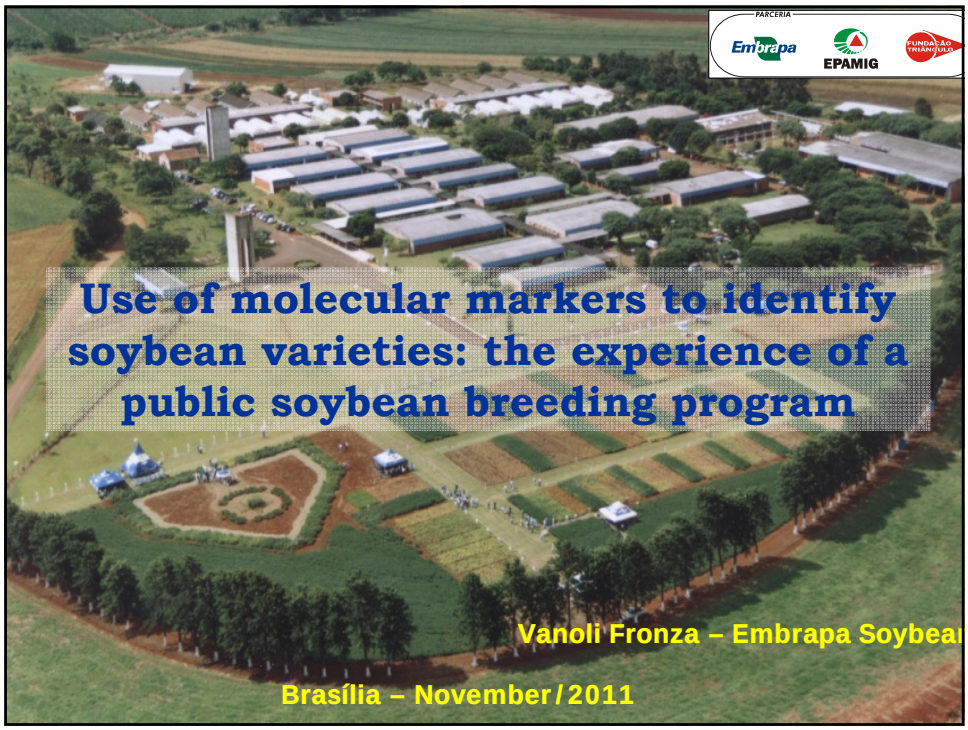
WORKING GROUP ON BIOCHEMICAL AND MOLECULR TECHNIQUES, AND DNA-PROFILING IN PARTICULAR

Thirteenth Session
Brasilia, November 22 to 24, 2011

ADDENDUM

USE OF MOLECULAR MARKERS TO IDENTIFY SOYBEAN VARIETIES: THE EXPERIENCE OF A PUBLIC SOYBEAN BREEDING PROGRAM

Document prepared by experts from Brazil



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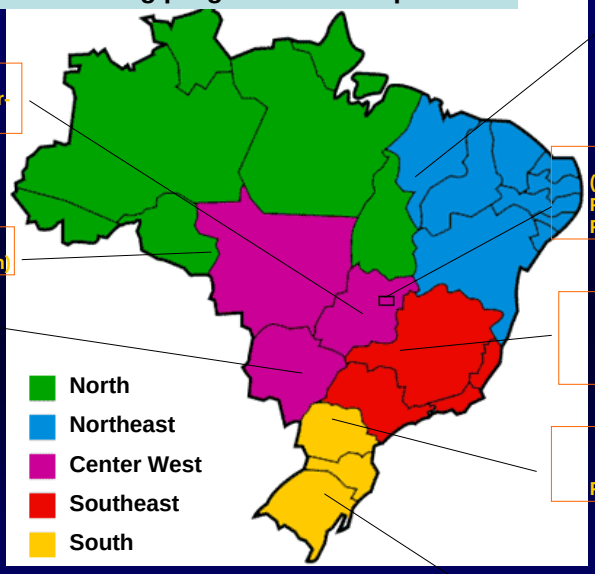
OBJECTIVE

To demonstrate some cases in each molecular markers were useful to identify soybean varieties to help breeders and the official service of protection of varieties (SNPC) in Brazil.

Soybean breeding program at Embrapa



Goiânia/GO (Embrapa, Emater-GO and CTPA)

Vilhena/RO (Embrapa Soybean)

Dourados/MS (Embrapa)

Balsas/MA (Embrapa Soybean)

Planaltina/DF (Embrapa Cerrados, Fundação Bahia and Fundação Cerrados)

Uberaba/MG (Embrapa, Epamig and Fundação Triângulo)

Londrina/PR (Embrapa and Fundação Meridional)

Passo Fundo/RS (Embrapa Wheat)

➢ Case 1 (1999):
MG/BR 46 (Conquista) *vs.* MT/BR 49 (Pioneira)

- "Fundação Triângulo"/MG: Conquista (1995)

- "Fundação MT"/MT: Pioneira (1996)

CARACHTERISTICS	Conquista	Pioneira
Hipocotilum pigmentation	Present	Present
Flower color	Purple	Purple
Pubescence color	Brown	Brown
Pod color	Brown	Brown
Pubescence density	Normal	Normal
Seed shape	Round	Round
Seed coat color	Yellow	Yellow
Seed coat luster	Medium	Medium
Hilum color	Black	Black
Days to flowering (10/GO)	55	55
Days to maturity (42/GO,MT,BA)	112	113
Plant height (cm) (42/GO,MT,BA)	78	79
Oil (%)	20.40	20.61
Protein (%)	36.77	36.04
Peroxidase reaction	Negative	Negative
Bacterial pustule	R	R
Bacterial blight	MR	MR
Frogeye leaf spot	R	R
Stem canker	R	R
Powdery mildew	MR	MR
Meloidogyne javanica (02)	1.5 (R)	1.4 (R)
Meloidgyne incognita (03)	1.5 (R)	1.6 (R)
Grain yield (kg/ha) (49/GO,MT,BA)	3,105	3,089

- Embrapa Soybean: RAPD (2 samples)

- Embrapa Soybean: SSR (“n” samples)

16 SSR Markers (SNPC)

	LG	MG/BR 46 (Conquista)	BRS Favorita RR	BRSMG 850GRR
Marker	Cross =>	(Loo76-4484 x Numbaíra)	[Conquista*3 x (BRSGO Jataí x E96-246)]	[Pioneira*4 x (BRSGO Jataí x E96-246)]
Satt002	D2	135	135	135
Satt005	D1	145	145	**157**
Satt009	N1	218	218	218
Satt030	F	165	165	165
Sat_038	O	100	-	**112**
Satt038	G	168	168	168
Satt042	A1	167	167	167
Satt045	E	130	**136**	130
Satt70	B2	144	144	144
Satt100	C2	142	142	142
Satt114	F	077	077	077
Satt216	D1	191	191	**218**
Satt431	J	198	198	198
Satt586	F	236	236	236
S45035	D1	155	155	155
GMABAB	N1	157	157	157
Similar.	(%)	**100**	**093**	**081**
Similar.	(%)	-	**100**	**080**

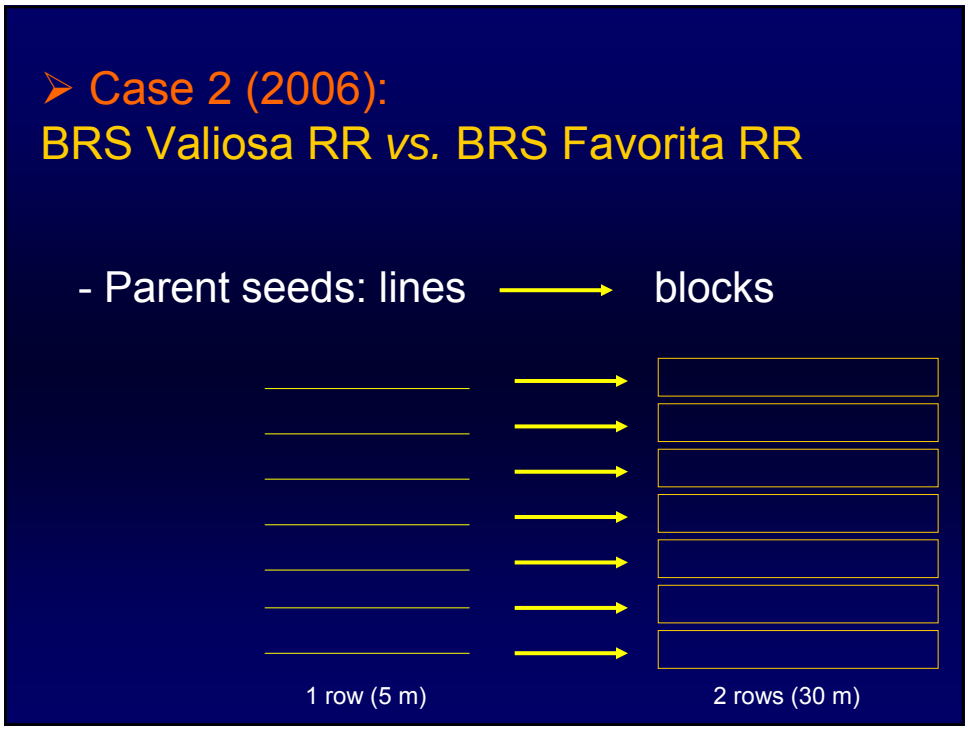
16 SSR Markers

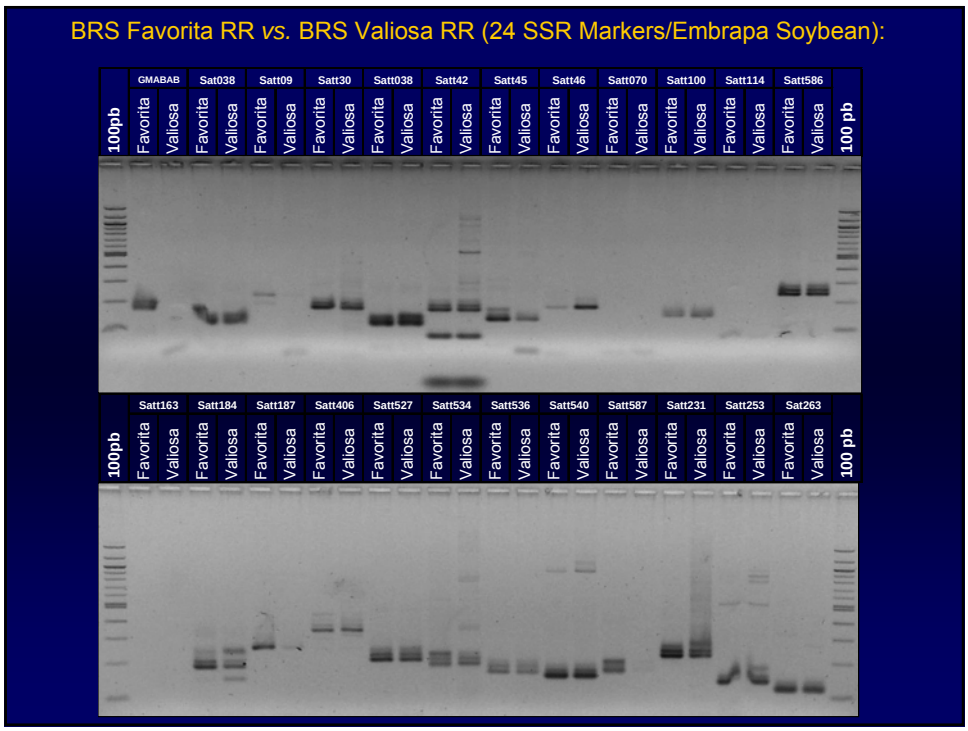
	LG	MG/BR 46 (Conquista)	BRSMG 752S	BRS 283
Marker	Cross =>	(Loo76-4484 x Numbaíra)	(Don Mario 43 x Suprema)	(Don Mario 48 x Suprema)
Satt002	D2	135	135	**123**
Satt005	D1	145	145	**136**
Satt009	N1	218	-	218
Satt030	F	165	**156**	**162**
Sat_038	O	100	**112**	**116**
Satt038	G	168	168	**174**
Satt042	A1	167	-	167
Satt045	E	130	**136**	**136**
Satt70	B2	144	144	**171**
Satt100	C2	142	142	142
Satt114	F	077	077	**092**
Satt216	D1	191	191	**221**
Satt431	J	198	198	198/231
Satt586	F	236	**209**	236
S45035	D1	155	155	**152**
GMABAB	N1	157	-	**161**
Similar.	(%)	**100**	**069**	**031/025**
Similar.	(%)	**-**	**100**	**023/015**

CONCLUSIONS

- Same genotype: variation into varieties was higher than variation between varieties;

- Mistake in identification in the breeding program (≠ cross)!


➢ Case 2 (2006):
BRS Valiosa RR vs. BRS Favorita RR
- Parent seeds: lines
blocks
1 row (5 m)
2 rows (30 m)


BRS Favorita RR vs. BRS Valiosa RR (24 SSR Markers/Embrapa Soybean):
100pb
GMABAB
Sat038
Satt09
Satt30
Satt038
Satt42
Satt45
Satt46
Satt070
Satt100
Satt114
Satt586
100 pb
Satt163
Satt184
Satt187
Satt406
Satt527
Satt534
Satt536
Satt540
Satt587
Satt231
Satt253
Sat263
Favorita
Valiosa

16 SSR Markers (SNPC)

Marker	LG Cross =>	MG/BR 46 (Conquista) (Loo76-4484 x Numbaíra)	BRS Valiosa RR [Conquista*6 x (E96-246 x BRSMT Uirapuru)]	BRS Favorita RR [Conquista*3 x (BRSGO Jataí x E96-246)]
Satt002	D2	135	135	135
Satt005	D1	145	145	145
Satt009	N1	218	218	218
Satt030	F	165	165	165
Sat_038	O	100	-	-
Satt038	G	168	168	168
Satt042	A1	167	167	167
Satt045	E	130	130	**136**
Satt70	B2	144	144	144
Satt100	C2	142	142	142
Satt114	F	077	077	077
Satt216	D1	191	191	191
Satt431	J	198	198	198
Satt586	F	236	236	236
S45035	D1	155	155	155
GMABAB	N1	157	157	157
Similar.	(%)	**100**	**100**	**093**
Similar.	(%)	-	-	**100**

Conclusion:

SSR Markers did not solve the problem, but MG was different (7.9 *vs.* 8.1)!!!

➢ Case 3 (2011):
BRSMG 700A *vs.* BRSMG 800A

- Mutation ???
- Mechanical mixture ??
- Natural cross ?

CARACHTERISTICS	BRSMG 790A	BRSMG 800A
Hipocotilum pigmentation	Present	Present
Flower color	Purple	Purple
Pubescence color	Gray	Gray
Pod color	Brown	Brown
Pubescence density	High	**Medium**
Seed shape	Round	Round
Seed coat color	Yellow	**Brown**
Seed coat luster	Medium	Medium
Hilum color	Yellow	**Bronw**
Peroxidase reaction	Positive	Positive
Bacterial pustule	R	**S**
Bacterial blight	MR	MR
Frogeye leaf spot	R	**S**
Stem canker	R	R
Powdery mildew	S	MR
Meloidogyne javanica	S	S
Meloidgyne incognita	R	**S**

16 SSR Markers

	LG	MG/BR 46 (Conquista)	BRSMG 790A	BRSMG 800A
Marker	Cross =>	(Loo76-4484 x Numbaíra)	(BRS 133 X BRM95-50478)	(Selection in BRSMG 790A)
Satt002	D2	135	126	
Satt005	D1	145	157	
Satt009	N1	218	158	
Satt030	F	165	**156**	
Sat_038	O	100	**110**	
Satt038	G	168	168	
Satt042	A1	167	167	
Satt045	E	130	**130**	
Satt70	B2	144	159	
Satt100	C2	142	142	
Satt114	F	077	092	
Satt216	D1	191	218	
Satt431	J	198	231	
Satt586	F	236	**224/236**	
S45035	D1	155	155	
GMABAB	N1	157	145	
Similar.	(%)	**100**		
Similar.	(%)	**-**	**100**	

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