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BMT/13/14 Add.
ORIGINAL: English
DATE: December 8, 2011

INTERNATIONAL UNION FOR THE PROTECTION OF NEW VARIETIES OF PLANTS

GENEVA

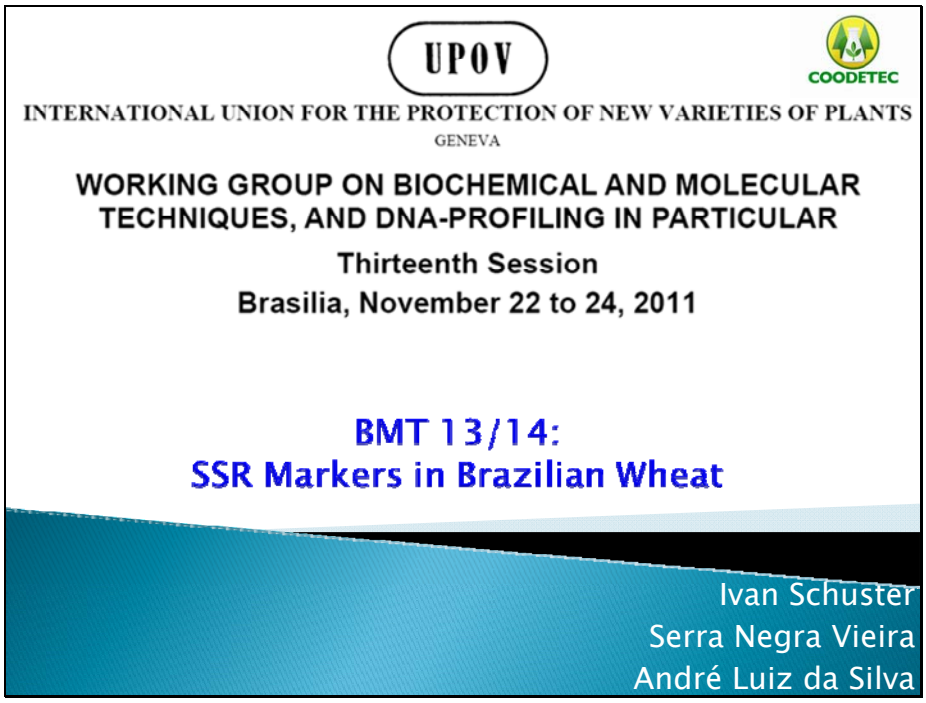
WORKING GROUP ON BIOCHEMICAL AND MOLECULAR TECHNIQUES, AND DNA-PROFILING IN PARTICULAR

Thirteenth Session
Brasilia, November 22 to 24, 2011

ADDENDUM

SSR MARKERS IN BRAZILIAN WHEAT

Document prepared by experts from Brazil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COODETEC
INTERNATIONAL UNION FOR THE PROTECTION OF NEW VARIETIES OF PLANTS
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Thirteenth Session
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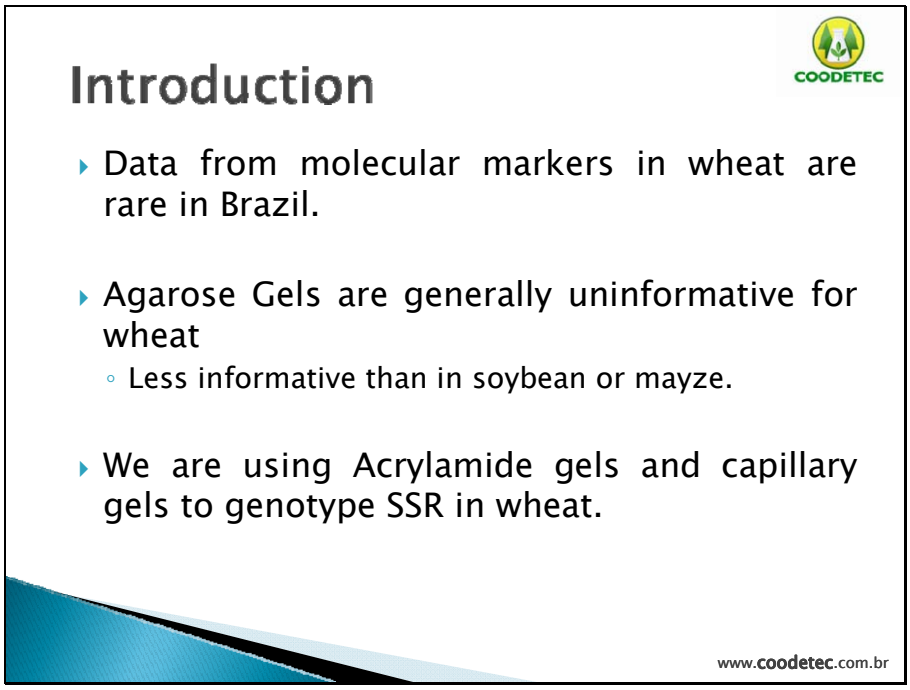
BMT 13/14:
SSR Markers in Brazilian Wheat
Ivan Schuster
Serra Negra Vieira
André Luiz da Silva


Introduction
COODETEC
Data from molecular markers in wheat are rare in Brazil.
Agarose Gels are generally uninformative for wheat
Less informative than in soybean or mayze.
We are using Acrylamide gels and capillary gels to genotype SSR in wheat.
www.coodetec.com.br

Wheat Microsatellite Genotyped in Acrilamide Gels

Genetics and Molecular Biology, 32, 3, 557-563 (2009)

www.sbg.org.br

Genetic variability in Brazilian wheat cultivars assessed by microsatellite markers

Abstract

Wheat (*Triticum aestivum*) is one of the most important food staples in the south of Brazil. Understanding genetic variability among the assortment of Brazilian wheat is important for breeding. The aim of this work was to molecularly characterize the thirty-six wheat cultivars recommended for various regions of Brazil, and to assess mutual genetic distances, through the use of microsatellite markers. Twenty three polymorphic microsatellite markers (PMM) delineated all 36 of the samples, revealing a total of 74 simple sequence repeat (SSR) alleles, *i.e.* an average of 3.2 alleles per locus. Polymorphic information content (PIC value) calculated to assess the informativeness of each marker ranged from 0.20 to 0.79, with a mean of 0.49. Genetic distances among the 36 cultivars ranged from 0.10 (between cultivars Ocepar 18 and BRS 207) to 0.88 (between cultivars CD 101 and Fudancep 46), the mean distance being 0.48. Twelve groups were obtained by using the unweighted pair-group method with arithmetic means analysis (UPGMA), and thirteen through the Tocher method. Both methods produced similar clusters, with one to thirteen cultivars per group. The results indicate that these tools may be used to protect intellectual property and for breeding and selection programs.

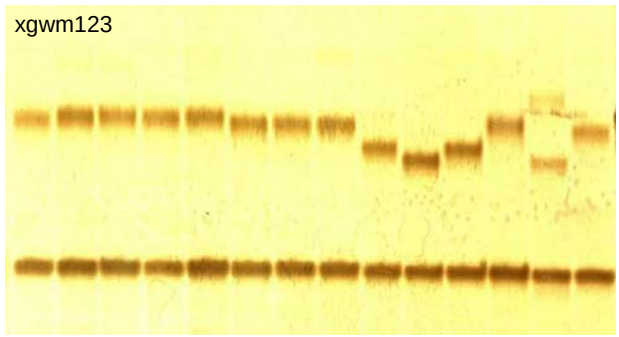
Key words: Triticum aestivum, germplasm, cultivar characterization, cluster analysis, molecular markers.

Wheat Microsatellite Genotyped in Acrilamide Gels

- 36 Brazilian wheat varieties
- 43 microsatellite markers
  - 23 polymorphic (54%)

Num Alleles	Num. Markers	%
5	3	13.0%
4	6	26.1%
3	8	34.8%
2	6	26.1%

Wheat Microsatellite Genotyped in Acrilamide Gels



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Wheat Microsatellite Genotyped in Acrilamide Gels

Table 2 - Microsatellite markers used in assessment of genetic diversity of Brazilian wheat cultivars.

Locus	Chromosome location (cM - GL)[#]	Number of alleles	Frequency of alleles	Representative alleles[§]	PIC
Xgwm 136	3.9-1A	5	0.12; 0.31; 0.26; 0,24; 0.07	CD 115; CD 114; FRONTANA; CD 112; ABALONE	0.76
Xgwm 164	40.5-1A	4	0.22; 0.17; 0.55; 0.06	CD 112; CD 105; CD 104; CD 111	0.61
Xgwm 135	55.2-1A	3	0.18; 0.29; 0.53	CD 113; CD 102; CD 104	0.60
Xgwm 403	64.4-1B	1	1.00	All	-
Xgwm 140	102.1-1B	1	1.00	All	-
Xgwm 337	39.5-1D	4	0.06; 0.10; 0.61; 0.23	BRS 208; CD 114; CD 105; CD 104	0.56
Xgwm 232	130.4-1D	2	0.11; 0.89	CD 102; AVANTE	0.20
Xgwm 359	54.4-2A	1	1.00	All	-
Xgwm 265	112.3-2A	1	1.00	All	-
Xgwm 257	12.3-2B	2	0.20; 0.80	CD 112; CD 104	0.32
Xgwm 261	? - 2D	2	0.39; 0.61	CD 104; IPR 85	0.48
Xgwm 102	36.0-2D	3	0.03; 0.10; 0.87	CD 114; CD 105; CD 103	0.23

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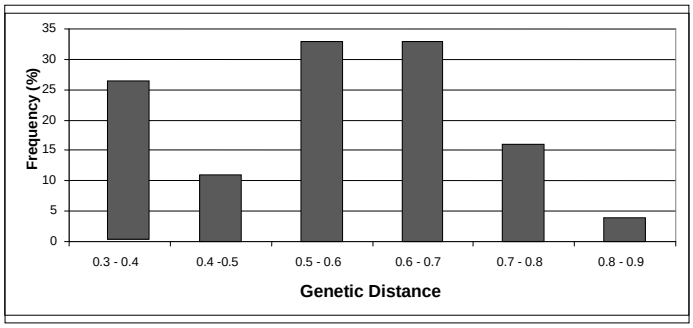
Genetic Distances



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Wheat Microsatellite Genotyped in Capillary Gels

- 32 Brazilian wheat varieties
- 23 microsatellite markers
  - 21 polymorphic

Num Alleles	Num. Markers	%
8	1	4.3%
7	1	4.3%
6	2	8.7%
5	4	17.4%
4	6	26.1%
3	4	17.4%
2	3	13.0%

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Wheat Characterization

Variety	Dupw115		Dupw205 Loci1	Dupw205 Loci2	Xgwm003 Loci1	Xgwm003 Loci2	Xgwm149 Loci1	Xgwm149 Loci2
CD 104	184		157	166	114	194	150	156
CD 105	184		157	166	114	194	150	166
CD 108	187		157	163	114	194	150	F
CD 112	184		157	166	114	194	150	166
CD 114	187		157	163	114	194	150	166
CD 115	187		157	163	114	194	150	166
CD 116	190		157	163	114	194	150	166
CD 117	190		157	166	114	194	150	166
CD 118	184		157	166	114	194	150	166
CD 150	184	190	157	163	114	194	150	166
Fundacep 50	190		157	166	114	194	150	166
Fundacep 52	184		157	163	114	194	150	156
Frontana	190		157	166	114	194	150	156
Avante	184	190	157	166	114	194	150	156
Onix	184		157	163	114	194	150	166
BRS179	184		157	163	114	194	150	166
IPR85	190		157	163	114	194	150	156
Vanguarda	184		157	166	114	194	150	156
BRS210	184	190	157	166	114	194	150	166
BRS220	190		157	166	114	194	150	156
Fundacep 46	190		157	[illegible]	114	194	150	166

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Allele Frequency

Marker	Nº alleles	Allele	Frequency	PIC
DuPw115	3	184	0.484	0.612
		187	0.156	
		190	0.359	
DuPw205 Loco 1	1	157	1	0
DuPw205 Loco 2	2	163	0.344	0.451
		166	0.656	
Xgwm164	4	118	0.703	0.468
		122	0.172	
		124	0.063	
		126	0.063	
DuPw167	3	230	0.094	0.498
		242	0.656	
		244	0.250	
Xbarc12	5	159	0.281	0.748
		183	0.250	
		189	0.313	
		201	0.063	
		207	0.094	

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Probability or Random Identity

Variety											PRI
CD 104	Marker	Xgwm 165	Dupw 167	Xgwm1 60	Xgwm 44	Xbarc 12	Xgwm2 57	Xgwm 526(2)	Xgwm 304	Xgwm 413	
	Allele	187	244	150	177	159	194	130	201	89	0,0001%
	Frequency	0,125	0,25	0,063	0,266	0,281	0,375	0,192	0,344	0,313	
CD 108	Marker	Dupw 115	Xgwm 219	Xgwm 161	Xgwm 164	Xgwm 155(2)	Xgwm 247(2)	Xgwm 44			
	Allele	187	180	178	124	151	176	179			<0,0001%
	Frequency	0,156	0,156	0,172	0,063	0,188	0,077	0,109			

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Conclusion

- A great quantity of variability exist, at molecular level, between Brazilian wheat cultivars.
- SSR markers can be used to characterize or differentiate wheat cultivars.

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