



BMT/9/4 Add.

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INTERNATIONAL UNION FOR THE PROTECTION OF NEW VARIETIES OF PLANTS
GENEVA

**WORKING GROUP ON BIOCHEMICAL AND MOLECULAR
TECHNIQUES AND DNA PROFILING IN PARTICULAR**

Ninth Session

Washington, D.C., June 21 to 23, 2005

**REPEATABILITY AND DISCRIMINATION POWER OF SSR DATA IN THE
VEGETATIVELY REPRODUCED POTATO VARIETIES:
IMPACT OF "WEAK ALLELES"**

Document prepared by experts from France

1. The BMT agreed that, where agreed by the relevant experts, the presentations made at the meeting should be made available in the BMT document section of the UPOV website, as addenda to the relevant documents. This document contains a copy of the presentation made by Mr. Eric Bonnel (France) for document BMT/9/4.

Potato Variety Identification (Genotyping)

**Reproducibility
&
« Weak Alleles »**

1

SSRs

MILBOURNE D. & al. (1998)

**Isolation, characterisation and mapping of
simple sequence repeat loci in potato.**

Mol Gen Genet 259:233-245

☞ 112 primer pairs

☞ 71 → polymorphism

☞ 55 → 66 discrete loci mapped

☞ 23 → chromosome designation

2

Year 2004 Variety Identification (Set 1)

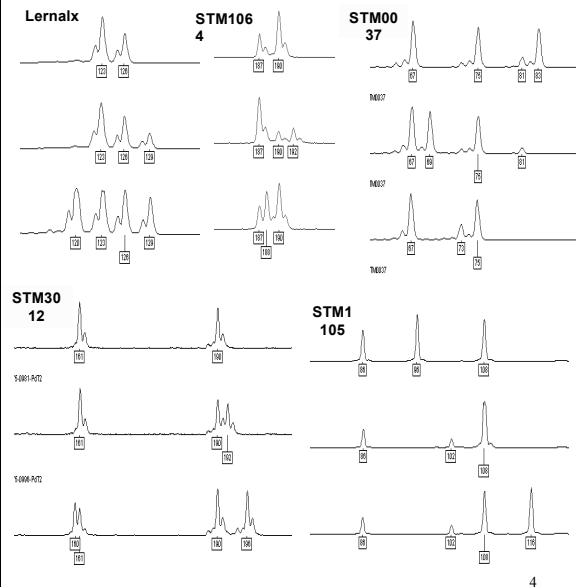
10 loci

- LERNALX: 4 alleles
- STM0037: 6 alleles
- STM1003: 10 alleles
- STM1064: 4 alleles
- STM1097: 6 alleles
- STM1100: 16 alleles
- STM1105: 9 alleles
- STM2005: 4 alleles
- STM2020: 9 alleles
- STM3012: 6 alleles

☞ 74 alleles

3

5 Loci



4

Year 2004

Variety Identification

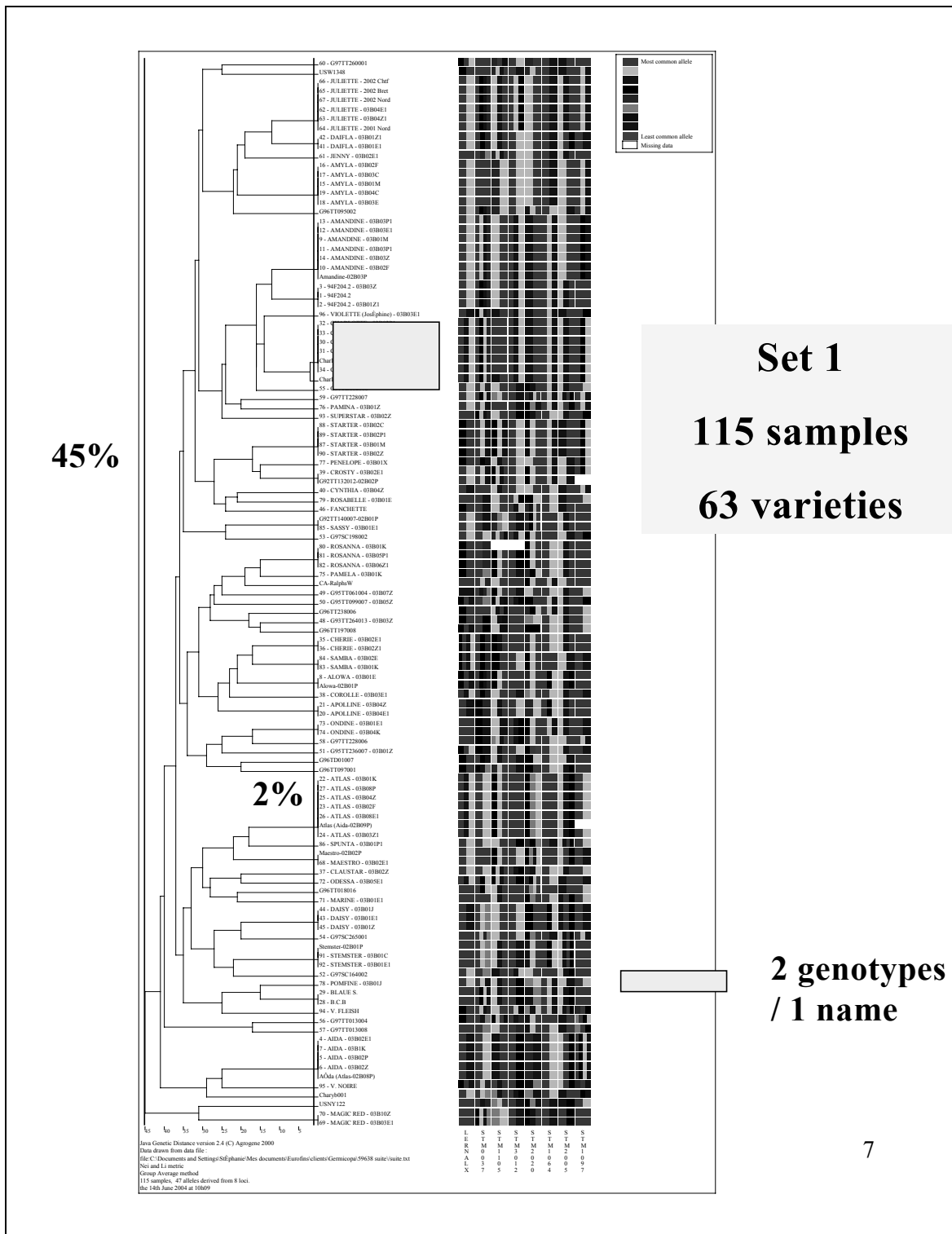
(Set 1)

8 Loci

- LERNALX: 4 alleles
- STM0037: 6 alleles
 - STM1003: 10 alleles
- STM1064: 4 alleles
- STM1097: 6 alleles
 - STM1100: 16 alleles
- STM1105: 9 alleles
- STM2005: 4 alleles
- STM2020: 9 alleles
- STM3012: 6 alleles



48 alleles



Year 2004

Identity Control

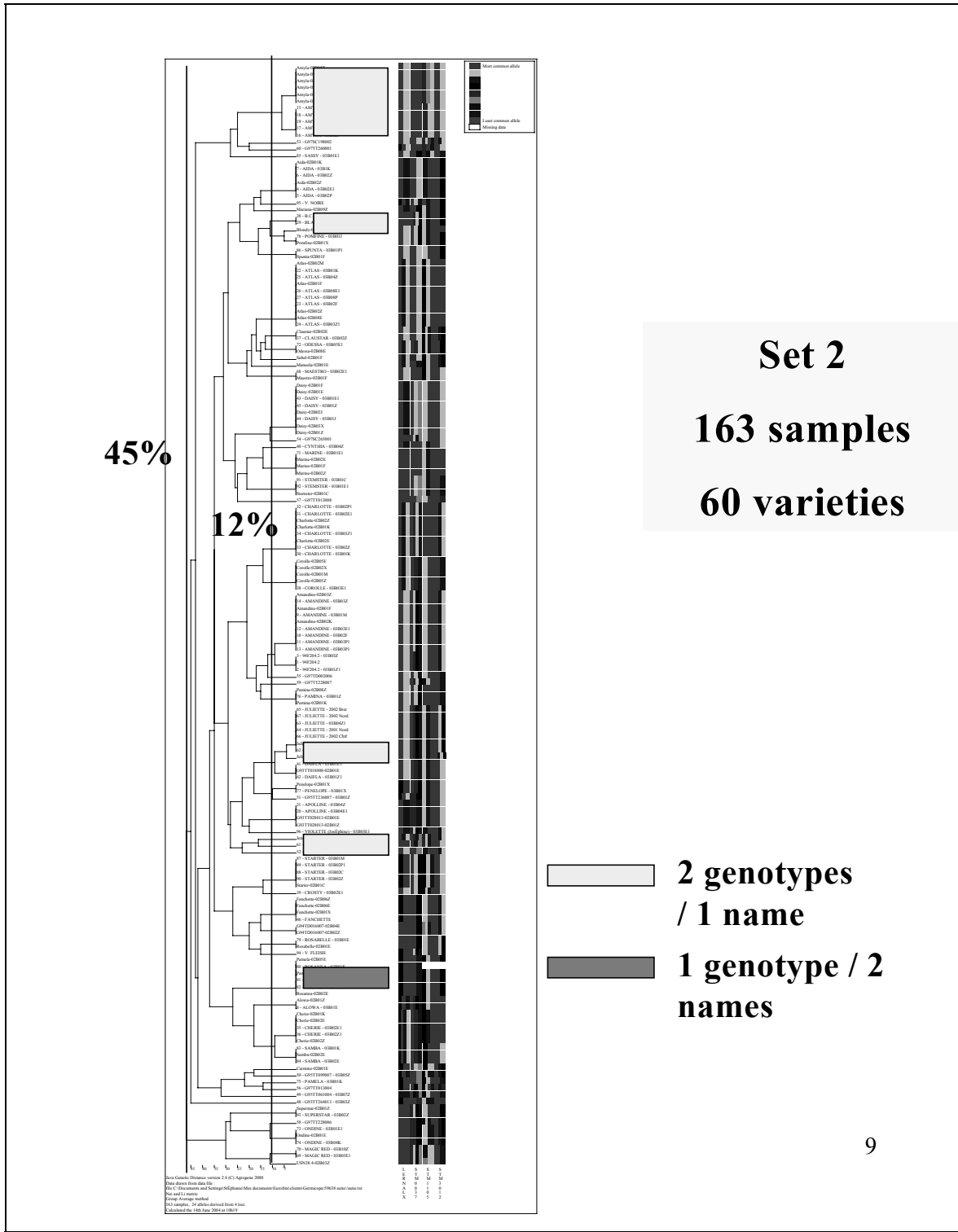
(Set 2)

4 Loci

- LERNALX: 4 alleles
- STM0037: 6 alleles
 - STM1003: 10 alleles
 - STM1064: 4 alleles
 - STM1097: 6 alleles
 - STM1100: 16 alleles
- STM1105: 9 alleles
 - STM2005: 4 alleles
 - STM2020: 9 alleles
- STM3012: 6 alleles




25 alleles

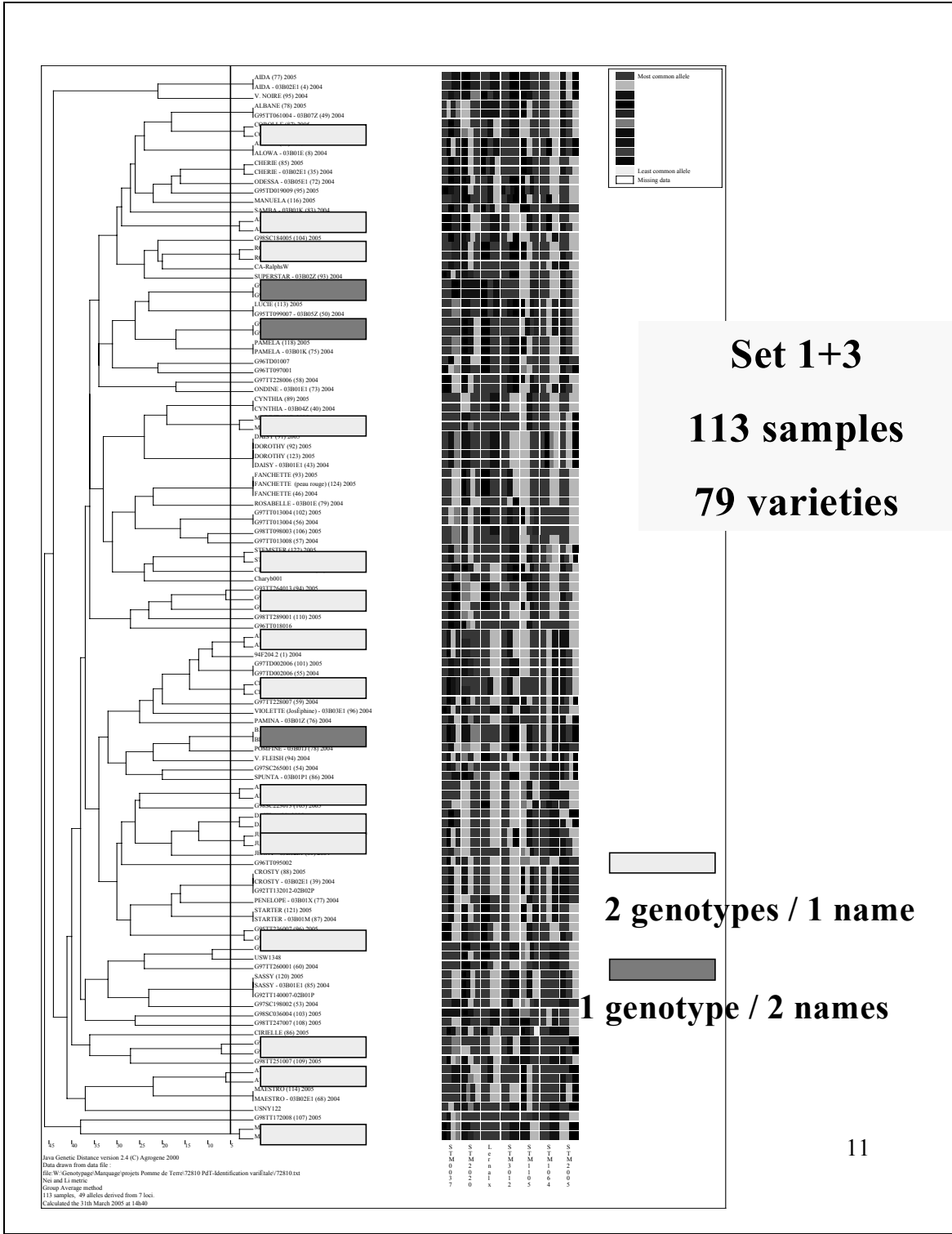


2004 & 2005 Variety Identification (Set 1+3)

7 Loci

- LERNALX: 4 alleles
- STM0037: 6 alleles
 - STM1003: 10 alleles
- STM1064: 4+3 alleles
 - STM1097: 6 alleles
 - STM1100: 16 alleles
- STM1105: 9+2 alleles
- STM2005: 4 alleles
- STM2020: 9+1 alleles
- STM3012: 6+1 alleles

 42 alleles



Year 2005

Identity Control

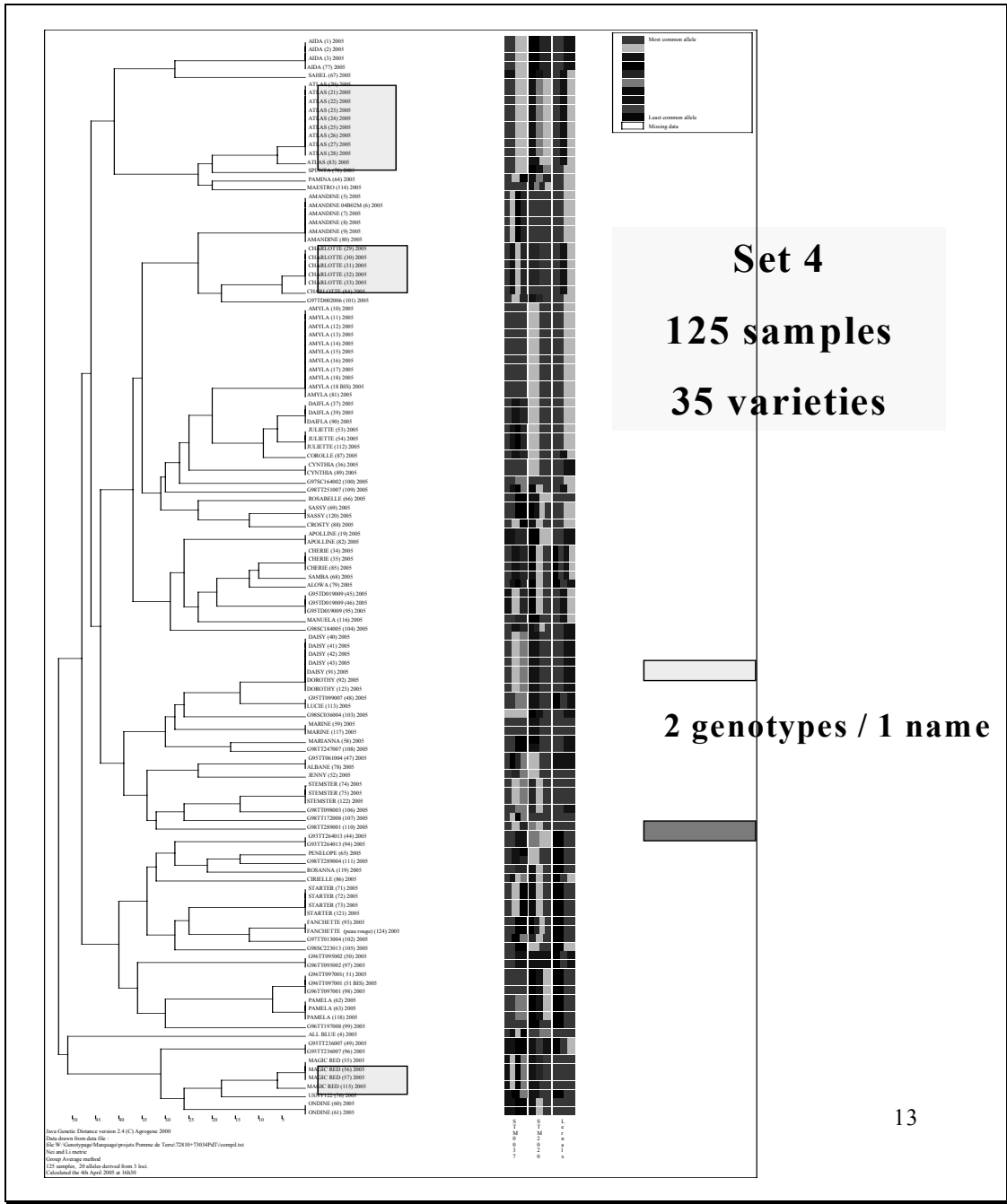
(Set 4)

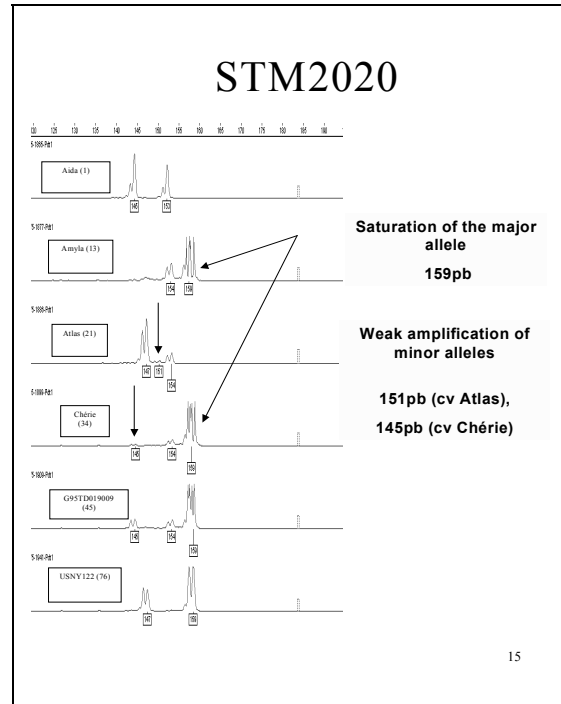
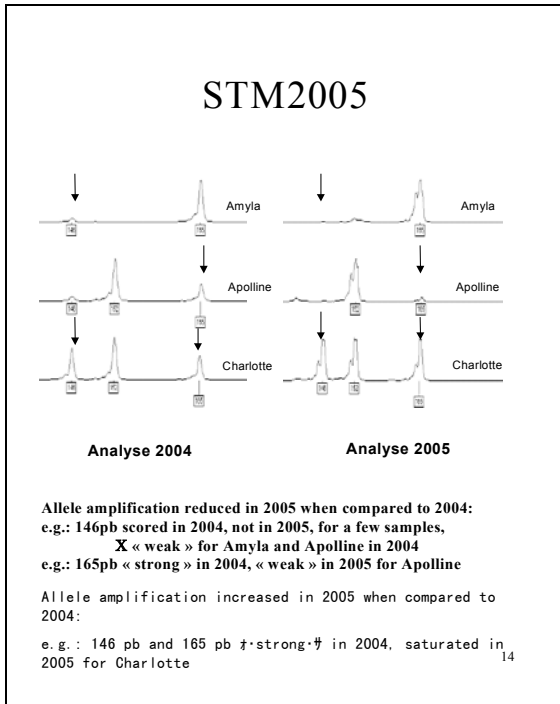
3 Loci

- **LERNALX:** 4 alleles
- **STM0037:** 6 alleles
 - STM1003: 10 alleles
 - STM1064: 4 alleles
 - STM1097: 6 alleles
 - STM1100: 16 alleles
 - STM1105: 9 alleles
 - STM2005: 4 alleles
- **STM2020:** 9 alleles
 - STM3012: 6 alleles



19 alleles

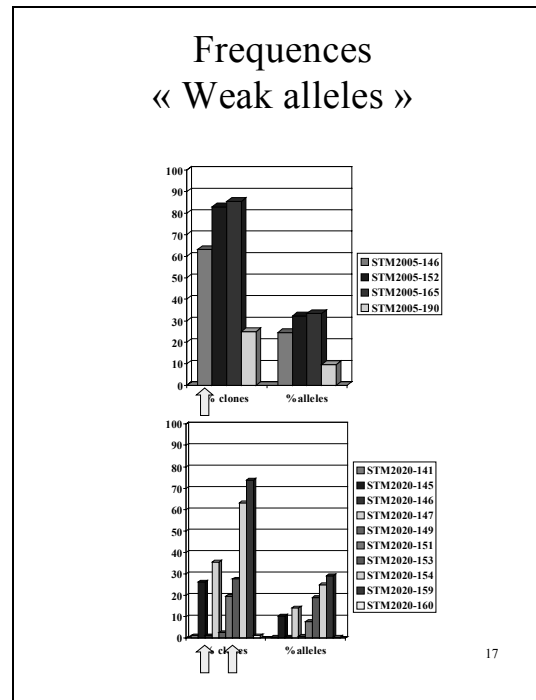


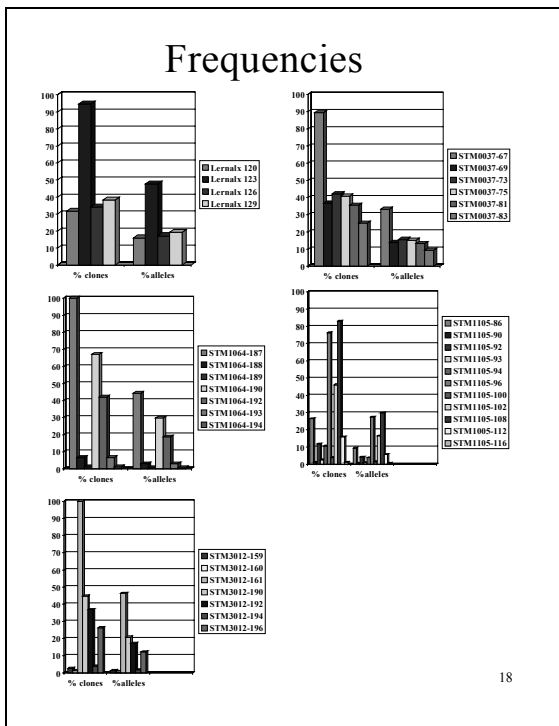


Weak Allele

Allele having a weak amplification which results in erratic scoring (presence vs absence) among replicated variety samples, therefore in variety mis-identification.

An allele may be « weak » only for a few varieties, not in others.





« Weak » alleles

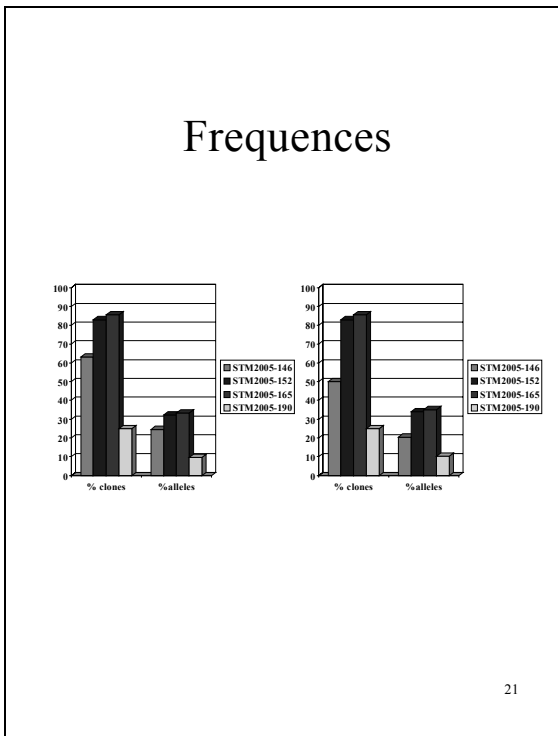
- Common
- Related to genetic background
 - X saturated allele vs weak allele
 - X variety dependant
 - X variety population
- Related to the PCR technology variability
- Not clearly related to allelic frequency in the gene pool..
- Useful for molecular polymorphism analyses

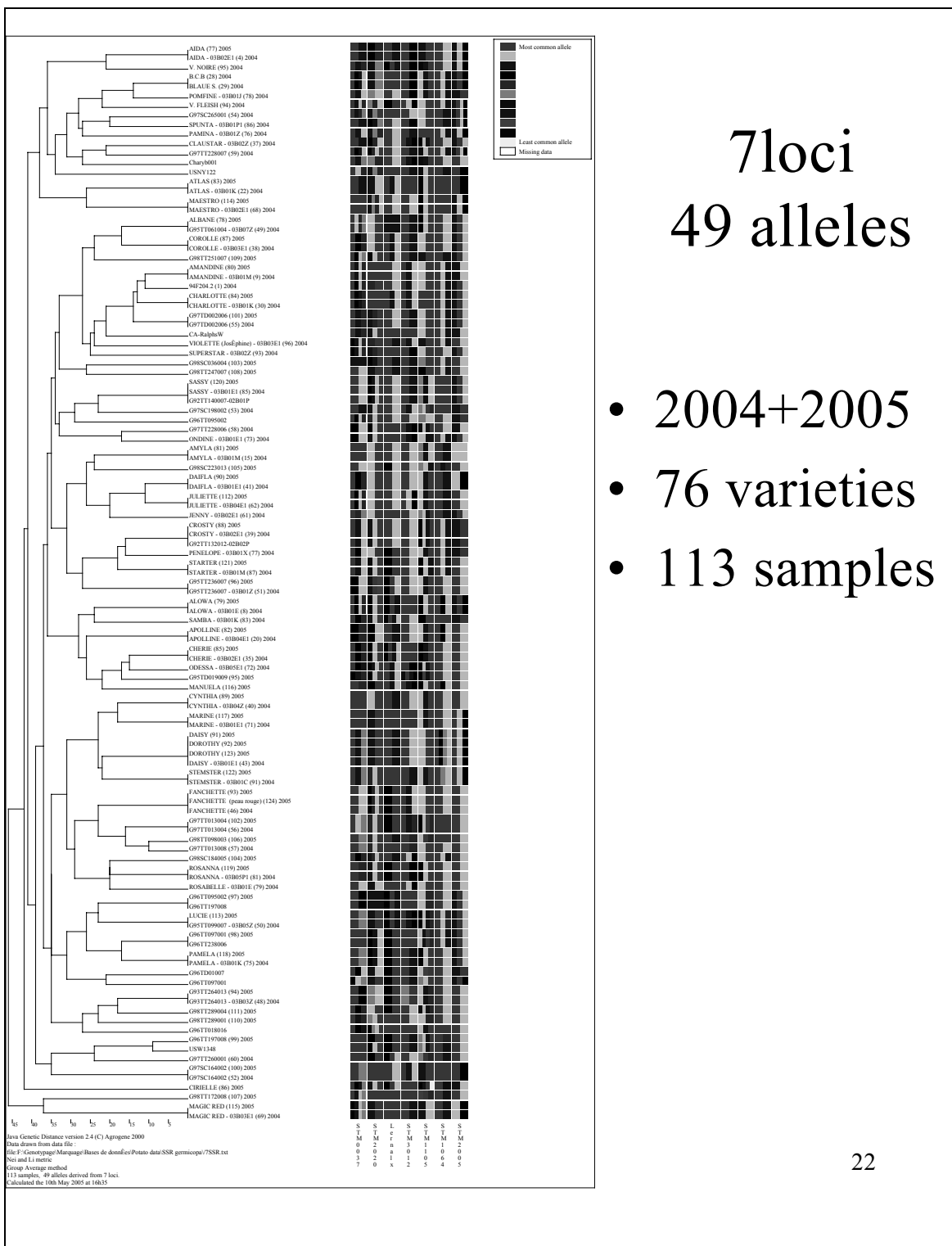
19

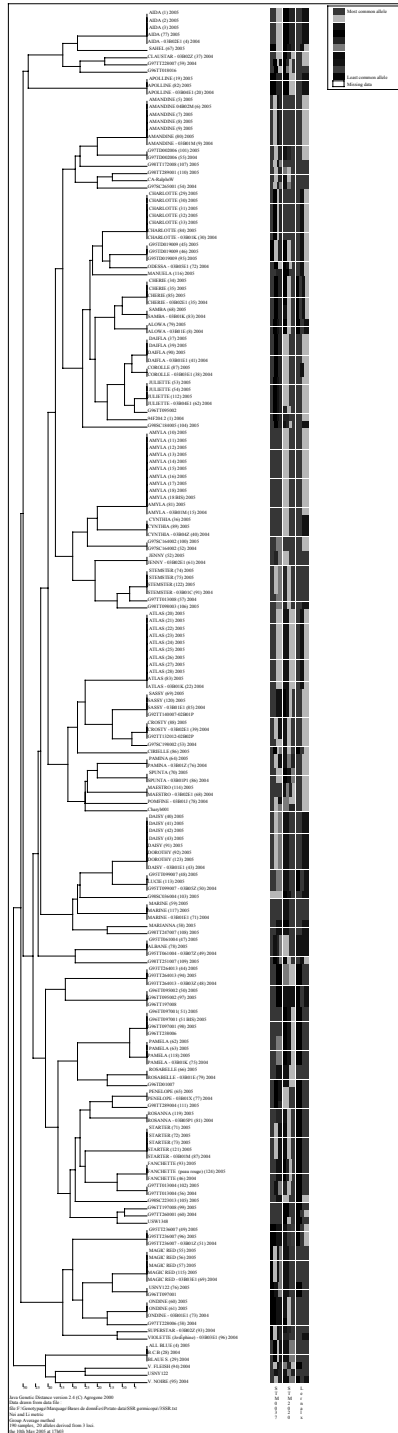
Decision Rule

- A weak allele may be scored a « 0 » or « 1 » in different replicates, then it will be stored accordingly in database.
- But for genetic distance analyses, it will always be scored a « 0 ».

20







3loci
20 alleles

- 2004+2005
- 76 varieties
- 190 samples

DISCUSSION

☞ **SSR markers reveal a high degree of DNA polymorphism and a large genetic diversity within a limited potato gene pool;**

☞ **As low as 3 selected markers (or 20 alleles) might discriminate potato varieties within a limited potato gene pool.**

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Improvement in repetability of the SSR fingerprints.

☞ **Select markers & alleles for DNA polymorphism, scoring reliability and stability within large & diversified potato variety pool.**

☞ **Reduce and stabilise occurrences of « weak alleles » by improving PCR technology.**



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Thank you !



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