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UPOV

INTERNATIONAL UNION FOR THE PROTECTION OF NEW VARIETIES OF PLANTS

GENEVA

AD HOC CROP SUBGROUP ON MOLECULAR TECHNIQUES FOR POTATO

Second Session
Quimper, France, April 17, 2007

ADDENDUM TO DOCUMENT BMT-TWA/POTATO/2/5

TOWARDS THE USE OF DNA PROFILES FOR THE IDENTIFICATION AND THE DISTINCTNESS OF POTATO VARIETIES

Document prepared by an expert from France

This document is an addendum to document BMT-TWA/Potato/2/5 "Towards the Use of DNA Profiles for the Identification and the Distinctness of Potato Varieties" and contains a copy of the presentation made by Mr. Eric Bonnel, France, at the second session of the *Ad Hoc* Subgroup on Molecular Techniques for Potato.

Towards the use of DNA profiles for the Identification and the Distinctness of the Potato Varieties

BMT-TWA/Potato/2/5

Eric BONNEL

UPOV-BMT, EAPR, EUCARPIA

Austria
Czech Republic
France
Germany
Latvia
Peru
Spain
UK

Technologies

RFLP
AFLP
SSR
SNP

All reported as powerful tools for Variety Identification

Consensus

Groups of Varieties

Species (phylogeny);
Geographical origin;
***Gene Pools*;**

Consensus ?

Variety Identification

Distinct DUS ? distinct DNA profiles
General case & Mis-labelling

Distinct DUS ? no distinct DNA profiles
Mutant & GMO

Consensus ?

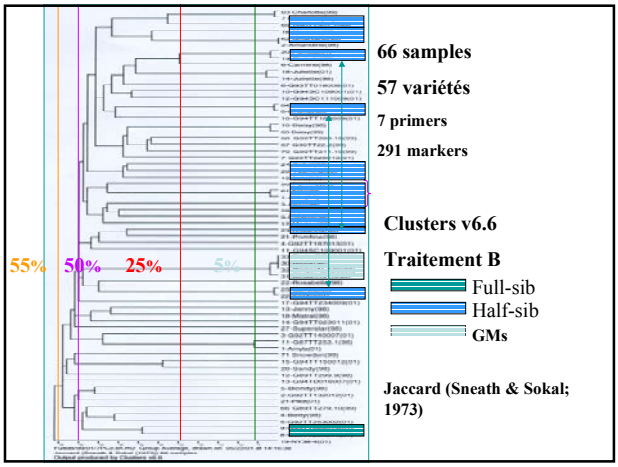
Variety Identification

No distinct DUS ? no distinct DNA profiles
Samples of a single Variety & Mis-appropriation

No distinct DUS ? distinct DNA profiles
technology artefact

Consensus ?

No correlation (prediction)
DNA profiles / Phenotypes



Essential Derivation & DUS Reports ?

General Genetics

DNA markers / Phenotype
No « global» correlation to be expected

DNA markers are neutral (no coding area)
Pleiotropy & Epistasy
Undectable point mutations
Phenotype = Genotype + Environment + GXE

Potato Genetics

Tetraploidy
Heterozygoty
Large Genetic Diversity of Cultivars
Long Recombination Breeding Cycles
Multi-trait Screening
Inbreeding Depressure
Low Turn-Over of Cultivars
Vegetative Reproduction

Distinct Phenotypes ? Low DNA similarity

Reliability & Repeatability

RFLP & AFLP:
DNA digestion is limiting,
Numerous markers on the whole genome
SSR, SNP:
Weak alleles & Distinct sets of markers:
Amplification is limiting ?
Less markers on partial genome

« Artefact » ? High DNA similarity

High DNA similarity

Artefact ?

Essential Derivation ?
(Mutation, GMO)

?

DUS by a group of Potato & DNA experts

Use DNA markers in Potato DUS

Additional « phenotype »
to Morphology & Agronomy
*****
Eliminate redundancy & mislabelling
*****
Ascertain the identity of control and tested material
*****
Identify essentially derived varieties
*****
Balance between various species, origins, old varieties…to be maintained as living material