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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**

Seventh Session

Hanover, Germany, November 21 to 23, 2001

A DESCRIPTION AND UPDATE OF MMEDV (MOLECULAR AND OTHER MARKERS
FOR ESTABLISHING ESSENTIAL DERIVATION IN CROP PLANTS)
AN EU FP5 PROJECT

prepared by experts from the United Kingdom

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**Molecular and other Markers for
Establishing Essential Derivation (EDV)
in Crop Plants.**

**MMEDV
An EU Framework 5 Project.**

(Marqueurs moléculaires et autres marqueurs
pour établir la dérivation essentielle (dev)
chez les plantes cultivées)

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MMEDV:

Objective:

**The overall objective of this project is to
develop a scientifically based framework to
assist in the determination of the essential
derivation of plant varieties.**

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MMEDV Partners:

NIAB, UK - Co-ordinator & Partner 1

**Sub-contractor :Wageningen Agricultural
University (WAU), NL**

Partner 2: Plant Research International (PRI), NL

**Partner 3: Institute of Biotechnology, University of
Helsinki (UH), FI**

Partner 4: University of Hohenheim (UHOH), DE

**Partner 5: Department of Agronomy, University of
Bologna (DABO), I**

Partner 6: Keygene N.V. NL

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MMEDV: CROPS AND MARKERS:

**Barley, Roses, Maize: - Back-crosses, Mutations,
GMOs, Somaclonal variants, Inbreds/Hybrids**

•AFLP- Amplified Fragment Length Polymorphisms


•STMS- Sequence-Tagged Microsatellite Sites

•SSAP- Sequence-Specific Amplified Polymorphism

**•REMAP- Retrotransposon Microsatellite Amplified
Polymorphism**

•IRAP- Inter-Retrotransposon Amplified Polymorphism


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Visual outline of the EDV concept.

Divergence (distance) from initial variety, X	-----	Minimum Distance	Limit of EDV? -----Distance
Type of variety:	X*plagiarised X	X' new, EDV (dependent)	Y new (independent)
Differentiation from X	insignificant changes	clearly distinct, but retains 'essential characteristics'	Clearly distinct
Eligibility for PBR	No	Yes (essentially derived)	Yes

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MMEDV - Basic Concept

The project will utilise specially produced plant genotypes arising from a range of potential EDV situations - e.g. back-crosses, mutations, GM, hybrid production. The degree of relatedness between the various genotypes will be well-defined, and thus it should be possible to relate the “distance” as estimated by the use of various types of molecular marker to the known relationship between the samples.

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MMEDV:

The project will concentrate on four main issues.

- **Determination of statistical confidence levels in studies of sources of variation due to DNA marker techniques, to materials ("distinctness/uniformity" between and within genotypes), and to measurement (robustness/reproducibility of fingerprints across laboratories).**
- **The suitability of markers to measure genetic distances that reflect the known pedigree relationships of the genotypes, and the precision of these measurements.**
- **Determining the importance of marker map position for defining each of the EDV aspects in the most efficient way.**
- **Determining the statistically relevant numbers of markers required for each of the relevant EDV situations investigated.**

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MMEDV: Statistical concepts and analysis.

The central question to be addressed is "at what degree of relatedness for a given species do breeders consider and agree that dependence (EDV) of varieties becomes significant?"

There are two related issues within this:

- i. the effective estimation of distance as a measure of variety relatedness,**
- ii. estimation of an objective distance threshold against which to measure essential derivation.**

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•MMEDV: Current Situation.

**The project has just completed the 18 month report.
The partnership technical meeting is to be held next week.**

Work is now focusing on:-

Barley-

analysis of molecular (SSAP, IRAP and REMAP) and morphological data from back-cross material

Maize -

analysis of data from GMO lines(AFLP) and 'triplets' (parents and progeny)

Rose -


within lab reproducibility studies (STMS and AFLP) and between lab (AFLP)

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MMEDV: Some Preliminary Results

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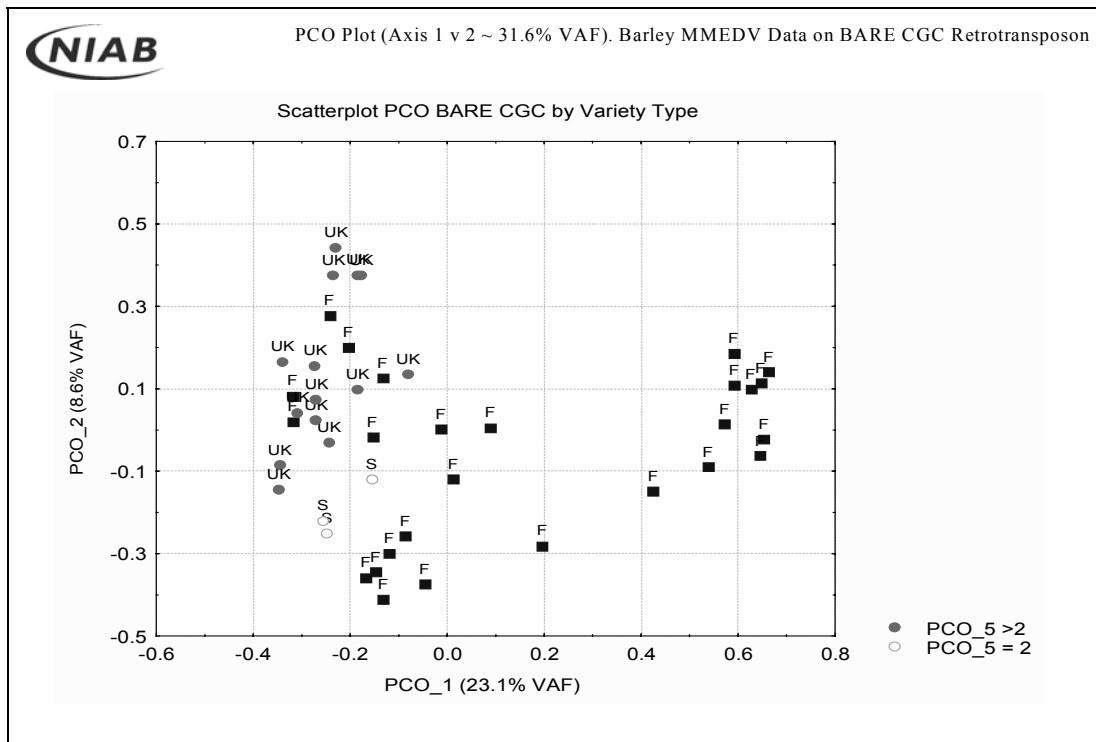


MMEDV: Barley Retrotransposon Markers.

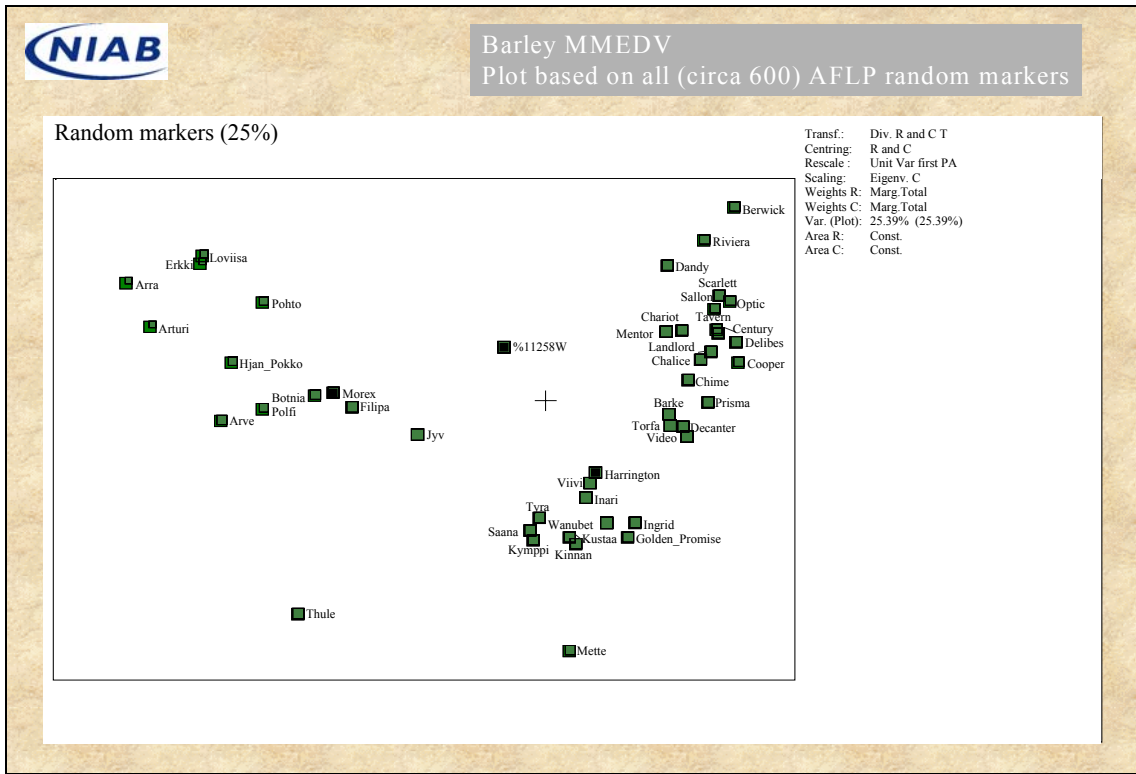
12 BARE, 4 Sukkula and 2 Sabrina retrotransposon markers have been used to quantify the relationship between discrimination 'power' and distinctness criteria in 43 barley varieties.

Material used represents varieties from the Finnish National List (NL)[26], the UK Recommended List (RL)[14] and studied varieties [3].

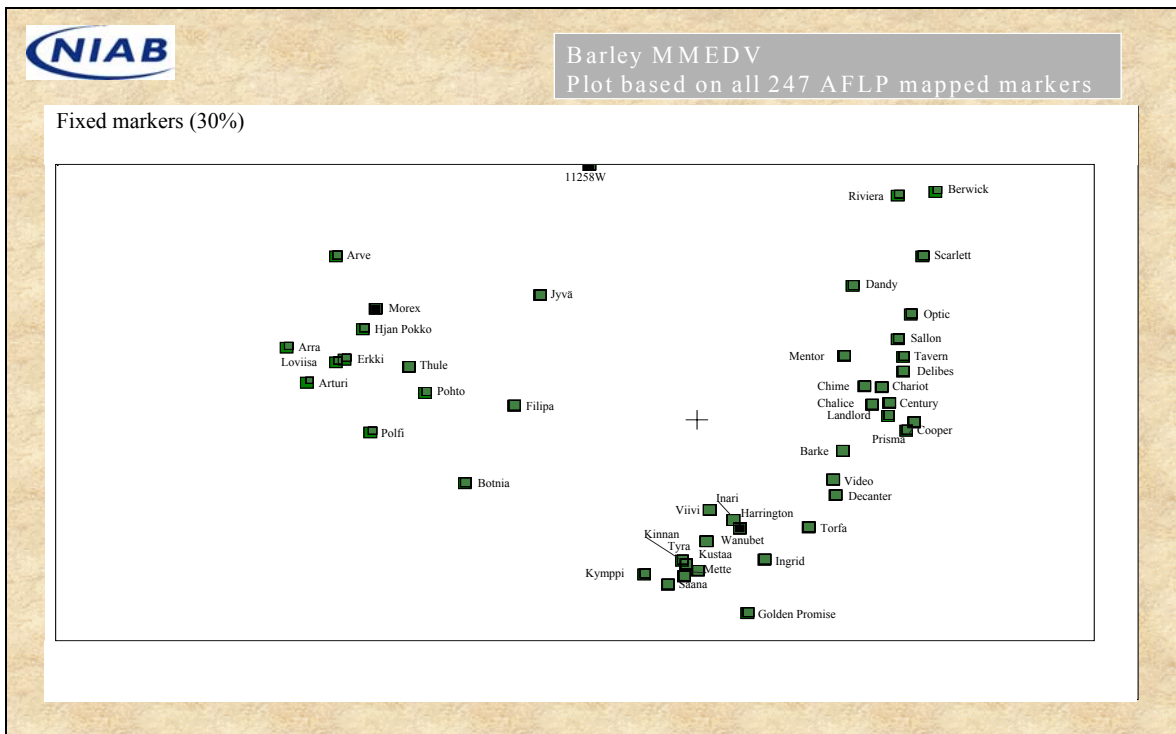
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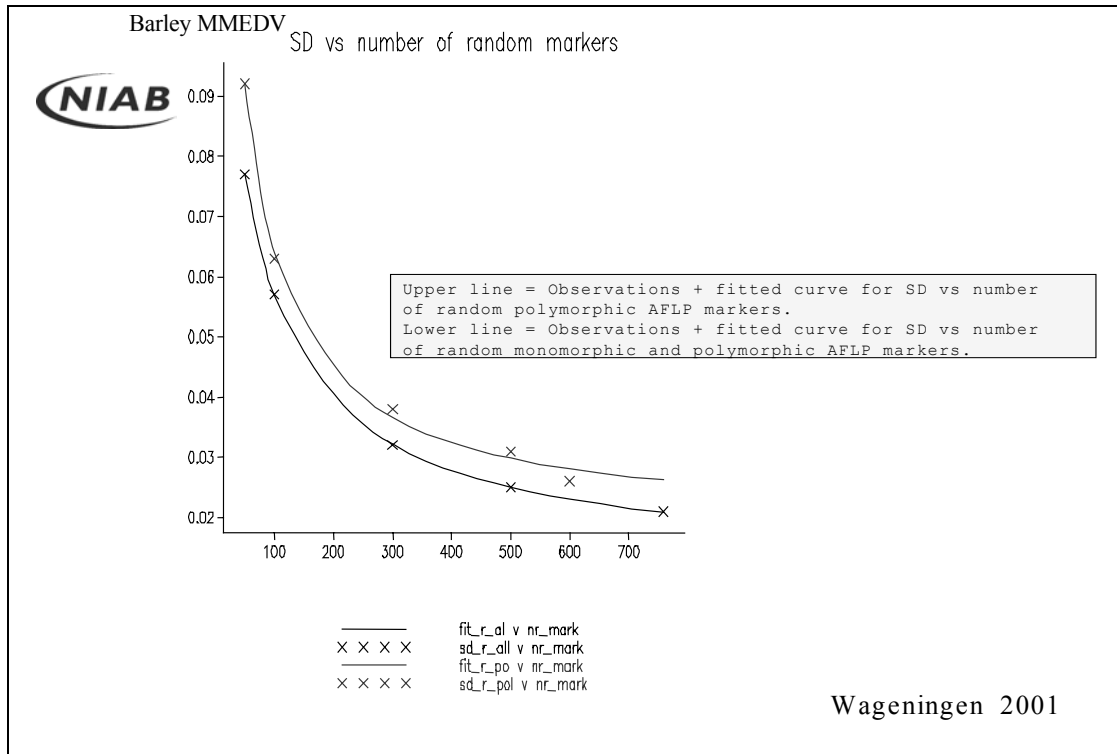
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