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

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**COMPARING WHEAT VARIETIES WITH THEIR OFFSPRING BY
MOLECULAR MARKERS**

Document prepared by an expert from Austria

1. The Austrian wheat seed market is exceptional, as two-thirds of the seed sold is of varieties in the premium quality wheat categories. One of these, our variety 'Capo' registered in 1989, is still the market leader with over 30% share of the market.
2. Needless to say that such a successful long-living variety has often been used as a breeding parent. As a consequence, several phenotypically quite similar varieties have been registered.
3. An analysis with 84 molecular markers covering all chromosomes was performed to check the relationship between those similar varieties. The tested wheats included 'Capo', a 'Capo' cross of our own and one from a competitor, a backcross to a 'Capo' sister line and three unrelated varieties.
4. Genetic similarities of the 'Capo' crosses were in the range of 57% - 78%, while those of the non related varieties were between 23% to 31%. The molecular analysis confirmed the pedigree information and also identified the competitor's variety as a true cross.

5. In a different case of phenotypically similar varieties our own variety and the competitor's variety showed a similarity of 98% when analyzed with molecular markers. That value is unlikely if two breeders selected from the same cross but could be explained by reselection from a variety with residual heterogeneity.
6. In the light of those findings it is necessary to define thresholds to differentiate sister lines from essentially derived varieties (EDVs).
7. If applicable, ISF arbitration procedures are to be preferred before initiating court cases.

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Comparing Wheat Varieties with their Offspring by Molecular Markers

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U P O V

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PROBSTDORFER SAATZUCHT

Introduction

Probstdorfer Saatzucht

- seed producing company
- cereal seeds (wheat, durum, barley) breeder until 2000
- since 1st July 2000 shareholder of breeding company "Saatzucht Donau"



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Austrian wheat seeds market

- total wheat market
19,000 – 21,000 tons C1
- of which high quality wheat
(quality groups 7 to 9, corresponds to German E-type, French BAF)
13,000 – 14,000 tons C1 (2/3)
- area 260,000 – 270,000 hectares



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Registered high quality wheat varieties

- currently 28 varieties of which
 - 24 of Austrian breeding
 - 17 of Probstdorf / Saatzucht Donau
- Exclusive Situation
 - 'Capo' registered 1989
 - still main variety
 - approx 35% share of seed
 - leading in multiplication area



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'Capo' as progenitor

- Due to its dominant situation 'Capo' was/is frequently used as parental line both by ourselves as well as by competitor breeders, resulting in phenotypically similar plants



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Comparison of 'Capo' with its offspring by molecular marker methods

84 Microsatellites covering all chromosomes of wheat

- 'Capo' 1990
- 'Capo' 2007
- 'Capo' own cross (VAR)
- 'Capo' competitor's cross (VAR)
- Backcross with 'Capo' sisterline (VAR)
- 3 non related varieties



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Results of 84-Markers

	Difference	Identity
'Capo' 2007	No/84	%
'Capo' 1990	0	100
'Capo' own cross	18	78
'Capo' competitor's cross	19	77
Backcross 'Capo' sister	36	57
non related varieties	58-65	23-31



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Conclusions 1st part

- 84 Microsatellites distributed over genome give adequate results for market control
- competitor's variety established as true cross
- for statistical evaluation probably more in-depth tests necessary



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And what is that ?

Our variety (reg. 1997)

- 92 markers
- 90 monomorph results
- 2 polymorph results

Competitor's variety (reg. 2001)

- 90 identical monomorph res.
- 2 monomorph results (of polym)



comment ?



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Conclusions part 2/1

- In light of previous results → EDV
Reselection from initial variety
- It is necessary to stipulate a threshold to define EDVs
- In which generation have varieties been drawn apart – define the border between sister line and EDV
(in 2 sister varieties we observed a difference of 4/43 markers = 91% identity)



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Conclusions part 2/2

In case of potential EDVs

- call for an ISF arbitration a.s.a.p (look at trade and arbitration rules for time schedule) if applicable
- court cases will be tedious as long as there are no accepted threshold levels



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