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ESN Conference | **Porto**Portugal**08**09**May**2007
A systematic approach to planning and performing Sensory Tests

Correlation between sensory data and chemical data:

case study

Touriga Nacional Wine

A. César Silva Ferreira – ferreira@esb.ucp.pt
Escola Superior de Biotecnologia-Universidade Católica Portuguesa - Portugal -

" The flavour Assault ..."

Defining: “The Goal”

Targeting the “varietal aroma” of Touriga Nacional …

Brand Key

Material & Methods

35 wine samples

Material & Methods

… Started with 32 Assessors …

1st step: Establish the Touriga sensory profile

Profiling

"typical" TN Wines

→ **FREE DESCRIPTION** = 41 Descriptors

↓ 1st Elimination
Removed non-relevant attributes

ATTRIBUTES
(perceived/non perceived)

↓

Select terms with
geometric mean > 50 %

11 Attributes…

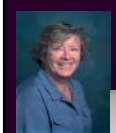
Balsamic
Veggie
Herbaceous
Bergamot
Floral
Dried fruit
Spicy
Berry fruit
Tree fruit
Tropical fruit
Citrus
Nutty

2nd step: Consensus Training

9 Sessions | 14 Panelists | 11 Aroma standards

Consensus Training

Reference Standards



Balsamic	Two drops of menthol and eucalyptus essence
Veggie	Asparagus (several drops of brine of canned asparagus)
Herbaceous	Fresh cut grass
Bergamot	One coffee spoon of earl grey tea
Floral	One drop of violet essence
Dried fruit	dried fruit mix (figs+ raisins+ prunes)
Spicy	Few grains black pepper
Berry fruit	Two Tablespoons of wild fruit preserves (cassis+ cherry+ strawberry)
Tree fruit	Tree fruit mix (peach+ apple)
Tropical fruit	One Teaspoon of Tropical fruit mix (passion fruit pulp + canned pineapple)
Citrus	One Teaspoon of a mixture of orange/lemon natural extracts&grapefruit juice
Nutty	One tablespoon of Nuts mix (pecan + walnuts + almonds)

http://www.winearomawheel.com/

Consensus Training

All the standards were presented in 2oz (59.2mL) soufflé containers with plastic lids

"Aroma Wheel"

Consensus Training

Profiling: Touriga Nacional

Consensus Training

3rd step: Wine Evaluation

Scoring

Structured 0-15 scale

- 12 Sessions
- 3 Wines/Session
- 14 Reproducible Panelists
- Rate 11 Aroma Attributes

ANOVA Results

Data treatment

wines were significantly different across all the 11 Aroma attributes generated by the trained panel.

All the attributes discriminate significantly among the wines using for error the Wine x Judge interactions.

Significant levels for ANOVA

Attributes	*Source Pr > F*
balsamic	< 0.001
veggie	< 0.001
herbaceous	0.0005
bergamot	0.0180
floral	0.0023
dried fruit	< 0.001
spicy	< 0.001
berry fruit	< 0.001
tree fruit	< 0.001
tropical fruit	< 0.001
citrus	0.0005
nutty	0.0407

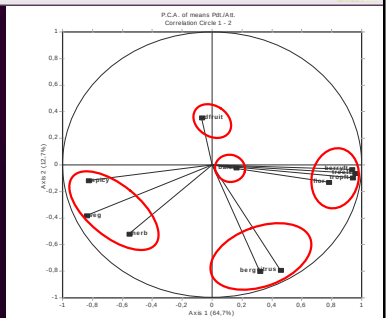
All statistical analyzes were performed using SAS (SAS Institutes, Cary, NC)

Attribute Results = 5 clusters

Data treatment

•The first 2 PCs accounted for **77,4%** of the variance

•**Table wines** from the Douro and Alentejo regions were higher scored in Bergamot, citrus and violet



PCA of mean sensory scores for terms differing significantly across wines was performed using the covariance matrix. For this analysis it was used the computerized data calculation system (FIZZ, Biosystemes, Couternon-France).

Results all Wines = Drivers of Typical

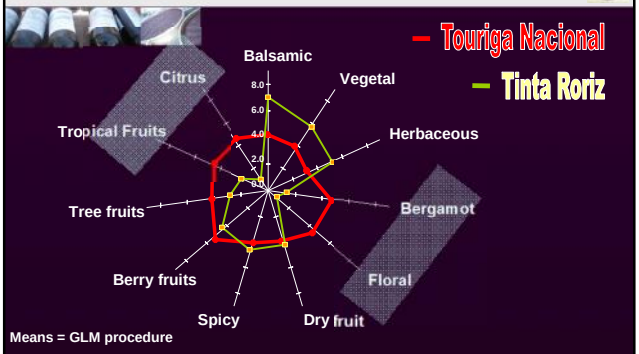
Data treatment

•The first 2 PCs accounted for **77,4%** of the variance

•**Table wines** from the Douro ; Alentejo and Dão…

NO DISCRIMINATION !!!

100% TN Fingerprint



Means = GLM procedure

… but …

Which Compounds Should be Quantified ?????

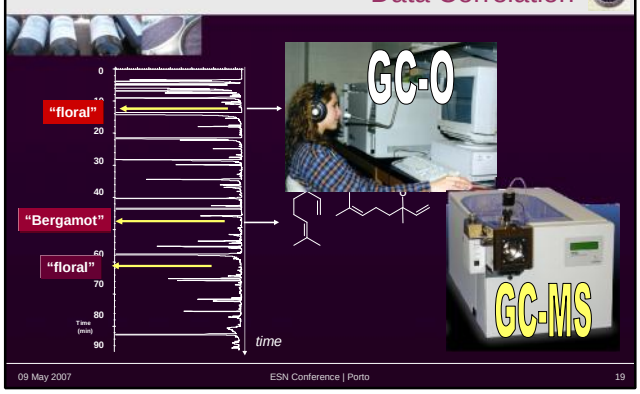
"Correlation Strategies"

Sensory Analysis

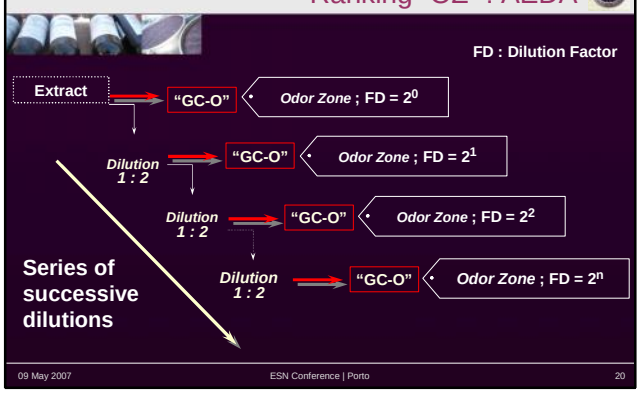
Instrumental Analysis

Hybrid techniques

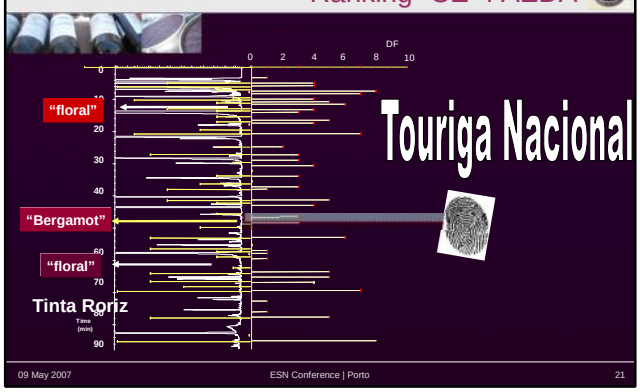
Data Correlation



Ranking "OZ" : AEDA

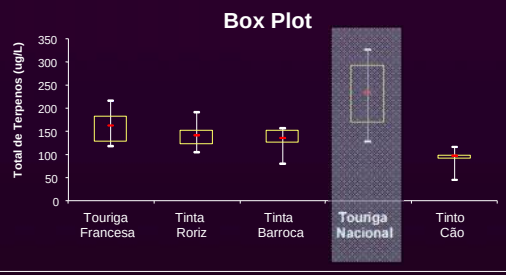


Ranking "OZ" : AEDA



Terpenols Quantification

Distribution of free terpenols compounds
(linalool, terpineol, geraniol, nerol and citronellol)

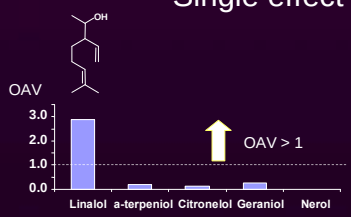


OAV : Touriga Nacional

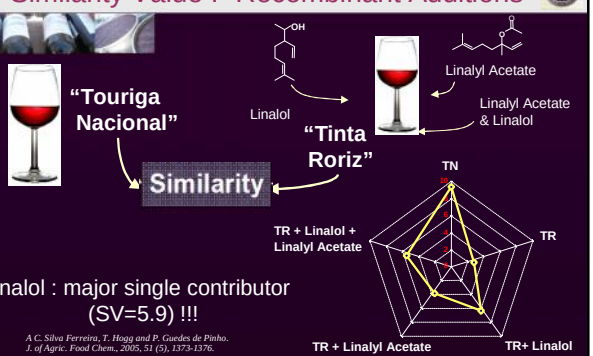
Terpenols Impact in Touriga Wine

$$OAV = \frac{\text{Concentration}}{\text{Aroma Threshold}}$$

Single effect

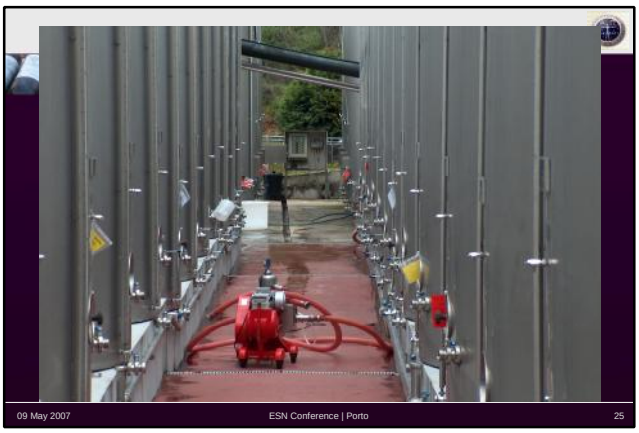


Similarity Value : “Recombinant Additions”



Linalol : major single contributor (SV=5.9) !!!

A C. Silva Ferreira, T. Hogg and P. Guedes de Pinho. J. of Agric. Food Chem., 2005, 51 (5), 1373-1376.



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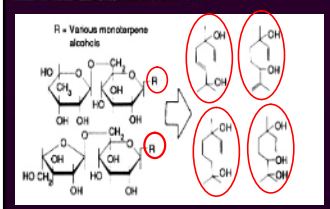
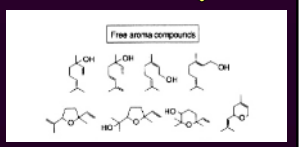
"Combined Fraction"



β-Glycosidase



"Grape Quality"

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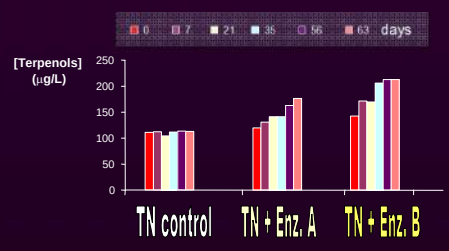
β-Glycosidase Enzyme Additions

Σ Terpenols *Vs*. Time



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Conclusion
Touriga Nacional
VINHOS VERDES
TRÁS-OS-MONTES
BEIRAS
ESTREMADURA
RIBATEJO
ALENTEJO
TERRAS DO SADO
ALGARVE
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