CHARACTERIZATION OF THE DOC WINE "COLLI PIACENTINI GUTTURNIO" OBTAINED IN THREE TRADITIONAL AREAS

Antonio Venturi[1], Lorena Castellari[2], Mario Ubigli[3], Antonella Bosso[3], Guaita Massimo[3], Albino Libè[4], Corrado Di Natale[5], Antonella Macagnano[5], Eugenio Martinelli[5], Alessandro Mantini[5], Arnaldo D'Amico[5]

[1] *C.R.P.V. - Filiera Vitivinicola, Via Tebano, 54 - 48018 Faenza (RA)*

[2] *C.A.T.E.V. S.r.l., Via Tebano, 45 - 48018 Faenza (RA)*

[3] *Istituto Sperimentale per l'Enologia, Via P. Micca, 35 - 14100 Asti*

[4] *Provincia di Piacenza, Dipartimento «Politiche di gestione del territorio e tutela dell'ambiente» - Monitoraggio delle risorse territoriali ed ambientali - loc. Gariga - 29027 Podenzano (PC)*

[5] *Università di Roma, Tor Vergata - Gruppo Sensori e Microsistemi Via di Tor Vergata n. 110 - 00133 Roma*

Introduction

The poster presents the results of the 3rd year of activity of the project "Characterization of the wine productions of the italian regions. The DOC wine Colli Piacentini Gutturnio". The project was activated by means of pubblic funds (Mi.P.A.F. and Emilia-Romagna Region funds) and thanks to the coordinating activity of the Experimental Institute for Viticulture of Conegliano (TV), the Experimental Institute for Oenology of Asti and the Centro Ricerche Produzioni Vegetali (CRPV) of Faenza (RA), that involved also other local and national Institutions to carry out the research.

The work concerned the "zoning" of the typical production area of the v.q.p.r.d. wine "Colli Piacentini Gutturnio", that results from the vinification of Barbera (55-70%) and Bonarda (30-40%) cultivars, grown in the hilly area of Piacenza (Emilia-Romagna region) and, particularly, in three river valleys: Val Tidone (zone A), Val Nure (zone B) and Val d'Arda (zone C).

The examination of the environmental characteristics (soil, climate) and of the vine-growing aspects led to the identification of ten homogeneous sub-zones (5 in A, 2 in B and 3 in C), from which samples of Gutturnio wine of the "vendemmia" 1998 have been taken. The aim was to define the sensorial characteristics of the same wine obtained in different zones with their own climate and kind of soil.

The wines were taken from different winery, so they included the variability due to the different environment in which the grapevines were grown, but also a certain variability due to non-uniform tecnologies in wine-making.

The wines were submitted to chemical, sensorial and instrumental (by "Electronic Nose") analisys.

The "Electronic nose" system is an instrumental apparatus able to produce, simulating the Mammalia sense of smell, electric signals that are quantified; then the data are submitted to multicomponent analysis. So the "Electronic Nose" can allow the recognition, distinguition and classification of wine odours.

Materials and methods

53 samples of Gutturnio Wine from "vendemmia" 1998 held in 25 liters tanks, have been taken from

different wine cellars near Piacenza with the help of technichians in collaborations with Consorzio DOC Colli Piacentini and Association ASSOVIPP. The wines have been sent to the Sperimental wine cellar of the C.A.T.E.V., where they have been refermented if there was a sugar residual >4g/L to make the different samples comparable for the tasting.

After they have been stabilized and bottled, only 30 of them have been chosen to be the most rappresentative for the different zone accordinog to the following table 1:

Zone A	Zone B	Zone C
A1 2	B1 4	C1 4
A2 5	B2 1	C2 0
A3 4		C3 2
A4 5		C4 1
A5 2		
Total 18	**Total 5**	**Total 7**

Tab. 1

For the sensorial analisys of wines, C.A.T.E.V. has organized a training course held in Piacenza for 15 export enologists and local wine producers to create a panel well informed about the aims and methodologies to be used in the experiment. So 3 tasting meetings were organized to evaluate the descriptors for the identification of the Gutturnio wines.

For the sensorial data the term list from Guignard (Guignard et al., 1986) have been utilized together with the results obtained in this experience.

On the same 30 samples used for the sensorial analysis have been done Chemical Analisys with the typical methods for wine products, at C.A.T.E.V. in Tebano.

Also an analisys for volatile compounds were performed using GC techniques at ISE in Asti according to Gianotti S., Di Stefano R. (1991).

Then all the samples were analyzed using the Electronic Nose "Libra Nose". These measurements have been done in dry atmosphere to avoid influence of enviromental umidity, with a constant flux of N_2 to avoid ossidation. From each bottle we took 20 ml that were put into a flask of 100 ml held in water at constant temperature of 20°C. Using 2 needles, the Electronic Nose took, with a constant flux of 0.2 l/min in recirculation, the head space generated inside the flasks. The measure time was 10 minutes to reach the equilibrium, then we have used a flux of N_2 to clean the sensors before the next measure.

At the end of the session we analyzed the data with multicomponent analisys techniques.

Results and Discussion

To distinguish the three sub clusters existing in the data set (Zone A, B, C), a new parameter $\sigma^* = \frac{\sigma}{\bar{p}}$ (where σ is the standard deviation and $\bar{p}$ is the mean value of each sensorial and chemical parameter) has been defined. This is related to the variability of the single parameter of the sensorial and chemical analysis inside the three classes.

The first step of data analysis has been the determination of the correlation between the response of the Electronic Nose sensors and respectively chemical and sensorial analysis, using a sub-set of the whole parameters characterized by high values of σ^*.

The results reported in figure 1 and figure 2 show the good correlation between the chosen paramters of the chemical and sensorial analysis and each PCA (Principal Component Analisys) components calculated on the responses of the Electronic Nose.

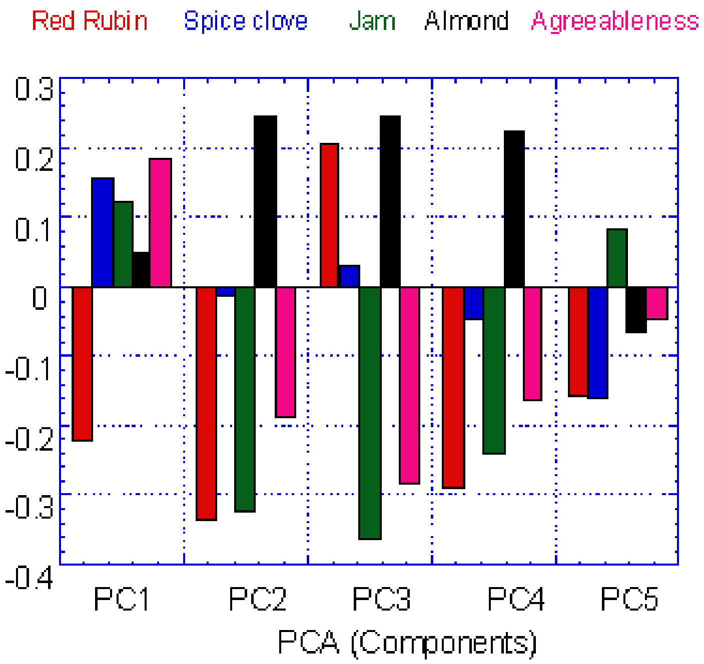


Fig. 1: Correlation between Electronic Nose Data and Sensorial Analisys Parameters

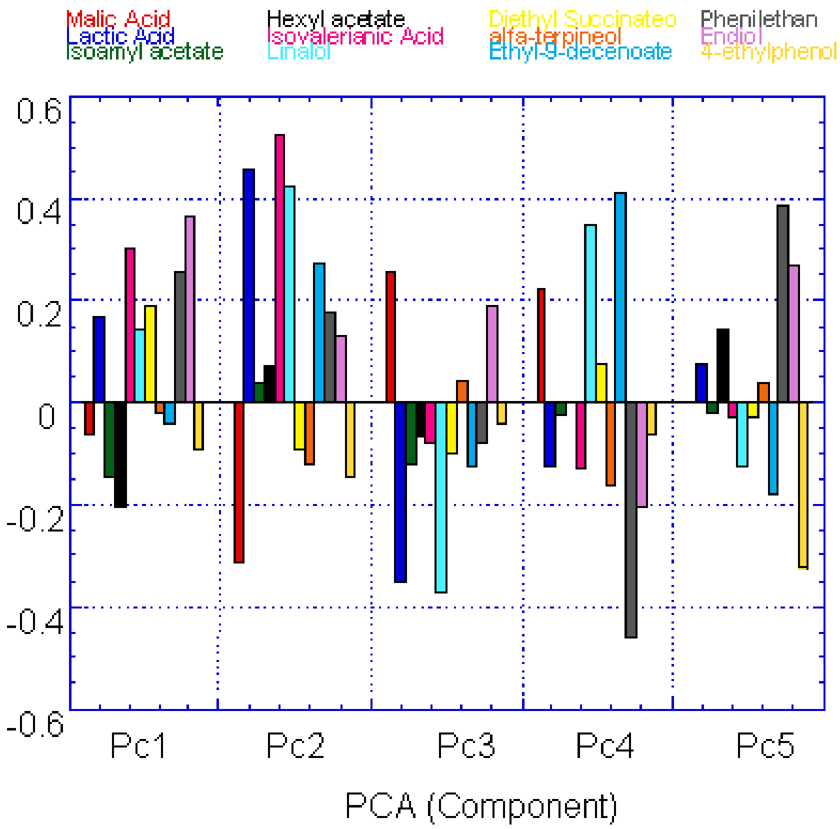


Fig. 2: Correlation between Electronic Nose Data and Chemical Analisys Parameters

Interesting results have been obtained from the analisys of sensorial parameters, whose σ^*'s values are presented in tab. 2. With a particular subset of the 5 most significative (higher σ^*) parameters (Ruby red, Spiced clove, Jam, Almond, Agreeableness), it is possible to distinguish one single cluster with respect to the others using the PCA.

Sensorial Features	σ*
Ruby red	*6,8155*
Purple tint	6,2216
Violet scent	5,9073
Spiced clove	*7,1747*
Raspberry	6,2494
Cherry	5,3968
Dried plum	6,1873
Jam	*7,3818*
Almond	*13,4065*
Herbs	6,0093
Sourness	6,3365
Astringency	5,3614
Structure	6,2891
Persistence	4,4158
Agreeableness	*6,8467*

Tab. 2

The results obtained with these different subsets of sensorial parameters are shown in figure 3 and in figure 4. In figure 3 zone A (labeled "1") is well separated from zones B and C. In figure 4 zone B (labeled "2") is separated from the other two. As far as zone C is concerned, with sensorial parameters it is not possible to distinguish it from the others. This is one of the reasons for using the Electronic Nose to identify the 3 zones. From these initial considerations on the sensorial analysis a modular neural network has been trained to classify the wine in relation to different areas. The scheme of the neural network and the summary of the results obtained with this architecture are shown in figure 5.

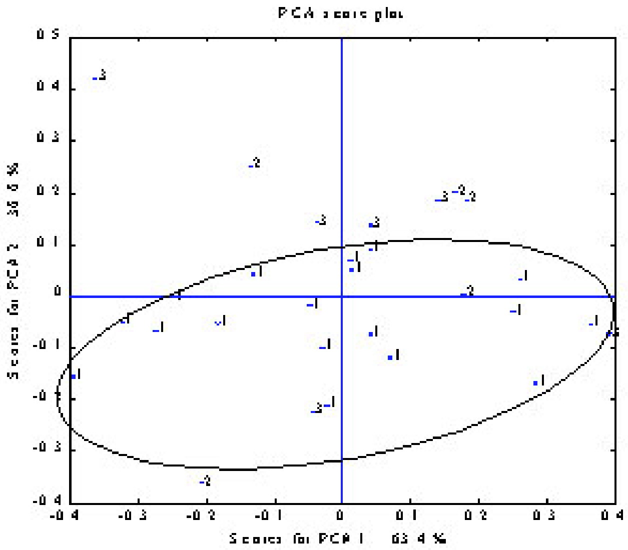


Fig. 3: Identification of zone A with Sensorial Parameters

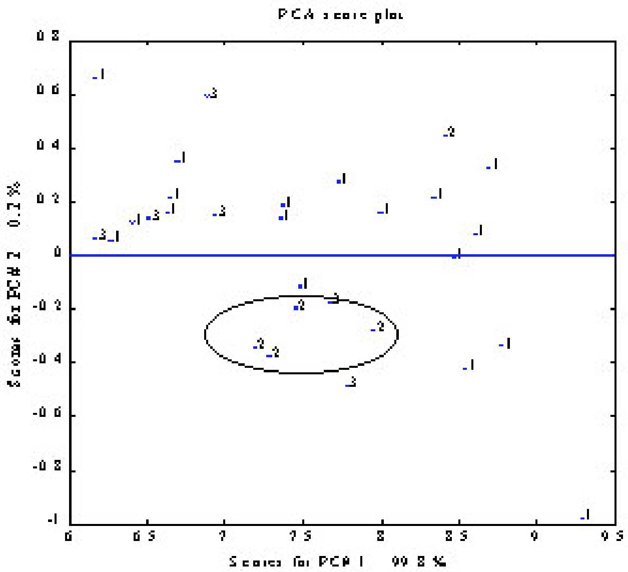
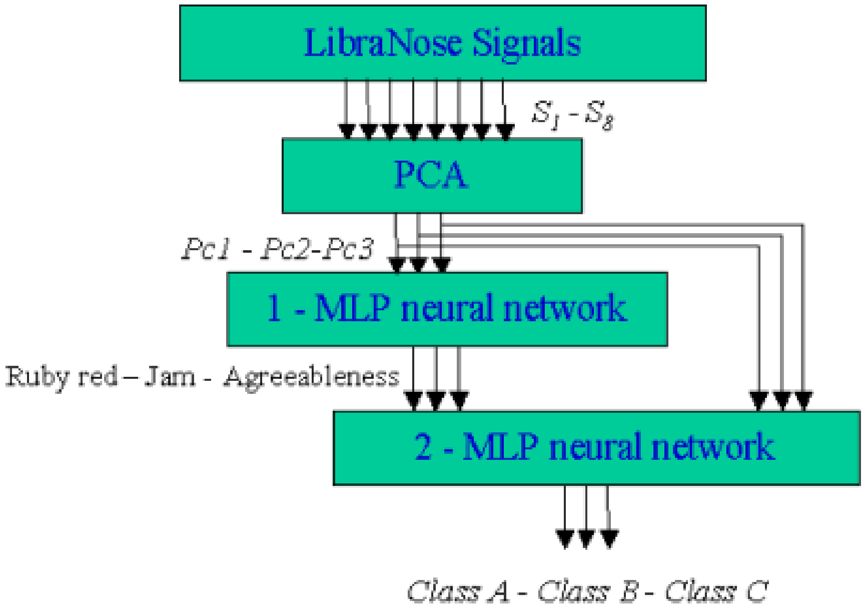


Fig. 4: Identification of zone B with Sensorial Parameters



Classification Rate

A	80% correct recognition
B	90% correct recognition
C	70% correct recognition

Fig. 5: Modular Neural Network and Classification Rates

The inputs of the modular neural network are the 3 Principal Components obtained from the Electronic Nose data. Inside the structure there is a neural network (trained with the true sensorial parameters) that estimates the most significative parameters of the sensorial analisys. The outputs of the network are the identifications of the input wine in one of the 3 classes. As it is possible to see in the worst case the capability of recognition is 70% of the samples.

Conclusions

This research has shown the capability of the electronic nose to distinguish wines from different vineyards of same geographical area.

In the next future the electronic nose will eventually support the standard analysis (sensorial and the chemical) currently used to classify wines.

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