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RELATIONSHIPS AMONG GRAPE CULTIVARS "NERETTI" ("THE BLACK ONES"), AUTOCHTHONOUS OF WESTERN ALPS, BASED ON THEIR PHENOLIC PROFILES

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In spite of the economy general globalisation, wine market seems to look with an increasing favour to minor and local native grape varieties, due to the appeal of their unique personality and to their historical and ecological link to specific viticultural areas. Exploring the oenological potential and the value of these ancient cultivars, scarcely known or underestimated nowadays, is the first step towards their economic exploitation.

The aim of this work was to study the phenolic composition of ancient grape varieties diffused in North-West Italy, at the foot of the Alps, and to evaluate the existing relations among these varieties by examining their phenolic profile, which often used for a taxonomical approach.

The group of grape varieties belonging to "Neretti" (the name means "the black ones") was chosen for the study, being traditional grapes of minor importance nowadays (sometimes almost disappearing), but reputed very rich in colour and structure. Among this group we studied:

- a) probably synonym varieties;
- b) a same variety grown in different geographical areas;
- c) homonymous, but distinct, grapes.

The study was carried out on 14 varieties; some of them were grown in a collection vineyard located in Grinzane (CN, Northwest Italy), others came from commercial vineyards located in Canavese, an area in Northern Turin province from where most of the investigated cultivars originally came (*table 1*). Three replicates of 10 berries each were analysed for every cultivar.

The berry samples were collected at harvest and the degree of maturity was determined by solid soluble content (°Brix) evaluation (*table 1*). The phenols were extracted from the skins by mean of hydro-alcoholic buffer at pH 3.2, followed by homogenisation. The analysis were carried out by spectrophotometry (total anthocyanins) and by HPLC, regarding anthocyanin profile and hydroxycinnamoyl tartaric acids (HCTA) (Di Stefano and Cravero, 1991).

The obtained phenolic profiles (anthocyanin percentage and quantitative amount of caffeoyl tartaric and *p*-coumaroyl tartaric acids) were analysed by Principal Component Analysis (PCA).

Table I: Cultivar list, observation site, geographical origin, harvest date, juice soluble solid content (°Brix) and skin anthocyanin amounts at harvest (\pm standard error)

Cultivar	Observation site	Geographical origin	Figure labels	Harvest date	°Brix	Anthocyanins (mg/100g of fresh berries)
Nebbiolo di Dronero	Grinzane	Dronero (TO)	ND	12 Oct	19.8	120 \pm 13
Neiret	Grinzane	Pinerolo (TO)	NEI	12 Oct.	20.6	125 \pm 4
Neretto duro	Piverone	Piverone (TO)	NDU	30 Sept.	18.6	171 \pm 2
Dolcetto di Boca	Grinzane	Boca (NO)	DB	22 Sept.	18.2	162 \pm 5
Neretto gentile	Piverone	Piverone (TO)	NG	30 Sept.	16.8	109 \pm 6
Neretto	Grinzane	Gattinara (VC)	NGA	23 Sept.	21.2	116 \pm 8
Vernassa	Carema	Carema (TO)	VE	10 Oct.	18.6	89 \pm 1
Uva di Biella	Grinzane	Lessona (BI)	UB	17 Sept.	24.2	151 \pm 5
Neretto di San Giorgio	Cuorgnè	Cuorgnè (TO)	NB	30 Sept.	16.0	139 \pm 11
Neretto di San Giorgio	Grinzane	San Giorgio (TO)	NSG	23 Sept.	19.0	129 \pm 12
Neretta cuneese	Grinzane	Costigl. Saluzzo (TO)	NC	23 Sept.	18.8	168 \pm 11
Neretto	Grinzane	Arnaz (AO)	NA	17 Sept.	20.0	132 \pm 3
Neretto nostrano	Grinzane	Scarmagno (TO)	NN	23 Sept.	20.2	175 \pm 2
Neretto	Grinzane	Salto (TO)	NS	23 Sept.	20.2	146 \pm 10

RESULTS

Almost all the studied varieties showed relevant quantities of anthocyanins, ranging from the 89 mg/100 g of fresh berries detected in Vernassa, to the 175 mg/100 g of fresh berries in Neretto nostrano; average values were about 130 mg/100 g (table I). These high quantities greatly justify the name "Neretto", considering that Barbera, ranging with the anthocyanin richest varieties in Piedmont, has an anthocyanin amount of about

120 mg/100 g and that Nebbiolo, known for its moderated colour level, has an anthocyanin amount of about 80 mg/100 g.

“Neretti” variety’s anthocyanin profile is characterised by the predominance of malvidin-3-glucoside (percentage ranging from 24 to 48%), except for Neretto di San Giorgio.

Among the studied varieties some synonymies were identified by morphological descriptions: Neretto duro/Dolcetto di Boca, Neretto (form Gattinara)/Neretto gentile, Uva di Biella/Vernassa and, as far as Nebbiolo di Dronero/Neiret are concerned, their genetic identity was demonstrated (Schneider *et al.* 2001).

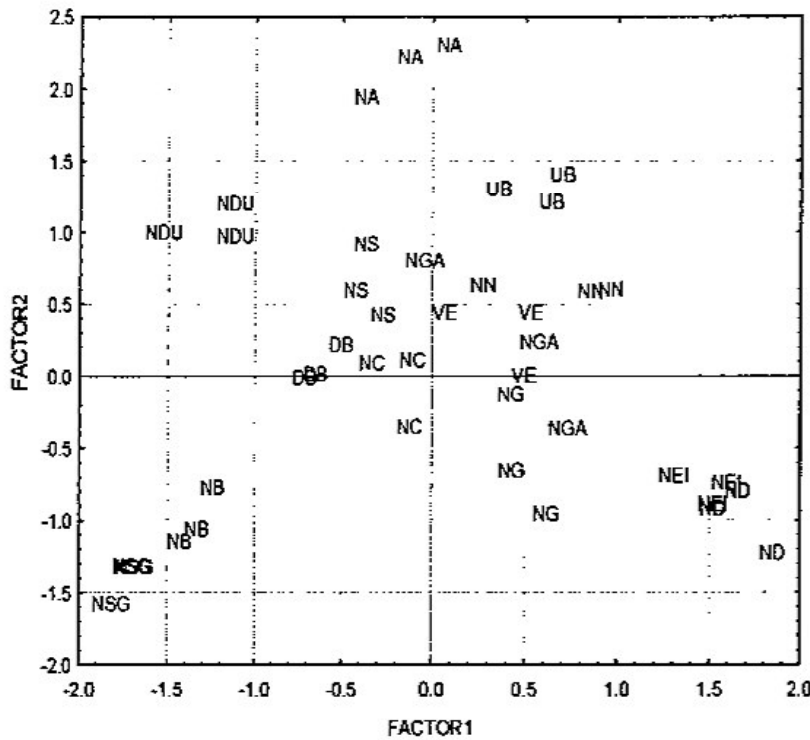


Figure 1: PCA of the anthocyanin (%) and of the hydroxycinnamoyl tartaric acid contents (mg/kg fresh berries) of the examined “Neretti” grapes (refer to table 1 for labels)

The cultivars are plotted by the first two principal components. Factor 1 and 2 explained respectively the 43 and the 25 % of the global variance; factor 1, 2 and 3 explained a cumulative variance of the 84 %. Malvidine-3-glucoside, cyanidin-3-glucoside, peonidin-3-glucoside and total *p*-coumarated anthocyanins were associated to the factor 1; caffeoyl tartaric acid and delphinidin-3-glucoside to the factor 2; total acetated anthocyanins and *p*-coumaroyl tartaric acids to the factor 3.

Looking at the PCA results, these synonyms were basically confirmed (figure 1), except for Neretto duro (NDU) and Dolcetto di Boca (DB). Nebbiolo di Dronero (ND) and Neiret (NEI), two varieties original of different geographical areas, are effectively synonyms: grown in the same environmental conditions they showed a very similar phenolic composition. Neretto di San Giorgio (NSG and NB) showed the same peculiar phenolic profile, when grown in two different areas; in this variety *p*-coumaroyltartaric acid, among HCTA, and peonidin-3-glucoside, among anthocyanin compounds, were highly prevalent.

The supposed synonymous Neretto duro (ND) and Dolcetto di Boca (DB) — collected in two different areas — showed rather different anthocyanin and HCTA profiles, possibly indicating some genetic distinction.

The other two couples of supposed synonymous, Neretto gentile (NG) and Neretto (from Gattinara) (NGA) on one hand, and Vernassa (VE) and Uva di Biella (UB) on the other, were separated by factor 2: berries of these varieties were collected in two different sites and the small detected differences may only be due to the different cultivation conditions. It has been reported that vineyard management can influence the anthocyanin profile, especially regarding the di-substituted anthocyanins (cyanidin-3-glucoside and peonidin-3-glucoside) while malvidin-3-glucoside is much less affected (Guidoni *et al.*, 2001).

The homonymous varieties Neretta cuneese (NC) and Neretto (from Salto) (NS) showed a very similar anthocyanin profile, but a different HCTA content, significantly higher in Neretto. The other homonymous Neretto nostrano (NN) differed overall for a reduced percentage of di-substituted anthocyanins and for a different HCTA ratio. Neretto (from Arnaz) (NA) showed a unique profile, thanks to its very high percentage of delphinidin-3-glucoside.

In conclusion, most of the varieties supposed synonymous showed similar phenolic profiles, even when grown in different areas (i.e. Neiret = Nebbiolo di Dronero); in one case, however, phenolic contents revealed possible genetic distinctiveness (i.e. Dolcetto di Boca and Neretto duro). Within the same variety, two clones of different geographical origin grown in the same vineyard had the same profile (i.e. Neretto di San Giorgio). Most of the "Neretti", however are distinct and homonym varieties. Finally a unique and peculiar phenolic profile was found in Neretto (from Arnaz), compared to other cultivars of regional or international importance.

In general, the name of "Neretti" was appropriated in most cases, regarding the considerable amount of anthocyanins. Due to the high colour potential, often jointed to the flavonoid high concentration, and to the peculiar quality of pigment profile, several "Neretti" can be considered valuable for blending or for developing their potential in single variety wine.

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