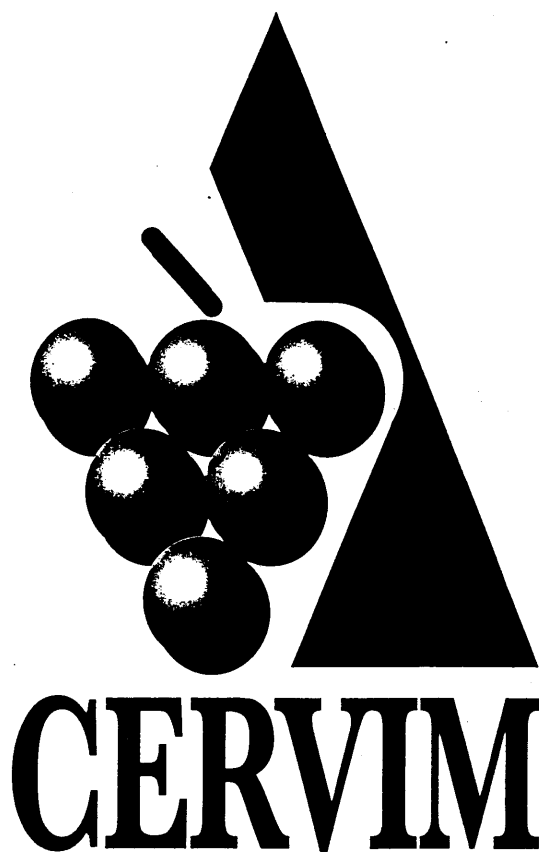
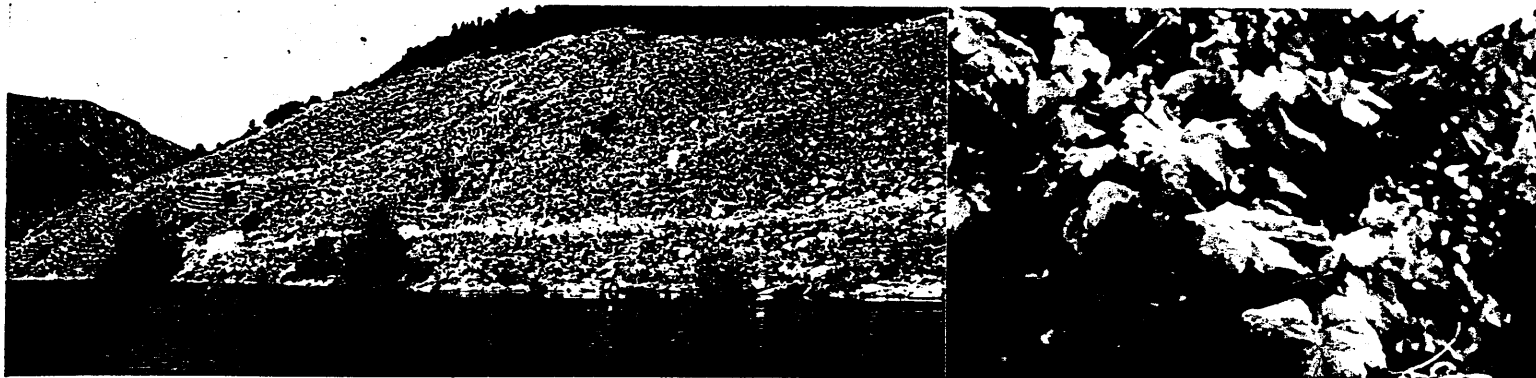




**SEGUNDO CONGRESO INTERNACIONAL
SOBRE VITICULTURA DE MONTAÑA Y EN FUERTE PENDIENTE**

**DEUXIÈME CONGRÈS INTERNATIONAL
SUR LA VITICULTURE DE MONTAGNE ET EN FORTE PENTE**

**SECOND INTERNATIONAL CONGRESS
ON MOUNTAIN AND STEEP SLOPE VITICULTURE**

MONFORTE DE LEMOS, RIBEIRA SACRA (GALICIA) 13-15/03/2008

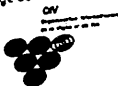
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**An interesting option emerging from the ancient varietal assortment of the
alpine Susa Valley: agronomical features and wine quality of the white
grape Baratuciàt**

**Une alternative intéressante émergeant de l'encépagement traditionnel de
la vallée alpine de Suse: aptitudes agronomiques et œnologiques du
cultivar à baies blanches 'Baratuciat'**

**Una alternativa interesante que surge del conjunto tradicional de vides del
valle alpino Susa: características agrónomas y enológicas de la uva
blanca Baratuciàt**

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Abstract

One of the key factors of the economical development of viticulture and wine industry in mountain areas is the exploitation of the ancient, local grape varieties. The local germplasm proves a superior adaptability to the severe mountain environment and could offer unique, typical wines of high quality and good market value.

This is the case of the white grape Baratuciàt, probably native of the lower part of Susa Valley, in Piedmont (North western Italy), where it was discovered several years ago.

The study of Baratuciàt's agronomical and enological features started in the frame of the project EAGLE Wines (Sustainable Enhancement of Autochthonous Wine Grapes in Mountain Areas) and it was carried out for six consecutive grape harvests.

Traditionally used for table consumption and storage during winter, this grape showed an attractive personality when turned into wine. This alpine wine is generally characterized from interesting content of ethanol (12% vol.), dry extract (23 g/L) and total acidity (8.4 g/L as tartaric acid) with medium amount of malic acid of 2.6 g/L.

Sensory profile obtained by tasting panel and a specific quantitative descriptive card, showed vegetal and flower odours, with a peculiar eucalyptus scent.

Résumé

L'un des atouts pour le futur économique de la viticulture et l'œnologie montagnarde est l'exploitation de ses anciens cépages autochtones. Le patrimoine génétique local possède une adaptation à l'environnement très dur de la montagne normalement supérieure aux cépages originaires d'autres milieux et peut être à l'origine de vins très typés, de grande qualité et avec de bonnes possibilités commerciales.

C'est le cas d'un cépage à baie blanche, le 'Baratuciat', probablement originaire de la partie inférieure de la vallée de Susa, en Piémont (Italie du Nord Ouest), où il a été récupéré depuis quelques années.

L'étude des caractéristiques agronomiques et œnologiques du 'Baratuciat' a débuté grâce au programme EAGLE Wines (valorisation durable de cépages autochtones à raisin de cuve) et a permis de suivre six vendanges consécutives.

Traditionnellement destiné à la table et à la conservation au cours de l'hiver, son raisin a démontré de bonnes aptitudes œnologiques qui permettent d'obtenir un vin avec une personnalité séduisante. Ce vin alpin est caractérisé par une bonne teneur en alcool (12 % vol.), un extrait sec de 23 g par litre, une acidité totale de 8.4 g/L (exprimé en acide tartrique) et une teneur moyenne en acide malique de 2.6 g/L. Le profil sensoriel indique des notes végétales et florales avec une senteur très particulière d'eucalyptus.

Resumen

Un factor clave del desarrollo económico de la viticultura y la enología de montaña es la explotación de las antiguas cepas autóctonas. Su patrimonio genético posee una mejor adaptación al duro entorno de la montaña que otras cepas que provienen de entornos diferentes, por lo que puede ofrecer vinos muy típicos y únicos, de muy buena calidad y con un buen valor de mercado.

Este es el caso de la uva blanca "Baratuciàt", que probablemente tenga su origen en la parte inferior del valle de Susa, en el Piemonte (noroeste de Italia), donde fue descubierta hace unos años.

El estudio de las características agronómicas y enológicas del Baratuciàt tuvo su origen en el marco del proyecto EAGLE Wines y se ha puesto en práctica durante seis vendimias consecutivas.

Esta cepa, que tradicionalmente se destinaba al consumo de mesa y a la conservación durante el invierno, presenta unas buenas características enológicas, que permiten elaborar un vino atractivo. Dicho vino alpino se caracteriza por lo general debido a su alto contenido en alcohol (12 % vol.), un extracto seco de 23 g/l., una acidez total de 8,4 g/l. (expresado en ácido tartárico) y una cantidad media de ácido málico que abarca 2,6 g/l.

El perfil sensorial obtenido por un jurado de cata indica olores herbáceos y florales con una aroma muy peculiar a eucalipto.

Key Words : Baratuciàt, Genetic analysis, wines, sensori analysis

1 Introduction

Viticulture must be able to furnish always new and original products. Interest in autochthonous or rare cultivars and the unique wines they can produce, has increased in recent years, with many heirloom varieties being rescued from potential extinction.

In order to recover and safeguard the old alpine grape germplasm and to promote the sustainable use of local biodiversity, many Research Project on assessing the enological value of these old grapevine varieties has been performed in Western Alps.

Autochthonous grape varieties, as well as those grown here for long times, are usually well adapted to the severe alpine environment, more than others recently introduced (Gerbi *et al.*, 2005). The assessment of the enological potentialities and the value of these scarcely known or underestimated cultivars, is the first step towards their economic exploitation (Zeppa *et al.*, 2001; Rolle *et al.*, 2004; Rolle *et al.*, 2006).

Susa Valley, located in the Western side of Piedmont (Turin province) is among the most attractive European mountain viticultural areas. The Valley connects the Italian side of the Alps, where the densely populated city of Turin is placed, with the French side (Chambery and Lion) through the town of Susa, located in the middle of the valley. The river Dora Riparia flows along the valley.

The development of viticulture in the Valle della Dora Riparia goes back as much as Roman times or even before (Fazio, 1996) and is historically well documented since 1000 A.C., during the expanding influence of Novalesa Abbey (Di Maio, 1997). Grape growing area is developed in Susa Valley between 350 and 800 m a.s.l., in the middle part of the slopes facing South, at the best gradient suitable to capture sun hit. The range of temperature between nights and days is usually high during grape ripening period, enhancing fruit quality. The rather severe environment conditions affected the selection of grape varieties being traditionally planted, allowing the preservation of a great wealth of biodiversity in the area. These grapes, almost exclusively grown in mountain areas, often of both side of Western Alps (Savoie, Valais and higher Piedmont) (Schneider *et al.*, 2001) are unknown elsewhere (Schneider, 2004). Neiret (known in France as Cathus), Becuét (the French Persan or Persagne), the white Bian ver (increasingly planted in Valais and alpine France as Verdesse) are examples of minor alpine wine grape assortment. Such varieties, together with other found in the old vineyards of the Susa valley, like Grò blanc and Baratuciàt,

where preserved and described (Schneider, 1997), but still unevaluated for their agronomical features and the enological potential.

The aim of this work was to study the oenological aptitude and appraise the quality of the wine obtainable from Baratucià grape. This grape, found in a limited area in the lower part of the Susa Valley and the surrounding plane, was until the beginning of this study indeed endangered to disappear. An historical research through local ampelographic documents drew the traces of its presence at the end of XIX century as "Berlon 'd ciat white" (Comm. Amp. Prov. Torino, 1877) in the same places where it has been now recovered. The grapes were traditionally used for table consumption and storage.

2 Materials and Methods

2.1 Grape

The study was carried out in six vintage (2000–2005). Two sites in Susa Valley (Turin province) were chosen as test fields: an experimental vineyard located in the upper valley near Chiomonte (loc. Signò) and a small vineyard in the lower part of the valley, near Almese, where Baratucià is grown. In the experimental vineyard in Chiomonte the soil is shallow, gravely, sandy, moderately calcareous, the slope about 20%, the exposition south and the altitude 750 m a.s.l. In the vineyard located in Almese, the soil is sandy-slimy, moderately calcareous, the slope 20%, the exposition south and the altitude 450 m a.s.l.

2.2 Agronomical and ampelographic characteristic

Ampelographic descriptions was carried out in according to primary and secondary descriptors priority list requested within the European Vitis Database (GENRES 081 project: <http://www.genres.de/vitis/vitis.htm>) in order to possibly include newly described neglected accessions in the Vitis Database through the ECP/GR Vitis Working Group recently established (http://www.ipgri.cgiar.org/networks/ecpgr/contacts/ecpgr_wgvit.asp).

Such ampelographic documentation is essential for variety identification and is required for including a grape varieties into National Grape Varieties Catalogues. Survey on phenological phases (bud burst, flowering, veraison and grape ripening), agronomical traits (fertility, vine vigour assessed by winter pruning weight, yield, tolerance or susceptibility to pests and diseases) and grape technological characteristics (bunch and berry weight and features, juice chemical composition) of grapevine was carried out.

2.3 Genetic analysis

Young leaves (0.2g) were reduced to a fine powder in liquid nitrogen and DNA was extracted following the procedure described by Thomas et al. (1993), with some modifications. Samples were then analyzed at 6 SSR loci: VVS2 (Thomas and Scott, 1993), VVMD5, VVMD7, VVMD27, (Bowers et al., 1996; Bowers et al., 1999), VrZAG62, and VrZAG79 (Sefc et al., 1999). Samples were analyzed by an ABI-PRISM 377 DNA sequencer, using GENESCAN software and alleles were defined by their size, determined in base pairs by comparison with the size standard (GeneScan-500 LIZ).

2.4 Winemaking

The winemaking was done in stainless steel tanks. Grape (100 kg) were crushed, destemmed and pressed. The must, added with SO₂ (40 mgL⁻¹), was clarified in a cold storeroom (5 °C), by means of enzymes (3 g/hL Rapidase CB) for 24 hours. The limpid must was inoculated with a starter culture of *S. cerevisiae* (D47 Lalvin; 25 g/hL) and fermented at controlled temperature (17 °C). Wine was stored at 4 °C for tartrate stabilization. Potassium bisulphite (4-8 g/hL) was added and the wine was maintained at low temperatures until the wine sensory and chemical analysis.

2.5 Chemical Analysis

Wine chemical profile was studied at bottling. Ethanol (% vol), pH, total acidity (g/L tartaric acid), dry extract (g/L), ashes (g/L), alkalinity of ashes (meq/L), potassium were determined in according to EEC methods, 1990. Grape, must and wine sugars, organics acids and glycerol were analysed by HPLC (Schneider *et al.*, 1987). Phenolic compound indexes were determined as described by Di Stefano *et al.* (1989): total phenols and flavanols reactive to vanillin were expressed as (+)-catechin (mg/L), while proanthocyanidins were expressed as cyanidin chloride (mg/L). Colour was determined in according to CIE L*a*b* parameters (OIV, 1990; Piracci, 1994).

2.6 Sensory Analysis

Sensory evaluation of wines was performed by tasting *panel* of DI.Va.P.R.A. - Food Technology Sector, trained and selected (ISO 3972, ISO 5496, ISO 8586-1, ISO 8586-2).

The Quantitative Descriptive Analysis (QDA) was performed in according to ISO 6564. The descriptors were identified using the Noble's wheel (Noble *et al.*, 1987). Only sensory descriptors of third level more exact and well defined, were used. A Quantitative Descriptive Card with these descriptors was then defined. For each descriptor a partially structured scale was used to allow a sensory quantification with continuous values.

3 Result and Discussion

3.1 Agronomical and ampelographic characteristic

Baratuciàt can be considered on average an early grape variety, in all the phenological stages. Its early bud break, however, let him open to the risk of late frosts (Table 1 and 2). The better exposed sites, possibly unaffected by the inversion (so frequent in the alpine environments) are recommended. Baratuciàt grapes ripe between middle and late September.

Table 1 - Agronomical features of Baratuciàt in the site of Almese (Susa Valley) (Vintage 2003-2004).
Tableau 1 - Caractéristiques agronomiques du Baratuciàt à Almese (Val de Suse) (Vendage 2003-2004)

Fertility (clusters/vine)	0.86
Pruning weight (g/vine)	695
N° of bunches/vine	12.7
Yield (kg/vine)	1825
Ravaz index (yield/pruning weight)	4.30
Bunch weight (g)	145

This white variety shows an high vigour and an average yield. Cane pruning is required because of the scarce fertility of the basal buds. Besides of that, vines are quite tolerant to different cultural systems and diverse environments, as well as towards the major fungus diseases. In cold springs they could be affected by poor fruit set, although yield is constantly sufficient.

Sometimes vine vigour could be to much and, especially in the young plantings, could cause delaying in the start of yielding stage.

Table 2 - Ampelografic notations recorded on the Baratuciàt autochthonous grape in the 2003 and 2004 vintage.
Tableau 2 - Registration des notes ampélographiques du cepage baratuciàt dans les années 2003 at 2004.

OIV N.	Descriptors	2003	2004
001	Young shoot: shape of the tip	5	5
004	Young shoot: density of prostrate hair of the tip	7	7
007	Shoot: colour of dorsal side of internodes	1	1
016	Tendrils: distribution on the shoot	1	1
051	Young leaf: colour of the upper side (4th leaf)	1	1
053	Young leaf: density of prostrate hair between main	5	5

	veins on the lower side (4th leaf)		
065	Mature leaf: size of blade	5	5
067	Mature leaf: shape of blade	2/3	3
068	Mature leaf: number of lobes	2	2/3
070	Mature leaf: anthocyanin coloration of the main veins on the upper side of the blade	1	2
076	Mature leaf: shape of teeth	2/4	2
078	Mature leaf: length of teeth compared with their width	5	5
079	Mature leaf: degree of petiole sinus opening	2	2/3
081-2	Mature leaf: naked petiole sinus	1	1
084	Mature leaf: density of prostrate hair between the main veins on the lower side	5	5
087	Mature leaf: density of erect hair on the main veins (lower side)	3	3
151	Flower: sexual organs	3	3
204	Bunch: density	6	7
208	Bunch: shape	1	1
223	Berry: shape	3	3
225	Berry: colour of skin	1	1
230	Berry: colour of flesh	1	1
236	Berry: particularity of flavour	5	5
241	Beery: formation of seeds	3	3

3.2 Genetic analysis

The genetic profile obtained for the cultivar Baratuciàt was compared with the SSR profile of over four hundred cultivars mainly from Piedmont and North-Western Italy, included in a genetic database developed by the CNR-Plant Virology Institute-Unit of Grugliasco (unpublished data). The results didn't show any genetic correspondence with other Italian cultivars. The profile was then courtesy compared with the SSR profiles of several hundred genotypes of French cultivars contained in a molecular database developed by INRA (Montpellier, UMR Diversité et Génome des Plantes Cultivées) The results, again, didn't show any genetic correspondence with French cultivars. The cultivar Baratuciàt therefore show a unique genetic profile (Table 3).

Table 3 – Genetic profile at 6 SSR loci of the cv Baratuciàt (alleles size in bp).
Tableau 3 – Profil génétique avec 6 loci SSR de la variété Baratuciàt (alleles exprimé en bp).

Cultivar	Locus											
	VVS2		VVMD5		VVMD7		VVMD27		VrZAG62		VrZAG79	
	Alleles		Alleles		Alleles		Alleles		Alleles		Alleles	
Baratuciàt	139	152	225	227	233	253	178	188	196	200	246	258

3.3 Chemical Analysis

Table 3 shows the analytical parameters of the Baratuciàt wines. The alcoholic content is normal, but obtained without a sugar correction. The acidity is high and typical of mountain wines (Rolle *et al.*, 2007). In particular, high content of malic acid (> 2g/L) were characteristic for this wines. Good values of dry matter were generally present.

Table 3 - Physicochemical characteristics of Baratuciàt wines.
Tableau 3 – Caractéristiques physicochimiques du vine Baratuciàt.

	2000	2001	2002	2003	2004	2005
Alcohol (% vol.)	12,0	11,4	11,5	13,3	12,4	12,0
Total Dry Matter (g/L)	21,9	23,6	22,3	24,0	22,6	22,5
Ashes (g/L)	1,38	1,68	1,76	1,98	1,15	1,42
Alkalinity of ashes (meq/L)	10,5	14,0	12,0	11,0	12,0	12,0
Potassium (mg/L)	418	598	739	650	698	432
Total Acidity (g/L as tartaric acid)	8,3	10,0	9,9	7,7	8,1	6,3
pH	3,18	3,20	3,12	3,09	3,08	3,21
Citric Acid (g/L)	0,16	0,30	0,36	0,28	0,38	0,53
Tartaric Acid (g/L)	3,85	3,36	2,01	4,56	3,41	2,87
Malic Acid (g/L)	2,70	2,58	4,11	1,52	2,54	2,02
Lactic Acid (g/L)	0,20	0,24	0,23	0,23	0,25	0,39
Glicerol (g/L)	8,2	7,9	7,4	9,9	9,4	nd
Total polyphenols (mg/L as (+)-catechin)	117	108	152	150	88	218
Flavanols Vanillin Assay (mg/L as (+)-catechin)	16	13	11	nd	nd	24
Proanthocyanidins (mg/L as cyanidin chloride)	21	18	24	nd	16	21
Y%	93,89	96,42	91,00	92,07	42,30	nd
P%	6,40	5,80	6,59	6,68	6,69	nd
D nm	573,40	574,34	572,61	573,30	567,10	nd
L*	97,59	98,60	96,41	96,85	71,07	91,45
a*	-1,84	-1,33	-2,20	-1,76	-3,60	-1,90
b*	7,04	6,38	7,24	7,27	6,04	9,42
h*	-1,31	-1,37	-1,28	-1,33	-1,03	-1,37
C*	7,28	6,51	7,56	7,48	7,03	9,61

3.4 Sensory Analysis

Figure 1 shows Quantitative Descriptive Card with descriptors used for sensory profile characterisation. Baratuciàt wines are very aromatic with vegetal and flower odours. The presence of eucalyptus aroma was a peculiar characteristic of this enological product (Figure 2). The high intensity of structure and acidity are also typical for this wine.

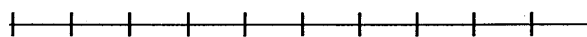
Sensory card of Baratuciat

Taster :

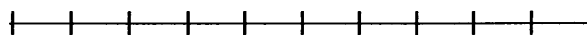
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Sample:

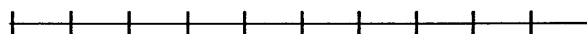
Eucalyptus



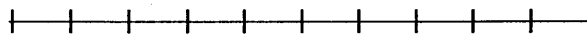
Cut green



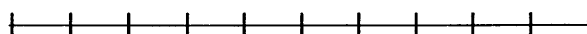
Hay



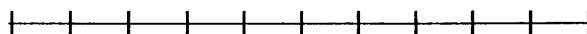
Pineapple



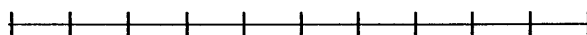
Apple



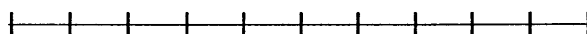
Rose



Acidity



Bitter



Structure

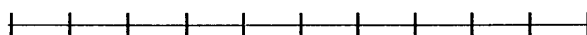


Figure 1 – Descriptive-quantitative card used for sensory characterisation of Baratuciat wines
Figure 1 – Fiche d'analyse sensorielle pour la caractérisation descriptive – quantitative du vin Baratuciat.

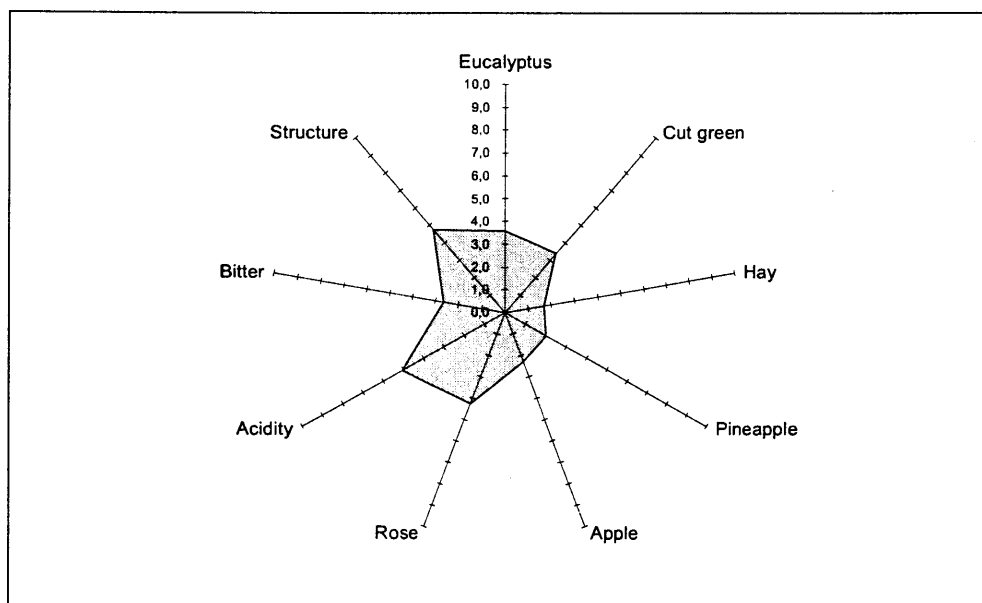


Figure 2 – Sensory profile of Baratuciat wines (average of 6 years).
Figure 2 – Profil sensorial du vine Baratuciat (moyenne de 6 ans)

4 Conclusion

Baratuciàt grapevine variety is well adapted to the mountain environment of production. The wines obtained were very interesting for the presence of singular sensory profile with of eucalyptus aroma. The high intensity of structure and acidity are also typical for this wine.

Recovery and safeguarding this rare and old cultivar is a main point of departure to promote the sustainable use of local biodiversity.

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