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   **Abstract**: After in vitro culture, 1-year-old Albarino vines showed juvenile characters in the basal area, between juvenile and adult characters in the intermediate and adult characters in the apical area of the shoot. From 5 selected canes of these plants (mother plants) single bud cuttings were grown. In the 1st year the leaves of all single bud cutting plants had very deep sinuses (juvenile character). In the 4th year, after severe pruning, single bud cutting plants from the basal area of the mother plant showed very juvenile and from the apical area adult characters.


   **Abstract**: For in vitro vines and seedlings following ampelographic characteristics could be stated: medium to strong coloration of the shoot tip and of young and adult leaves; medium to dense erect hairs on the shoot tip and on young and adult leaves; adult leaves were deeply 3-5-lobed in the medium part of the shoot and from the 31st nodium onwards they were sparsly 3-lobed. In comparison to this, ‘normal’ vines were characterized by: coloration of shoot tip and leaves was very weak; dense prostrate hairs occurred (instead of erect hairs); all leaves were 3-lobed.


   **Abstract**: Plants of the Spanish cv. Albarino propagated in vitro were planted on own roots and subjected to 3 different pruning systems: high (Crosstree cordon), middle (Sylvoz) and low level (Royat cordon). Ampelographic and ampelometric characters were studied. In the 4th year juvenility was observed but less expressed from Crosstree cordon vines. Flowering was limited, only a small number of clusters developed. In the high pruning system flowering was slightly better. In the 5th year the Sylvoz and Royat trained plants did still express all juvenil symptoms, whereas the leaves of the vines of the Crosstree cordon did almost show no more juvenility and the number and size of clusters increased significantly.


   **Abstract**: Five-year-old cv. Albarino vines derived from cuttings of very old stock plants and from in vitro propagation (0.2-0.3 mm apical meristems) were compared in the field. Morphological and phenological data of 5 plants/variant were collected and evaluated: The vines from in vitro culture differed from the plants of cuttings in pubescence, leaf morphology, anthocyanin pigmentation, and fertility. It was obvious that number and weight of the clusters of in vitro material were substantially lower.


   **Abstract**: To obtain a broader Variability of the Grenache N grapevine, somaclones were produced from another call and placed in two different environments: a poor sandy soil (Espiguette) and a richer silty clay soil (Chapitre). To evaluate the observed variations at the foliage level, an ampelometric study was conducted over three
consecutive years. Various biometrical analyses revealed that (i) leaf size varies in relationship with the environment: in the poor soil, leaves are smaller than in the rich soil for the control clone as well as the somaclones; (ii) whatever the environment, indentation is deeper in somaclone leaves than in control leaves, even 10 years after outplanting; (iii) some somaclones with deeply or barely indented leaves have a more stable behaviour, while others have a leaf morphology changing with the year and the environment; (iv) leaf indentation parameters defined by the authors allow for a fairly good characterization among somaclones and control: indentation index X5, (S1 + S2)/(L + L1), appears to have the highest discrimination potential; vein length and angle parameters do not allow for discrimination. Representation of the somaclones based on a “theoretical leaf”, obtained from the different measurements, gives interesting supplementary information for the interpretation of the results. Principal component analysis leads to more information on the parameters as well as on individuals. This method was therefore retained for further analyses. In conclusion, this study shows that before commercial introduction of a somaclone, one must ensure that the morphology always corresponds to the grapevine type.


Abstract: ‘Albarino’ (Vitis vinifera L.) is an important grape cultivar in Spain, morphologically diverse but subject to much misnaming. The objectives of the present work were to correct some of the more common misnaminings concerning ‘Albarino’ and to evaluate the genetic variability within this cultivar by analyzing DNA polymorphisms using randomly amplified polymorphic DNA (RAPD) markers and microsatellite techniques. Several accessions of ‘Albarino’ (16 accessions from Mision Biologica de Galicia, one accession from El Encin, one accession from Rancho de la Merced), related cultivars (‘Alvarinho’, ‘Caino blanco’, ‘Cainho branco’, ‘Loureiro’), and cultivars presumably identical to misniners (‘Savagnin blanco’ and ‘Gewurztraminer’) were analyzed using 20 RAPD markers and six microsatellite loci. Both techniques revealed polymorphism among ‘Albarino’, ‘Caino blanco’, ‘Albarino’ from Rancho de la Merced and ‘Loureiro’. No polymorphism was detected among the 16 ‘Albarino’ accessions from Galicia, the ‘Albarino’ accession from El Encin and ‘Alvarinho’, nor among the ‘Albarino’ accession from Rancho de la Merced, ‘Savagnin blanco’ and ‘Gewurztraminer’, nor between ‘Caino blanco’ and ‘Cainho branco’. These results enabled us to clarify the main misniners concerning these cultivars. The absence of polymorphism among the true ‘Albarino’ accessions did not allow the detection of any clonal variation. The suitability of both techniques for defining the cultivar level for grapevine is discussed.


Abstract: The description of vine varieties has been under consideration for many years. A parameter description enabling the best variety characterisation has been improved over the years. However, even though some results have been achieved, no method enables a rapid and clear visualisation of the leaf morphology of any vine variety.

Here, we present an average leaf reconstitution method from measures carried out on a sample representative of the variety. On leaves divided into sectors, we measured the fundamental parameter of the angles and length as well as notations on the qualitative character. These measures are: tooth number and shape, sinus morphology and vein arrangement. Using this information, we established a method which allows step by step average leaf reconstitution. Of course, this method could be improved; nevertheless, it is a tool easy to obtain and to use by experimenters wishing to compare their statistical results with an accurate synthetic representation. The validity of our proposal is proven with the graphic representation of the average leaf of eight very well-known worldwide varieties, such as Cabernet-Sauvignon, Alicante Bouschet, Jerez, Muscat a petits grains and Chasselas Cioutat, and other very important varieties in the north-west of Spain and north of Portugal, such as the Albarino, Godello anti Loureira varieties. In addition, data collected using this means could be the basis of computerisation of the method.

**Abstract**: Vineyards in the Asturias Principedom (the north of Spain) are on the verge of extinction. Their existence has been recorded since the 9th century, and they are as old as other prominent vineyards in Spain and Europe. Some autochthonous grapevine cultivars of this region have never been described. Well-known wine grape cultivars are also cultivated together with these autochthonous cultivars. The former were introduced after the phylloxera crisis in the late 19th century. For the past 10 years, vineyards in Cangas del Narcea (heart of the Asturian vine-growing area) have been studied. Four white-berried cultivars (Albarín blanco, Alblillo, Blanca extra, and Moscatel blanco), eight black-berried cultivars (Albarín francés, Albarín negro, Cabernet, Carrasco, Garnacha tintorera, Mencia, Negrona, and Verdejo negro), one rose-berried cultivar (Jaen), and one red-berried cultivar (Moscatel rojo) were found. The average leaf of each of these cultivars was graphically reconstructed. An ampelographic description of the young shoot, the adult leaf, the cluster, the berry, and the seeds was also carried out using the descriptor list for grapevine cultivars and Vitis species of the OIV. Other parameters considered appropriate for a full description of these cultivars were also measured.

  
  **Abstract**: PCR techniques and pulse field electrophoresis karyotyping showed wide genetic diversity in *Saccharomyces cerevisiae* strains isolated from spontaneous fermentations in progress at a wine cellar in the Rias Baixas appelation controle region (Spain). The karyotyping method showed greater discriminating power than PCR profiling, making it better suited for the detection of genetic diversity in wine strains, and for the monitoring of selected strains in controlled fermentations.

  
  **Abstract**: Specimens of centuries-old *Vitis vinifera* L. cv. Albarino were collected in 1987 throughout Galicia, Spain. Eight of these uncertified clones were planted in a homogeneous plot and characterized by ampelographic traits and DNA-based molecular markers in order to identify their agronomic variability. Clone CSIC-3 had the largest grape clusters, the highest must yield per berry, the highest alcohol potential, and relatively low total must acidity. CSIC-2 had the highest total must acidity. CSIC-9 had the largest grape clusters.

  
  **Abstract**: Resistance to downy mildew (*Plasmopara viticola*) was Studied in eight clones of the grape (*Vitis vinifera*) cultivar Albarino (confirmed as such by DNA and ampelographic analysis) growing at the Mision Biologica de Galicia, Spain. Resistance to downy mildew was quantified using an image processor. Some clones (CSIC-10 and CSIC-11) were more resistant than others to leaf infection by *P. viticola*. However, the susceptibility of grape clusters did not differ significantly among the clones.


  
  **Abstract**: Nine grapevine varieties from northwestern Spain (8 commonly known as types of Caino and one as Tinta Femia) were characterised by constructing their typical ‘mean leaves’ and by determining their genetic profiles with respect to 6 microsatellite markers. Leaf morphologies were compared and the similarities between the cultivars were determined. Thirty three alleles were detected at the 6 microsatellite loci analysed. The different cultivars were successfully identified by both methods. In combination, the different techniques provide a more complete variety characterisation. Synonymy between these and other Spanish and Portuguese cultivars is discussed.

  **Abstract:** The vinegrowing regions of northwestern Spain and northern Portugal are geographically adjacent. in order to prove the hypothesis of existing synonyms, ampelographic comparisons were carried out with 7 Spanish cultivars and 13 Portuguese cultivars. Mature leaves were selected and ampelographic characteristics proposed by the OIV for the description of the vine cultivars were measured. The basic parameters for the reconstruction of the mean leaf were recorded. Five synonyms were confirmed after analyzing the data of the different cultivars. A doubtful synonymy was detected in two other cultivars. The remaining cultivars were clearly distinguished.


  **Abstract:** Two grapevine types established in the collection of the Mision Biologica de Galicia (CSIC), both commonly called Albarín Blanco (type I and III), showed characteristics suggesting an error of homonymy. Varieties with similar characteristics to Albarín Blanco I, but with different names (Blanco Pais, Blanco Verdin, Blanco Legitimo, Raposo), were found in the Principality of Asturias (northern Spain) and Galicia (northwestern Spain). Ampelographic characterisation, agronomic and molecular analysis showed that Albarín Blanco I should be understood as the << true >> Albarín Blanco, and that Blanco Pais, Blanco Verdin, Blanco Legitimo and Raposo are synonyms. Albarín Blanco H was found to be Savagnin Blanc, introduced into the area after the phylloxera epidemic in the 19th century.


  **Abstract:** Fifty six grapevine varieties traditionally grown in the Northwest region of the Iberian Peninsula were analysed for six microsatellite loci, in order to determine the relationships among them as well as the plant material that should be collected and preserved in germplasm banks. Previous morphological and molecular results were taken into account for assessment of the existing synonyms among accessions from different European countries. Percent distribution of the main alleles was calculated. Multivariate analysis was carried out and similarities among the studied material were described and commented.


  **Abstract:** Resistance to downy mildew was studied in different *Vitis vinifera* L. cv. Albariño clones belonging to the collection of the Mision Biologica de Galicia, CSIC (Spain). V riparia, V vinifera cv. Solaris and V vinifera cv. Muller-Thurgau were used as controls. Plants were inoculated with *Plasmodpora viticola* in the laboratory using the leaf disc, whole leaf and whole plant techniques. The results were compared with those obtained in the field for the same Albariño clones. The most susceptible group of clones included MBG-2, MBG-14, MBG-12 and MBG-9, while MBG-13, MBG-3 and MBG-6 formed the most resistant group. The remaining clones showed intermediate resistance. These results coincide with observations made in the field. The resistance observed in MBG-12 could have been generated from in vitro culture, because this induces changes in the downy mildew resistance.

Abstract: The red wine grapevine cultivar Mencia is grown over much of northern and northwestern Spain. It is the preferential cultivar for the wines of the Appellation Contrôlée regions of "Bierzo", "Monterrei", "Ribeira Sacra" and "Valdeorras", and an "authorized" cultivar for "Rias Baixas" and "Ribeiro" wines. This cultivar does not seem to have existed in the north of Spain until the end of the 19th century (after the arrival of phylloxera), but from this time on it has been one of the most important of all those cultivated. The interest surrounding its true identity has increased over the years as its market value has increased. Some parties defend it as a native of the area while others believe it to be a synonym of Cabernet Franc or Tintilla. It is also similar to cv. Garnacha, as some authors have mentioned over the years (although with no great emphasis) (GARCIA DE LOS SALMONES, 1901-1911; COMENGGE, 1942; GALET, 1990). The present paper reports a comparative ampelographic study of different clones of Mencia and Garnacha. The results are also compared to those published by other authors. Mencia appears to be totally different to Cabernet Franc and Tintilla but shows characteristics similar to those of Garnacha and there is possibly a parental relationship. Mencia might therefore be obtained from different crosses between Garnacha and another cultivar.

19. Rodríguez-Plaza, P.; González, R.; Moreno-Arribas; Polo, M.C.; Bravo, G.; Martínez-Zapater, J.M.; Martínez, M.C. y Cifuentes, A. (2006). Combining microsatellite markers and capillary gel electrophoresis with laser induced fluorescence to identify the grape (Vitis vinifera) variety of must. European Food Research and Technology, 223: 625-631

Abstract: In this work, a new method that combines the use of microsatellite markers (VVMD5 and ZAG79) together with capillary gel electrophoresis with laser-induced fluorescence (CGE-LIF) is developed and applied to the identification of Albarino and Moscatel Grano Menudo musts. The CGE-LIF method uses commercially available products including polymers, DNA-intercalating dyes and bare fused silica capillaries to provide reproducible and sensitive separations of DNA fragments for grapevine characterization. The CGE-LIF procedure offers highly resolved separations of DNA fragments from 48 to 1031 bp in ca. 30 min with efficiencies up to 1.8x10(6) plates/m allowing the separation of fragments that differ in 4 bp. The use of different DNA standards (i.e., 100 bp ladder, Phi x174 and pBR322) and their effect on size assignment of the amplified DNA is also investigated. It is demonstrated that the microsatellite markers (VVMD5 and ZAG79) provide DNA amplification patterns specific for Albarino and Moscatel Grano Menudo grapes that can be adequately differentiated by using CGE-LIF. Moreover, the DNA sizes determined by this CGE-LIF method are corroborated using a more standard procedure (i.e., an automatic genetic analyzer with a commercial kit) demonstrating the usefulness of this new methodology.


Abstract: The grapevine cultivar Albarino (Vitis vinifera L.) is one of the most economically important of northwestern Spain. It is also grown in northern Portugal. The present work examines the results obtained by two clonal selection processes involving this cultivar. The first of these was begun in 1987 by the Viticulture Research Group of the Spanish Research Council (CSIC). This involved centuries-old mother plants showing small ampelographic or agronomic differences. The second process was begun in 1989 by the wine-making company Bodegas Terras Ganda S.A. This involved the use of centuries-old 'Albarino' plants too, but also of other plants no older than 20 years of age. The number of mother plants originally examined in the CSIC procedure was 40, but only eight were finally selected and planted (at the Mision Biologica de Galicia Research Station). In the procedure followed by Bodegas Terras Ganda S.A., 115 mother plants were originally planted. The characteristics of the eight CSIC clones and the 22 surviving Bodegas Terras Ganda S.A. clones were determined. The variability of the eight CSIC clones was found to be greater. It is recommended that candidate materials for use in clonal selection programs be examined for differences in situ before being admitted to collections.

Abstract: Resistance of leaves and fruit clusters of Vitis vinifera 'Albarino' clones to downy mildew (Plasmopara viticola) using non-grafted plants and plants grafted on 110-R. All the experimental plants had been growing since 1993 at the Mision Biologica de Galicia, Spain. Both in terms of their leaves and clusters, some clones were more resistant to infection than others. Some were more susceptible to primary attack than secondary attack, while others showed the opposite characteristics. The degree of susceptibility to disease was independent of the rootstock used or indeed of whether the plant had been grafted or not.


Abstract: The course of colonization of leaf mesophyll by the causal agent of grapevine downy mildew, Plasmopara viticola, in a susceptible and a resistant grapevine genotype was examined in order to characterize the development of the pathogen in compatible and incompatible host pathogen interactions. Within a few hours after inoculation, the pathogen was established in the susceptible Vitis vinifera cv. Muller-Thurgau and formed primary hyphae with a first haustorium. No further development occurred in the following 10 to 18 h. The next step, in which the hyphae grew and branched to colonize the intercellular space of the host tissue, was observed 1.5 days after inoculation. After 3 days, the intercostal fields were entirely filled with mycelium and sporulation was abundant under favorable environmental conditions. The first infection steps were essentially the same in the resistant V rupestris. However, the invasive growth of P. viticola was delayed, and further development ceased before the intercostal fields were filled with mycelium.


Abstract: The effects of rootstock (110R or SO4) on the performance of grape cultivars Albariño and Cañino Tinto were studied in Pontevedra, Spain, during 2001, 2002 and 2003. The rootstock had significant effects on the number of seeds per fruits in Albariño, but had no significant effects on the other variables studied in this cultivar. The effects of the rootstock were more pronounced on Cañino Tinto; SO4 markedly increased the weight of pruning wood produced per plant, whereas 110R reduced plant vigour, and enhanced fertility and cluster weight in this cultivar. The year had greater effects on plant performance than the rootstock. The number of clusters per shoot, probable alcohol content, must yield, and cluster weight, length and width were affected by the year of cultivation in Albariño, whereas cluster weight, berry weight, weight of pruned wood and total acidity were more affected in Cañino Tinto. The rootstock × year interaction had significant effects on berry weight, pedicel length and must pH in Albariño, and on cluster length, berry length and width, pedicel length, total fruit weight, must yield and must pH in Cañino Tinto. 110R was more suitable than SO4 for both Albariño and Cañino Tinto.


Abstract: The grapevine cultivar 'Albariño' is one of the oldest grown in the vine-growing areas of north-western Spain and northern Portugal. Since recognition of Origin Denomination status for the Rias Baixas region (the coast of western Galicia, Spain) in 1987, the economic importance of this cultivar has increased, and its grapes are now among the most expensive in Spain. The area occupied by 'Albariño' vines in this region is increasing every year, and the wines made from its grapes are gaining international recognition. These events, plus the fact that 'Albariño' was little known outside its traditional growing area, have led to speculation about its origin and the existence of synonyms. Misnames of 'Albariño' have included 'Savagnin Blanc' and 'Cañino Blanco'. The present work compares 'Albariño', 'Savagnin Blanc' and 'Cañino Blanco' amelpolographically (i.e., it compares shoot, leaf, grape cluster, berry and seed characteristics) and molecularly using microsatellite markers. The results show that they are in fact three different cultivars providing a complete description. For 'Cañino Blanco', there is little previously reported information.
  
  **Abstract:** Wines produced from Vitis vinifera cv. Castanal from Galicia (NW Spain), harvest 2002 and 2003, were submitted to gas chromatography (GC/FID). A total of 36 varietal and fermentative aroma compounds were identified and quantified. The total concentration of aroma compounds in 2002 and 2003 vintage was 872.06 and 520.70 mg/L, respectively, which include free and bound terpenes and C-13-norisoprenoids, alcohols, acetates and ethyl esters. To estimate the contribution of specific compound to the aroma, the odour activity value (OAV) was calculated using the concentration of each component and the corresponding odour threshold reported in the literature. From 36 compounds identified, 10 were determined as the most powerful odorants: beta-ionone, 3-methyl-1-butanol, benzyl alcohol, 2-phenylethanol, ethyl acetate, isoamyl acetate, ethyl lactate, ethyl butyrate, ethyl hexanoate and ethyl octanoate. These data suggested Castanal wines as a fruity (blackberry) and floral (rose) product.

  
  **Abstract:** Enological variability of musts and wines from eight clones of Albariño variety, grown in Mision Biologica de Galicia (NW Spain), was performed in this study. Data obtained were analyzed by ANOVA and principal component analysis. High enological variability among clones was found. Significant differences were found for all the classical parameters analyzed and these parameters were used in order to differentiate among the clones. CSI-3 followed of CSIC-10 musts were the clones with highest maturation index (30.41 and 26.83, respectively) and CSIC-2 and CSIC-9 obtained the lowest index. Wines elaborated with CSIC-1, CSIC-2 and CSIC-3 clones have shown the maximum ethanol content and the highest levels of extract. Wines from different clones could be distinguished according to their classic parameters. (c) 2007 Elsevier Inc. All rights reserved.

  
  **Abstract:** The aromatic compounds produced during the fermentation of the red grape cultivars Caino Tinto, Caino Longo, and Caino Bravo were analysed by gas chromatography (FID) on the wines of 2002 and 2003 vintages. In both years, significant differences (p < 0.001) were observed between the wines with respect to the concentrations of aromatic compounds. Caino Longo wines had the highest concentrations of acetates and esters. The concentrations of ethyl ester and acetates in Caino Bravo wines were comparatively very low. Principal components analysis confirmed these results: the wines made from the different cultivars and the vintages were clearly different.

  
  **Abstract:** Downy mildew, caused by the obligately biotrophic peronosporomycete Plasmopara viticola, is one of the most destructive of grapevine diseases that occurs worldwide. The classical cultivars of Vitis vinifera, up to date utmost important for wine and table grape production, are all susceptible to P viticola, resulting in severe epidemics under warm and humid conditions. The aim of our present study was to characterize the susceptibility to infection by P viticola among different grapevine cultivars grown in European vineyards in comparison to resistant Vitis species. For this purpose we inoculated leaf discs, leaves and whole plants of eight V vinifera cultivars considered to be susceptible (‘Albarino’ [Clone1, Clone2 and Clone3], ‘Tempranillo’, ‘Touriga Nacional’, ‘Riesling’, ‘Pinot Noir’, ‘Pinot Blanc’, ‘Muller-Thurgau’ and ‘Cabernet Sauvignon’) with P viticola under controlled conditions. Four Vitis genotypes with a distinct degree of resistance to P viti-cola (V. riparia, V. rupestris, V. amurensis and the hybrid Vitis x vinifera ‘Solaris’) were used as resistant and partially resistant references. To assess the degree of susceptibility we scored the disease incidence and severity visually and microscopically analyzed the course of host tissue colonization by the pathogen. The microscopical studies indicated even slight
differences in the infection rate, the course of host tissue colonization and the parasitation i.e. haustoria formation, among the V vinifera cultivars. The obtained data were suitable for statistical analysis that showed significant differences in the assessed parameters among the V vinifera cultivars. The principal component analysis (PCA) of the data revealed three groups of susceptibility: (i) genotypes which are little susceptible, e.g. 'Cabernet Sauvignon', 'Pinot Blanc', 'Pinot Noir', 'Muller-Thurgau' and 'Riesling'; (ii) a second group formed by those genotypes which are very susceptible, i.e. the two clones of 'Albarino' (the most susceptible of all) and 'Tempranillo'; and (iii) a third group comprising the genotypes used as resistant and partially resistant references (V riparia, V rupestris, V amurensis and the hybrid Vitis x vinifera 'Solaris'). Within the first group 'Cabernet Sauvignon' formed a subgroup indicating a very low susceptibility to P viticola. In this work, for the first time the visual assessment of disease incidence and severity with a microscopic analysis of infection intensity, colonization of host tissue and parasitation to discriminate differences in susceptibility of European V vinifera cultivars for P viticola was combined.


  **Abstract:** The free volatile compounds of two successive vintages of cv. Caiño Tinto, Caiño Bravo and Caiño Longo red wines, together with the volatile compounds released after the enzymatic hydrolysis of their glycosidically bound forms, were identified and quantified by gas chromatography using a flame ionization detector (GC/FID). All these wines possessed the same free volatile compounds; Caiño Longo wines showed the highest concentrations and Caiño Tinto wines the lowest. In all cases, the release of the bound forms of these compounds may contribute to the final aroma, from both a qualitative standpoint (with the appearance of free 4-terpineol, nerol and geraniol) and quantitative standpoint (notable increases were recorded for most of the compounds detected). The principal component analysis (PCA) showed a good separation of the different wine cultivars and vintages. Caiño Tinto wines were more homogeneous between vintages than the others.


  **Abstract:** The use of rootstocks is widespread in modern viticulture; non-grafted Vitis vinifera vines are now grown in only a handful of places with very specific conditions. Since the need to graft vine-scions onto American rootstocks, a lot of work has been performed in which different aspects of the relationship between the vine and the rootstock have been studied. Despite this there are still many open questions, which remained unanswered. The present paper reports a study performed on five Albari (n) over tildeo clones (MBG-1, MBG-2, MBG-7, MBG-9 and MBG-10), in which the influence of rootstock type (110-R and SO4) on a number of agronomic variables was examined. The results show that these rootstocks have no influence on many of the variables which were studied (phenology, cluster size and weight, fertility, yield, and berry size and weight), although they do influence variables such as the probable alcohol content, the quantity of free-run juice, must total acidity and weight of pruned wood. Therefore it is possible to conclude, that rootstocks influence agronomic parameters.


  **Abstract:** The arrival of powdery mildew, phylloxera, and then downy mildew from America in the late 19th/early 20th century, was one of the most important causes of the loss of grapevine diversity in Europe. Many varieties traditionally grown in small winemaking areas of Europe were substituted by direct producing hybrids or by a small number of varieties from other vine-growing areas. For geographic, economic, sociological, and cultural reasons, the north and northwest of Spain acts as a kind of refuge area where grapevine diversity is still high. At the Mision Biological, de Galicia (CSIC) research station a collection of living vines with a number of dispersed individuals belonging to old varieties was established in 1992. Many of these varieties had practically disappeared from vineyards and the majority existed only as centuries-old individuals. Tinta Castanal, was known until the...
early 20th century as one of the most highly regarded by viticulturalists and one of the most widely cultivated varieties on the Spanish side of the River Mino (which forms part of the Spanish-Portuguese border). Officially, this variety does not exist, it is not included in the Spanish List of Commercial Vine Varieties and therefore, it can neither be cultivated nor its wine marketed. The present work describes for the first time Tinta Castanal with morphological, agronomic and phenological descriptors over three consecutive years. Molecular analysis of six loci microsatellite commonly used in grapevine characterisation is also presented. The results obtained allow this variety to be compared with those of neighbouring areas (Portuguese regions) and with others further afield and demonstrate this variety to be different from any other previously described. The present description provides the data for pursuing the necessary steps to legalise this variety and contribute to the maintenance of vine biodiversity. (C) 2007 Elsevier B.V. All rights reserved.


Abstract: Background and Aims: The arrival in Europe of powdery mildew (1845), phylloxera (1863) and mildew (1878) led to great interest in grapevine varieties less sensitive to these diseases, but still producing good quality wine. Standing out was a small group of teinturier vines that were once much appreciated for the colour their grapes brought to wines because of their pigmented skins and pulp. The aim of the present work was to determine the true identity of nine teinturier grapevine varieties that were collected from different vine-growing areas of northern and north-western Spain under local names.

Methods and Results: This study combined the ampelographic characterisation of the leaves and the use of molecular markers (simple sequence repeats) to allow some of these varieties to be identified, the existence of a number of synonyms to be established and the relationships among some of these grapevines to be determined.

Conclusions: Most of the teinturier varieties studied are related to the internationally known cultivars Morrastrel Bouschet, Alicante Bouschet, Petit Bouschet and Jacquez. The origin of the teinturier variety collected with the local name Folla Redonda is still unknown.

Significance of the Study: The information provided by this research helps define the origin of commercially important teinturier varieties and may be helpful in their identification and selection for cultivation in certain vine-growing areas.


Abstract: Grapevine (Vitis vinifera L.): Old Varieties Are Reflected in Works of Art. The northwest of the Iberian Peninsula is home to a number of ancient grapevine varieties now in danger of extinction, regarding which the literature contains only a few references, dating from the 19th century. In this region, baroque religious art, which is commonly ornamented with grapevine motifs, achieved great importance. This work reports the ampelographic comparison of the leaves of 19 old grapevine varieties from this region with those represented on 42 baroque altarpieces. Many of the latter were found to be ampelographically correct representations of grapevine leaves; in some cases they showed such similarity to these old varieties that their cultivation at the time when the corresponding sculptures were made can be confirmed. A larger study may therefore help determine when other varieties were cultivated in the past.


Abstract: Modern viticulture practices with vineyards planted to only one cultivar can contribute to the loss of grapevine diversity. The special geographic conditions in the northern and northwestern Iberian Peninsula make this region a refuge area where grapevine diversity is still high. The preservation of older traditional cultivars reduces the genetic erosion and allows the production of unique wines. A total of 22 older grapevine cultivars growing since 1993 at the grapevine collection located at the Mision Biologica de Galicia research station, Spain, are described in this work. The phenotypic and genetic variability have been evaluated through the
ampelographic characteristics of the adult leaves and analysis of 10 microsatellite markers (VVS2, VVMD5, VVMD7, VVMD25, VVMD27, VVMD28, VVMD31, VVMD32, VrZAG62, and VrZAG79). Describing these older cultivars, some of which have not been described to date, and resolving the problem of synonyms and homonyms are necessary steps in their recovery.

  
  **Abstract:** This work reports the leaf morphology of six grapevine genotypes, five belonging to *Vitis vinifera* and one to *Vitis riparia*. Earlier studies on these genotypes showed different levels of susceptibility to grapevine downy mildew (*Plasmopara viticola*). The aim of this work was to detect differences between the leaf morphology of these cultivars at the macro- and microscopic levels, and to characterize morphological traits which could be associated with susceptibility and resistance to downy mildew. An ampelographic description of each genotype was used to develop a scheme illustrating the characteristic leaf morphology. The density and morphology of the trichomes and the stomatal index was assessed by means of microscopic techniques. Distinct macro and microscope differences among the genotypes were seen. No clear relation between ampelographic characteristics and susceptibility to downy mildew was observed. The two cultivars that in earlier studies were found to be the least susceptible to downy mildew were the most similar in terms of their spongy mesophyll. Both showed very little or no wax oil on the abaxial surface of their leaves.

  
  **Abstract:** The aim of this work is to determine whether different clones of 'Albariño' differ in terms of their number and size of stomata and its possible relation with the different susceptibility to *P. viticola* of these same clones. The results of this work hint a relationship between stomata number and downy mildew susceptibility rather than with stomata size. Although this correlation was not always given and this is not the only factor that influences in the susceptibility to this pathogen, an apparent effect of the stomata frequency seems to exist. Thus, further studies should be developed in this way in order to clarify this aspect.

  
  **Abstract:** Aims: The grapevine (*Vitis vinifera* L.) cultivar Albarino is currently the most economically important in Galicia (northwestern Spain). Earlier works assessing the natural susceptibility to downy mildew leaf infection (both in the laboratory and in the field), carried out in the collection of Albarino clones at the Mission Biologics de Galicia (CSIC), showed great differences among the clones (Boso et al., 2004b, 2005b, 2006; Boso and Kassemeyer, 2008). The aim of the present Work is to highlight the histological differences in leaves, in particular thickness and structure, among the 11 different Albarino clones and to find out their possible relation with their natural susceptibility to *Plasmopara viticola*.

  **Methods and Results:** Transverse sections of adult leaves where prepared and observed under light microscope. The area corresponding to the different leaf layers was measured. The results showed significant differences between the clones regarding the thickness of the spongy mesophyll. The clones CSIC-4 and CSIC-1 had the thickest spongy mesophyll (average mean = 14316.8 mu m(2)) whereas CSIC-3 showed the thinnest one (11548.1 mu m(2)).

  **Conclusion:** The CSIC-3 clone, one of the least susceptible clones to *P. viticola* in previous studies, showed the thinnest and most compact spongy mesophyll. On the contrary, the CSIC-1 clone had the thickest spongy mesophyll and was also one of the most susceptible to this pathogen. Therefore, it could be possible to relate their histological leaf characteristics with their different levels of natural susceptibility to *P. viticola*.

  **Significance and impact of the study:** This work contributes to the understanding of the link between histological characteristics of leaf layers and mesophyll cells and the different natural susceptibility of grapevines to downy
mildew. This may become in the future a valid tool to be used during clonal selections in grapevine breeding programs.


Abstract: Background and Aims: Downy mildew, which occurs worldwide, is one of the most destructive of all grapevine diseases. Several authors have examined the host-pathogen interaction in different Vitis species, crosses and hybrids, but only a few studies comparing this in true V. vinifera varieties have been undertaken. The aim of the present study was to examine the in-field susceptibility to infection by Plasmopara viticola, the causal agent of downy mildew, of 44 grapevine varieties, all belonging to the collection of the Mision Biologica de Galicia.

Methods and Results: Over a period of 2 years, the incidence and severity of downy mildew on the leaves and clusters of all 44 varieties was determined using a visual scale. Some of those examined showed high susceptibility (Chenin Blanc, Albarino and Prieto Picudo), others showed low susceptibility (Silveirina, Caino Bravo, Follajeiro and Brancellao Blanco), and still others showed intermediate susceptibility. Some varieties showed high disease incidence but low disease severity and vice versa. No significant correlation was detected between disease incidence and severity in either leaves or clusters, nor indeed between leaves and clusters. Neither berry colour, cluster compactness nor any other studied variable bore any clear relationship with susceptibility.

Conclusion: The different grapevine varieties examined showed great variation in terms of their susceptibility to downy mildew. The susceptibility of most varieties was the same in both study years.

Significance of the Study: The results of this work could help provide new material that might be of use in grapevine genetic improvement programs, and in the study of resistance to downy mildew. The selection of old varieties from the Iberian northwest may contribute towards the growth of organic viticulture in this area and even other winemaking regions around the world.


Abstract: Scanning electron microscopy (SEM) was used to examine the characteristics of the upper and lower sides of leaves belonging to members of the genus Vitis – 11 vinifera varieties (‘Albarino’, ‘Treixadura’, ‘Caíño Blanco’, ‘Mencía’, ‘Chasselas’, ‘Cabernet Sauvignon’, ‘Alicante Bouschet’, ‘Godello’, ‘Torrontés’, ‘Blanco Legítimo’ and ‘Caíño Tinto’) and three non-vinifera varieties (‘110-Ritcher’, ‘SO4’ and ‘Jacquez’). All the genotypes studied grew in the same plot, were of the same age, and had been raised following the same cultivation practices. The leaves examined were taken from node 8 of a fruiting shoot growing from the previous year’s wood. The same part of the leaf – the area between the main vein and the first right lateral vein – was examined in all plants. SEM observations were made at 200×, 655× and 2000×. Photomicrographs and drawings were prepared reflecting the observed morphology of the upper and lower leaf surfaces. Variables such as cell density, cell surface area (in the horizontal plane) and stomatal density and surface area (in the horizontal plane) were measured for both leaf surfaces, and intra- and intervarietal differences recorded. The upper leaf surfaces of all the studied genotypes were similar, but clear differences were recorded for the lower sides.


Abstract: Leaves of different Vitis vinifera L. cultivars, susceptible or resistant to downy mildew, Chasselas, Solaris, IRAC 2091 ( cvs. Gamaret x Bronner) and Muscadinia rotundifolia were inoculated with Plasmopara viticola. Samples were then examined by scanning and transmission electron microscopy, by light microscopy and for their ability to synthesise stilbenes. These phytoalexins were strictly analysed at infection sites. In the susceptible Chasselas, P. viticola colonises, at 72 h post-infection (hpi), all of the spongy mesophyll with functional haustoria and produces mainly the non toxic piceide. No necrotic zone was observed on Chasselas
leaves. The ultrastructural response to downy mildew infection is different in each of the other three resistant grape cultivars. In Solaris, where leaf necrosis are rapidly induced, the infection is restricted to the upper part of the loose spongy mesophyll, and associated with a rapid cell wall disruption and the dispersion of cytoplasmic content along with the production of viniferins. In IRAC 2091, leaf necrosis are quite similar to those observed on Solaris but the infected plant cell, as well as the haustoria, show high electron dense cellular particles without any recognisable organelles, probably related to the effect of the toxic compound pterostilbene, which is synthesised in this grape cultivar. In M. rotundifolia leaf necrosis are much more scarce and smaller than in other cultivars, but pathogen and plant cells are both strongly affected, with concomitant expulsion of cytoplasmic materials through the stomata after P. viticola penetration. In this cultivar, the concentration of all identified stilbenes exceeds $1 \times 10^3 \mu$mol mg$^{-1}$ FW. The critical role of stilbenes in the resistance of Vitis spp. is discussed.


**Abstract:** Leaves of different *Vitis vinifera* cultivars, susceptible ('Chasselas' and '2185'), less susceptible ('2142') or resistant to downy mildew ('Solaris' and '2091'), were inoculated with four different concentrations of an aqueous sporangia suspension of *Plasmopara viticola* (5 x 10^5, 2 x 10^5, 6 x 10^4 and 2 x 10^4 sporangia/ml). The infection rate of these samples was then examined by light microscopy and synthesis of stilbenes was analysed at infection sites. Infection rate increased parallel with inoculum concentration, but there was no correlation between the infection rate and resistance to *P. viticola*. Moreover, at the lowest inoculum concentration, the infection rate is similar for susceptible and resistant grapevine varieties. Quantification of stilbenes at 72 hpi showed that at the lowest inoculum concentration, the most susceptible grape variety synthesized the largest amount of stilbenes, whose level remained however below the ED50 values defined for each of them. Conversely, at the highest inoculum concentration, the most resistant varieties produced the highest amounts of the most toxic stilbenes against *P. viticola*. The critical role of the inoculum concentration used for artificial inoculation to evaluate grapevine resistance to downy mildew is discussed.

**42.** P. Gago; J.L. Santiago; S. Boso; V. Alonso-Villaverde; I. Orriols; and M.C. Martinez (2011). Identity of three grapevines varieties thought to be very old cultivars from the Betanzos region (Rias Altas Gallegas Spain). *Journal International des Sciences de la Vigne et du Vin*. 45 (4): 245-254

**Abstract:** Aims: The old literature contains references to the varieties once cultivated in the Betanzos region (northwestern Spain) and three of them (Blanco Legitimo, Agudelo and Serradelo) were rediscovered during a survey work that began in 1987 and now form part of a collection held at the Mision Biologica de Galicia (MBG-CSIC). The aims of the present work were 1) to describe these three varieties, 2) to determine whether grapevines recently planted are indeed true representatives of these varieties and if so 3) to examine their agronomic and oenological potential.

**Methods and Results:** Ampelographic descriptions were made following the OIV method (OIV, 2009) and the reconstruction of 'mean leaves' (Martinez and G, 1999). Ten microsatellite loci were also characterised. Having confirmed the supposed identity of the vines in the vineyards, their agronomic and oenological potentials in the region were investigated (fertility, weight of fruit, composition of must and wine). The ampelographic and molecular results showed the following synonyms: Blanco Legitimo = Albarin Blanco; Serradelo = Brancellao (Spain) or synonym Alvarelhao (Portugal); Agudelo = Chenin Blanc.

**Conclusions:** The vines supposed to be Blanco Legitimo and Agudelo recently planted in the Betanzos area had largely been correctly identified by their planters. Significance and impact of the study: The identification of synonyms has repercussions for the commercial exploitation of these varieties. The implications for Blanco Legitimo are relatively reduced since its synonyms are also grown in minority areas; however, for Serradelo and Agudelo they are more serious because their synonyms are varieties already widely grown. Finally, the present results contribute to our knowledge of the history and movement of grapevine cultivars in Europe.
Abstract: The present attempt to establish a comprehensive and harmonized list of grapevine varieties authorized in Europe represents the contribution of the group of experts within the project GrapeGen06. In no case is this work intended to substitute for administrative initiatives in progress and has the sole aim to make available to professionals a usable document. To the involved people, the list presented here is a tool that will facilitate the implementation of the European regulations on grapevine. It also offers a panorama of the European grapevine genetic potential, thus enabling to specify whose responsibilities are involved and how much efforts should be produced to plan a sound genetic resources protection and further breeding. In this respect it is worth to underline the fact that over half of the varieties are registered in only one Member State. This opens new perspectives emphasizing the importance of European inter-institute cooperation for sharing conservation and breeding responsibilities. Considering the natural evolution of the national catalogues of grape varieties in each Member State and the progress in grape variety identification, it would be necessary to consider an annual update of this European harmonized catalogue.

The compilation of 24 national catalogues (among which 19 Member States of EU) is presented in the 95 form of 6 .pdf documents available on the following website: http://www1.montpellier.inra.fr/grapegen06/page_results/EU-catalogue.php


Abstract: The presence of anthocyanins and flavonols in three selected red grape varieties was investigated, in order to use their polyphenolic characterisation as a fingerprint. Berry skins of Gran Negro grapes were characterised by the presence of high content of malvidin- and peonidin-3-O-glucoside; Mouratón grapes, by the presence of high content of petunidin- and delphinidin-3-O-glucoside; and Brancellao grapes, by the presence of high content of cyanidin-3-O-glucoside. The main flavonols found included the 3-O-glucosides of quercetin, myricetin, kaempferol, larinicitin, isorhamnetin and syringetin. Using cluster analysis and principal components analysis, Gran Negro could be characterised by their content of isorhamnetin-3-O-glucoside and syringetin-3-O-glucoside and, along with Mouratón, by their myricetin conjugates. Flavonol profile could not provide a fingerprint of Brancellao variety. Stepwise discriminant analysis was performed in order to find the polyphenolic compounds, which characterised the selected grape varieties. Finally, anthocyanin and flavonol profiles in red grapes were compared and results confirmed that biosynthesis of flavonols is closely related to that of anthocyanins.


Abstract: The use of selected yeast strains with improved or novel properties may promote wines with special and original quality attributes. In this paper, changes in the chemical composition (aroma compounds and polyphenols) and sensorial properties of Albariño white wines elaborated with the same must and selected yeast (named as 1, 2 and 3) have been studied in comparison with wines subjected to non-inoculated fermentation (control wine). The results indicated that yeast strain can significantly influence the aroma and polyphenol composition of the wines. Wines elaborated with strain 1 had a higher concentration of terpenes and norisoprenoids, which are compounds closely associated with the fruity and fresh character of Albariño white wines. These same wines had a lower concentration of flavan-3-ols, closely associated with the astringency and bitterness of the wine and the lowest browning potential. The formal sensory analysis conducted by 8 trained judges showed that wines elaborated with strain 1 were preferred by the tasting panel. Therefore, the selection of
yeast strains could offer the possibility to modulate sensorial attributes related with the aroma and phenol composition in Albariño white wines.


  **Abstract:** In this study the presence of aroma compounds in grapes of Brancellao (*Vitis vinifera* L.) was investigated in order to obtain its aroma potential fingerprint. It is well known that differences exist in aromatic compounds amongst grapevine varieties at ripening stages. Within the framework of an increasingly competitive market, the chance of obtaining different wines from vines of the same variety grown at the same vineyard is becoming of increasing importance. This can be done through the managing of the vineyard, but also some wineries have assayed the separation of the tip and shoulder berries of the clusters of a specific variety with this objective. In this work it is evaluated that, in the final stages of maturation, differences exist in the probable alcoholic degree, total acidity of the must, as well as in the aromatic composition of skin and flesh of berries coming from the tips and shoulders of the clusters. Gas chromatography coupled to mass spectrometry (GC–MS) was used to determine the aromatic composition, in the skin and flesh of each sample, either tip or shoulder berries from the clusters. The obtained results showed that there was not variability for the probable alcoholic degree and total acidity between the shoulders and tips, whereas there was variability for their aromatic composition. For the berries from the tips of the clusters most of volatiles were found in the flesh (except aldehydes) and spicy and floral nuances (with the only exception of β-ionone) were in higher proportions. For the berries from the shoulders of the clusters, most of volatiles were found in the skin (monoterpenes, norisoprenoids, aldehydes, and C6 alcohols), where the flesh was slightly richer in aromatic alcohols, volatile phenols and pantolactone; β-ionone and herbaceous nuances were in higher proportions. These results are promising for those wineries that are considering the chance of separating berries from tips and shoulders of the clusters for the elaboration of different quality wines.


  **Abstract:** Galicia (the north-western corner of Spain) is a Spanish region with several old-traditional winegrowing areas. *Vitis vinifera* L. cv. Mencia is one of the most often used to produce quality red wines but the tendency of the world wine-making market is to reward the production of wines that have particular and differentiated characteristics. In Galicia, there are other red cultivars such as Gran Negro which were not exploited for their potential to produce quality red wines. Dynamics of anthocyanin and flavonol accumulation in Gran Negro berries were studied separately in two different positions within the cluster (tips and shoulders) during thirty days before harvest to assess the existence of different polyphenol quality in both positions and as a consequence, red wines with different qualities. Dynamics of anthocyanins over ripening confirmed that anthocyanins presented upward trends (from 1510 to 1727 mg/Kg in tips; and from 1532 to 1728 mg/Kg in shoulders) but dynamics of flavonols confirmed that maximum values were reached and stabilized thirty days before harvest (from 45 to 39 mg/Kg in tips; and from 49 to 45 mg/Kg in shoulders). No differences were observed in anthocyanin and flavonol contents collected from tips and shoulders which indicates that it is not necessary to harvest them separately. The results from Gran Negro were compared with those of Brancellao and Mouratón.


  **Abstract:** Stilbenic phytoalexins have been associated with disease resistance. In *Vitis* spp., stilbene synthesis can be induced by UV irradiation, treatment with a variety of substances extracts, and inoculation with *Botrytis cinerea* or *Plasmopara viticola*. The aim of the present work was to examine the relationship between stilbene production and the level of resistance of different *Vitis* genotypes to *P. viticola*. The ability of different grapevine genotypes (*Vitis vinifera* L. cvs. Tempranillo, Touriga Nacional, Pinot Noir and Cabernet Sauvignon, and the non-
vinifera *Vitis riparia* to resist *Plasmopara viticola* infection was assessed via their potential to accumulate toxic stilbenic phytoalexins. Leaf discs taken from plants belonging to these genotypes were inoculated with *P. viticola* sporangia and disease severity determined 5 days later. Stilbene production was quantified in similar leaf material at 6, 24, 48, and 72 h post inoculation (hpi). After *P. viticola* infection, the resistant genotype *V. riparia* showed high production of the phytotoxic stilbenes ε- and δ-viniferin, which limited the development of the pathogen and prevented it from producing spores. Indeed, this genotype was associated with the lowest sporulation values. No relationship was observed, however, between resistance and these compounds in the *V. vinifera* genotypes. Further study is required to define the role of stilbenic phytoalexins in resistance to *P. viticola*.

- 49.- Gindro, K.; Alonso-Villaverde, V.; Voinesco, F.; Spring, J.L.; Viret, O.; Dubuis, P.-H. (2012). Susceptibility to downy mildew in grape clusters: new microscopic and biochemical insights. *Plant Physiology and Biochemistry.* 52: http://www.sciencedirect.com/science?_ob=RedirectURL&_method=outwardLink&_partnerName=936&_eid=1-s2.0-S098194281100369X&_pii=S098194281100369X&origin=article&_zone=art_page&_targetURL=https%3A%2F%2Fs100.copyright.com%2FAppDispatchServlet%3FpublisherName%3DELS%26contentID%3DS098194281100369X%26orderBeanReset%3Dtrue%26_acct=C000228598&_version=1&_userid=10&md5=06ce7a1868c98594766f185b05e7f5d674-146

Abstract: Grape clusters of different *Vitis* genotypes, including *Vitis vinifera* cvs Chasselas and Merlot, and two interspecific grape varieties, Solaris ( cvs. Merzling x (Saperavi severneyi x Muscat ottonell)) and 2091 ( cvs. Gamaret x Bronner), are susceptible or resistant to downy mildew. These cultivars were inoculated with *Plasmopora viticola* at three developmental stages (BBC stages 53, 69 and 75). Samples were examined by scanning electron microscopy and the synthesis of stilbenes was measured. Microscopical examinations of pedicels, rachis and calyptras showed important differences in stomatal structures within seasonal development. At BBC 53, successful infections were observed on all tested cultivars and functional stomata were present, while no infections were observed after this stage. At BBC 69 and 75, cracks were observed around the stomata and guard cells were unstructured or completely collapsed, leading to closed-like stomata. At BBC 53, significant stilbene accumulation was quantified in 2091 and Solaris; pterostilbene and δ-viniferin were produced in large amounts. In the susceptible varieties, only piceid and resveratrol were induced. At the other two stages, the concentration of all measured stilbenes was undetectable. The critical roles of seasonal development and stilbenes in the resistance of grape clusters towards downy mildew are discussed.

- 50.- Gindro, K.; Berger, V.; Godard, S.; Voinesco, F.; Schnee, S.; Viret, O.; Alonso-Villaverde, V. (2012). Protease inhibitors decrease the resistance of *Vitaceae* to *Plasmopara viticola*. *Plant Physiology and Biochemistry.* 60: http://www.sciencedirect.com/science?_ob=RedirectURL&_method=outwardLink&_partnerName=936&_eid=1-s2.0-S098194281100369X&_pii=S098194281100369X&origin=article&_zone=art_page&_targetURL=https%3A%2F%2Fs100.copyright.com%2FAppDispatchServlet%3FpublisherName%3DELS%26contentID%3DS098194281100369X%26orderBeanReset%3Dtrue%26_acct=C000228598&_version=1&_userid=10&md5=06ce7a1868c98594766f185b05e7f5d674-80

Abstract: *Plasmopora viticola* must successfully infect susceptible grapevine cultivars to complete its biological cycle. In resistant grapevine varieties, *P. viticola* is blocked by the activation of defense mechanisms; these defense mechanisms produce hypersensitive reactions, which are related to programmed cell death. In animals, programmed cell death is dependent on caspase activities. In plants, different caspase-like proteases assume the same functions. To examine the roles of caspase-like proteases in *P. viticola*-grapevine interactions, three varieties of grapevine with different levels of *P. viticola* resistance were chosen. These grapevine varieties were treated with either PMSF, a serine protease inhibitor, or E-64, a cysteine protease inhibitor. The development of the pathogen was followed microscopically, and the plant defense reactions were estimated through stilbene quantification. Both protease inhibitor treatments increased the infection rate in the resistant and immune varieties, diminished the production of toxic stilbenes and changed the level of the plants’ susceptibility to the
pathogen. In particular, after either protease treatment, the cultivar that was originally immune became resistant (hyphae and haustoria were observed), the resistant cultivar reached the level of a susceptible cultivar (sporulation was observed) and the susceptible cultivar became more sensitive (P. viticola colonized the entirety of the leaf mesophyll).


Abstract: Galicia (N.W. Iberian Peninsula) is a Spanish region with several old-traditional winegrowing areas. Vitis vinifera L. cv. Mencía is one of the most often used to produce quality red wines in the five Galicia Denomination of Origin. However, there are traditional cultivars such as Brancellao, which were not exploited for their potential to produce quality red wines. Dynamics of anthocyanin and flavonol accumulation were studied separately in two different positions within the cluster (tips and shoulders), during 30 days before harvest. The objective of separating berries is to assess the existence of different polyphenol quality in both positions; as a consequence, the selection and harvest of those berries with a higher content of anthocyanins and flavonols could produce red wines with different qualities. Derivatives of five anthocyanins (malvidin, peonidin, petunidin, delphinidin and cyanidin) were detected in skins at both positions within the cluster. Anthocyanin contents stabilized in the 30 days prior to harvest in the berries from the shoulders whereas they continue to increase in those from the tips. Derivatives of six flavonols (quercetin, myricetin, kaempferol, laricitrin, isorhamnetin and syringetin) were detected in skin and flesh at both positions within the cluster. Dynamics of anthocyanins (from 400 to 515 mg/kg in tips; and from 598 to 574 mg/kg in shoulders) and flavonols (from 19 to 29.3 mg/kg in tips; and from 22.7 to 29.4 mg/kg in shoulders) over ripening confirmed that these polyphenols presented upward trends. Therefore, it is not necessary to harvest Brancellao berries separately and a high quality red wine will be obtained with berries from entire clusters regarding these compounds.


Abstract: Within the framework of a more and more 18 competitive market, the opportunity to obtain different wines from the same variety cultivated in the same vineyard is becoming of increasing importance. In this study the presence of aroma compounds in Gran Negro (Vitis vinifera L.) grapes was investigated in order to obtain its aroma potential fingerprint taking into consideration the separation of apical (tips) and basal (shoulders) berries of the clusters. In the final stages of maturation, differences were searched in the probable alcohol content, total acidity of the must, as well as in the aromatic composition of skin and flesh from shoulder and cluster tip berries. A GC-MS method was used to determine the aromatic composition. The obtained results showed that there was variability for their aromatic composition. These results are promising for those wine cellars that are considering the separation of berries from tips and shoulders of the clusters for the elaboration of wines with different qualities. For the berries from the tips of the clusters, the main volatiles were: aromatic alcohols and volatile phenols were mainly found in the flesh (15 and 2 times higher than in skin, respectively); whereas aldehydes and C6 alcohols were mainly in the skin (4 and 3 times higher than in the flesh, respectively). For this reason, it could be recommended to separate berry skin before enzymatic maceration of the berry flesh must. For the berries from the shoulders of the clusters, the main volatiles were the group of volatile phenols showed 2 times more importance in the skin than in flesh; it could be recommended to maintain berry skin during enzymatic maceration of the must. Overall, tips showed a 40% lower level of C6 alcohols (contributing to herbaceous nuances). These results from Gran Negro were compared with those of Brancellao and Mouratón cultivars.

Abstract: The opportunity for obtaining different wines from the same variety cultivated in the same vineyard is becoming of increasing importance. This is why some wine cellars have started to assay the separation of the tips and shoulders berries of the clusters of a specific variety with this objective. In this work, the study is focused on berries of Mouratón (Vitis vinifera L.) to investigate if, in the latter stages of ripening, differences exist in the probable alcoholic degree, total acidity of the must, as well as in the aromatic composition of skin and flesh of berries coming from the tips and shoulders of the clusters. Gas chromatography coupled to mass spectrometry (GC–MS) was used to determine the aromatic composition. The obtained results showed that there was not variability for the probable alcoholic degree and total acidity between the tips and shoulders, whereas there was variability for their aromatic composition during ripening. These results are promising for those wine cellars that are considering the separation of berries from tips and shoulders of the clusters for the elaboration of different quality wines.


Abstract: In this study, ten clones of *Vitis vinifera* Cabernet franc (not yet commercial) have been phenotyped on precocity, grape composition and assessment of wine quality made by micro vinification in 2008, 2009 and 2010. Additionally, two original criteria have been considered: concentration of 3-isobutyl-2-methoxypyrazine in grapes and wines (the green bell pepper flavor) and resistance of grapevines to downy mildew (*Plasmopara viticola*) by stilbene quantification upon infection. Precocity of veraison varied up to four days at veraison. Berry size and yield were highly variable among clones. However, these variables were not correlated. Tanins and anthocyanins varied among clones in grapes and wines. Variations in grape and wine IBMP were not significant. Some clones showed lower susceptibility for downy mildew on leaves. Lower susceptibility was linked to a higher production of stilbenic phytoalexins involved in downy mildew resistance mechanisms.


Abstract: Galicia (N.W. Spain) is a Spanish region with several old-traditional winegrowing areas. There are autochthonous grapevine varieties, such as *Vitis vinifera* L. cv. Mouratón, considered a biodiversity resource in viticulture and an opportunity for Galician sustainable wine production. Therefore, it is necessary to assess the potential of traditional cultivars to produce quality red wines. In this work, anthocyanin and flavonol evolution was followed in red berries from *Vitis vinifera* L. cv. Mouratón. The novelty of this study is that grapes were separately collected from two different positions (tips and shoulders) within the cluster, over ripening to examine the effects of berry position within the fruit cluster on the flavonoid compounds. Derivatives of five anthocyanins (malvidin, peonidin, petunidin, delphinidin and cyanidin) and derivatives of six flavonols (quercetin, myricetin, kaempherol, laricitrin isorhamnetin and syringetin) were detected in both positions within the cluster. Dynamic of anthocyanins (from 819 mg/kg to 1206 mg/kg in tips; and from 786 mg/kg to 1077 mg/kg in shoulders) and dynamic of flavonols (from 25 mg/kg to 41 mg/kg in tips; and from 18 mg/kg to 21 mg/kg in shoulders) confirmed their upward trends over ripening. Grapes located inside the shoulder bunch receive less sunlight radiation than those located inside the tip bunch and this fact could explain the different accumulation observed for both positions. These results can be useful for winemakers in order to obtain different final red wine quality.

56. Manuel Gutiérrez-Capitán; José-Luis Santiago; Jordi Vila-Planas; Andreu Llobera; Susana Boso; Pilar Gago; María-Carmen Martínez; Cecilia Jiménez-Jorquera (2013). Classification and Characterization of Different White Grape Juices by Using a Hybrid Electronic Tongue. *Journal of Agricultural and Food Chemistry*. 61:9325-9332

Abstract: A multisensor system combined with multivariate analysis is applied for the characterization and classification of white grape juices. The proposed system, known as hybrid electronic tongue, consists of an array of electrochemical microsensors and a colorimetric optofluidic system. A total of 25 white grape juices
representing the large variability of vines grown in the North-west Iberian Peninsula were studied. The data obtained were treated with Principal Component Analysis (PCA) and Soft Independent Modeling Class Analogy (SIMCA). The first tool was used to train the system with the reference genotypes -Albariño, Muscat à Petit Grains Blanc and Palomino- and the second to study the feasibility of the hybrid electronic tongue to distinguish between different grape juice varieties. The results show that the three reference genotypes are well differentiated in the PCA model and this can be used to interpolate the rest of varieties and predict their basic characteristics. Besides, using the SIMCA, the system demonstrates high potential for classifying and discriminating grape varieties.


- **58.** P. Gago; S. Boso; V. Alonso-Villaverde; J.L. Santiago; M.C. Martínez. (2014). Real ancient grapevine varieties were sometimes used as models by artisans when 4 decorating Baroque altarpieces. *Economic Botany.* (Aceptada en prensa)