Characterization of varieties named 'Caiño' cultivated from Northwest of Spain

Caractérisation des cépages appelés 'Caiño' cultivés au Nord-Ouest de l'Espagne

DÍAZ LOSADA E.[1]*, TATO SALGADO A. [1]; CORTÉS DIÉGUEZ S. [1]; RIO SEGADE S. [1];REGO MARTÍNEZ F. [1] & PEREIRA-LORENZO S.[2]

[1]Estación de Viticultura y Enología de Galicia. Ponte San Clodio s/n. 324270 Ourense, Spain.
[2]Departamento de Producción Vexetal. Universidad de Santiago de Compostela. Campus de Lugo, 27002 Lugo, Spain.

***Corresponding author**: evegadoc1@cesga.es, tel.: +34 988488033

Summary

The 'Caiño' cultivar was cultivated in Galicia (Northwestern Spain) before the invasion of grape phylloxera. Genetic diversity from this cultivar have been described and considered as originating in Galicia, 'Caiño Tinto', 'Caiño Bravo', 'Caiño Redondo', 'Caiño Longo' and 'Caiño Blanco'. 'Caiño' was recommended as a principal cultivar for new plantations in the 'Ribeiro' Designation of Origin (D.O.) due to its potential for producing quality wines. Four accessions were collected from the Gemplasm Bank of Grapevines in the EVEGA (Estación de Viticultura y Enología de Galicia), Xunta de Galicia. These accessions have been studied using ampelography, ampelometry, agronomic characters. Microsatellites were selected, as recommended, to distinguish grapevine cultivars and profiles were compared with previous results. Six microsatellite primers and morphological characteristics differentiated every accession and they may therefore be considered as different cultivars. Two cultivars from the EVEGA presented genotypes that had not been reported previously: 'Caiño Longo-EVEGA' and 'Caiño da Terra'.

Keywords: Caíño, ampelography, ampelometry, agronomy, microsatellites

Introduction

A Germplasm Bank of grapevines collected in Galicia (Northwestern Spain) was established during the 90s and updated later on in the Estación de Viticultura y Enología de Galicia, Xunta de Galicia. These grapevines are supposed to originate from this region by a selection process implemented by growers over a long period. Most of the accessions are not characterized, among which four accessions are included, recorded as 'Caiño Redondo', 'Caiño Longo', 'Caiño da Terra' and 'Caiño Astureses'.

The group of cultivars 'Caiño' is considered the oldest in Galicia (Northwestern Spain) and was recorded there before the invasion of grape phylloxera, *Daktulosphaira vitifoliae* (Fitch). The difficulty with identifying different strains within the 'Caiño' group resulted in the use of the generic term 'Caiño' (Consellería de Agricultura, 1986), although its enology potentiality indicated further differentiation. The first differentiation inside the 'Caiño' group in Northwestern Spain was made by Freijanes *et al*. (1997), who identified 'Caiño Bravo' and 'Caiño Gordo' by morphology. In addition, Santiago *et al*. (2005) described 'Caiño Blanco', 'Caiño do Freixo', 'Caiño Redondo' and 'Caiño Longo' as Galician cultivars. 'Caiño' from Galicia is recorded in the *Registro de Variedades Comerciales* (Chomé *et al.*, 2003) as 'Caiño Tinto', which is the type authorised to be planted, with 'Caiño Bravo' or 'Cachón' as synonyms (BOE, 2005).

In this study we present the characterization of the 'Caiño' accessions from the Germplasm Bank of the Estación de Viticultura y Enología de Galicia, Xunta de Galicia, determining the relationship between them, in the same way as those previously described. Potential to produce quality wine could be determined given that different accessions were planted in the same grove. This study has been

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Material and methods

This study comprises of four accessions corresponding to the 'Caiño Redondo-EVEGA', 'Caiño Longo-EVEGA', 'Caiño Astureses' and 'Caiño da Terra' cultivars. Each accession was grafted over rootstock (196-17 C) with up to eleven repetitions, in the Estación de Viticultura y Enología de Galicia, Xunta de Galicia, located in Leiro-Ourense (Spain). Grapevines were planted at 1.2 x 1.8 m, conducted by trellis and formed in espalier, orientated East-West. Each grapevine was pruned in a single cordon with four buds.
Six SSRs were considered the most appropriate to evaluate grapevines (European project GENRES081, http://www.genres.de/vitis/). PCR was conducted according to the methodology defined by (Martín *et al.* 2003).

Different variables corresponding to young shoots, leaves, bunches and berries were studied during 2005 and 2006 according to variables defined by the Office International de la Vigne et du Vin (OIV, 1983).

Ten leaves from a one-third section in the middle of the shoot were studied with NIS-Elements BR 2.30 software, according to the methodology proposed by Cid *et al.* (1994).
During 2005 and 2006, budburst, fertility, maturity, production and vigour were studied for 'Caiño Redondo-EVEGA', 'Caiño Longo-EVEGA', 'Caiño Astureses' and 'Caiño da Terra'. Mature grapes were processed based on methodology proposed for analysis of wines (DOCE, 1985) to evaluate pH, total acidity, tartaric acid and malic acid contents.

Results

Microsatellites

Recommended microsatellites for *Vitis* identification were useful in order to identify two new genotypes for the 'Caiño' cultivar not reported previously (Martin *et al*., 2003, 2006; Santiago *et al*., 2005). These two accessions are named in the Germplasm Bank as 'Caiño Longo-EVEGA' and 'Caiño da Terra'. The most differentiated genotypes of 'Caiño' by microsatellites were the two accessions of 'Caiño Redondo' and 'Caiño Freixo', most probably due to the smallest number of alleles in common with the others, only three with 'Caiño Freixo', and four and five with 'Caiño Redondo' and 'Caiño Redondo-EVEGA', respectively. 'Caiño Gordo' also showed only five alleles in common with the other accessions. 'Caiño Astureses', 'Caiño Blanco', 'Caiño Longo-EVEGA' and 'Caiño Longo' shared between eight and nine of the most frequent alleles presented in all the variants of 'Caiño', and 'Caiño da Terra' shared seven alleles.

Ampelography

We found differences between accessions for the anthocyanin coloration of the tips in young shoots, distribution of the anthocyanin coloration on the bud scales and in the density of prostrate hairs. 'Caiño Longo-EVEGA' presented lack of anthocyanin coloration of the tips in young shoots in, 'Caiño Redondo-EVEGA' showed high density of prostrate hairs in young shoots and leaves in (code OIV 004, 053), and 'Caiño Longo-EVEGA' had bud scales with anthocyanin coloration up to the medium (cod OIV 015-1, 015-2).
In the mature leaf, main differences were found in the general shape of petiole sinus (code OIV 079, 080), half opened in 'Caiño Longo-EVEGA', shaped in U, and, occasionally, with the sinus limited by the veins (cod OIV 081-2). Shape of teeth was convex on both sides in 'Caiño Redondo-EVEGA', and straight in 'Caiño Longo-EVEGA', 'Caiño Astureses' and 'Caiño da Terra' (code OIV 076). A shorter petiole, measuring the length of the middle vein, was found in 'Caiño Redondo-EVEGA' and 'Caiño Longo-EVEGA' (cod OIV 093).

Cylindrical bunches were found in 'Caiño Longo-EVEGA', 'Caiño Redondo-EVEGA' and 'Caiño da Terra', and conical in 'Caiño Astureses' (cod OIV 208). 'Caiño Longo' showed the longest bunches

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with the smallest width (cod OIV 202, 203). Berries were round in 'Caiño Redondo-EVEGA' and elliptical in 'Caiño Longo-EVEGA', 'Caiño Astureses' and 'Caiño da Terra' (cod OIV 223).

Ampelometry

Most of the quantitative traits showed significant differences for the four evaluated 'Caiño' accessions. 'Caiño Longo-EVEGA' was differentiated from 'Caiño da Terra' due to LA2 (relationship between length and width of the tooth in the main vein in the superior lateral) and ABC (angle between central and secondary inferior veins). 'Caiño Longo-EVEGA' showed the highest values for LA2 and the lowest for ABC. 'Caiño da Terra' differentiated from 'Caiño Astureses' due to ND (number of teeth between the main vein in the lateral superior and its secondary vein) and PLN1 (comparison of the distance between main and secondary vein, number of teeth in that distance and the length of the central vein in the leaf). 'Caiño da Terra' showed lower values for ND and the highest for PLN1.

Agronomic study

No significant differences were found in vigour between accessions when this was estimated from the weight of pruning wood. In addition, there was no significant difference in the number of clusters per plant. 'Caiño Longo-EVEGA' and 'Caiño Redondo-EVEGA' produced more grapes (kg/ha). In 'Caiño Longo-EVEGA' this was determined by the higher weight of the bunches. 'Caiño da Terra' produced a significant higher number of shoots from basal buds. 'Caiño Redondo' presented the highest number of inflorescences per basal shoot. Every accession showed a high percentage of effective basilar bud burst, over 8%. Potential fertility of basilar buds was similar to the lateral ones. Practical fertility (fertility related to the buds left after pruning) was higher in 'Caiño Redondo-EVEGA' and 'Caiño Astureses'.

'Caiño Astureses' and 'Caiño Redondo-EVEGA' produced musts with lower alcoholic graduation related to total acidity, which was reported previously by Santiago *et al*. (2005) for 'Caiño Bravo'. 'Caiño Longo-EVEGA' and 'Caiño da Terra' showed a tendency to produce wines with higher alcoholic graduation, because they produced a must with higher potential alcohol content (º Baumé), within the range of Galician cultivars quality wine production (Orriols *et al*. 2004; Díaz *et al*. 2005). Additionally, they showed higher equilibrium between alcoholic degree and acidity in the must related to the other two cultivars, which is more appropriate for producing quality wines.

Dicussion

'Caiño' is a policlonal cultivar. Genetically closest accessions shared most of the most common alleles presented in the 'Caiño' group. As happened in 'Malvasia' (Crespan *et al*., 2006), alleles with higher frequency could be detected in the 'Caiño' group. These alleles were present in the most closely related accessions. The most differentiated accessions of 'Caiño' were 'Caiño Redondo', 'Caiño Freixo' and 'Caiño Gordo' as was reported by Santiago *et al*. (2005).

Morphology confirmed the differentiation between the different genotypes found in this study. 'Caiño Longo-EVEGA' was the most different accession, more productive and with smaller practical fertility. 'Caiño Longo-EVEGA' and 'Caiño da Terra' were the most differentiated accessions in must characteristics, with the most appropriate equilibrium between alcoholic degree and acidity to produce quality wines.

In Galicia, clonal selection is being developed in autochthonous cultivars, considered by *Consellos Reguladores* as referents to produce quality wines. This clonal selection has been finished for 'Mencía' and is just begining for 'Brancellao' and 'Sousón'. According to the high polymorphism found for 'Caiño' in this study, further efforts should be focused on 'Caiño Longo-EVEGA' and 'Caiño da Terra' cultivars.

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