Research Note

Identification and classification of grapevine cultivars (*Vitis vinifera* L.) from the Balkan subgroup by phyllometric descriptors

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K e y   w o r d s : *subconvarietas balcanica* Negr.; cluster analyses.

Introduction: The correct differentiation and identification of grapevine varieties is very important for *Vitis* germplasm conservation, legislation and for wine industry. Nowadays, at least three different methods exist for cultivars characterization and identification: morphological description of the plant, usage of isoenzyme and microsatellite markers (Asensio *et al.* 2002). Description of the plant using morphological parameters is not expensive and applicable on the field or in the laboratory (Schneider 1996, Carneiro and Lima 1989). Traditional ampelography methods are based on the description of vine different organs. Biometry combined with visual observations is often used. Identification of grapevine variety using leaf parameters is one of the most important targets of ampelometry (Campostrini *et al.* 1993, Camussi *et al.* 1990) According to this, the leaf measurements have a high discriminating power. The present paper will focus on the application of leaf descriptors to evaluate their efficiency to determine the grapevine biodiversity.

Material and Methods: The 14 examined varieties belong to the *convarietas Pontica* Negr., *subconvarietas balcanica*, from which 10 are red varieties ('Blatina', 'Vranec', 'Kratoshija', 'Teran', 'Prokupec', 'Kadarka', 'Stanushina', 'Melnik', 'Mavrud' and 'Plovdina') and 4 are white varieties ('Sipon', 'Zilavka', 'Zupljanka' and 'Smederevka'). Some of this cultivars are autochthonous and have been cultivated since long time in the Macedonian vineyards ('Stanushina') while others have been introduced after the phylloxera appearance ('Prokupec', 'Teran',). 'Vranec' (synonym 'Vranac') transferred in Macedonia in 1950 (Nastev 1967) and 'Kratosija', are Montenegrin autochthonous grapevine varieties (Nastev 1967, Bozinovic 2010). The varieties are located in Skopje and Tikvesh vineyard area. Mature leaves were collected during the phenological stage veraison. The sample consisted of 10 leaves taken between the 8th and 12th node of a main shoot. The leaves were placed

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in the herbarium before being analyzed for phyllometric parameters. Nineteen phyllometric descriptors have been used according to the GENRES List of primary descriptors, part II (601, 602, 603, 604, 605, 606, 607, 608, 609, 610, 612, 613, 614, 615, 616, 617, 066-4, 066-5, 079-1). Also the "leaf method" parameters have been recorded (Schneider 1996): length of vein N1; distance between petiol sinus and lower sinus; distance of N3 / distance of N1; length of peduncle / length of N1; length of N2 / length of N1; length of N3 / length of N2; distance between petiole sinus and lower sinus / length of N3; angle N1 / N2; angle N2 / N3; width of leaf / length of N2; leaf area / length of N1; length of N4 / length of N1; angle between N1 i N2; angle between N1 i N3.). The parameters were processed by Cluster Analysis using the computer program STATISTICA 10.0. The leaf area was calculated by the computer program IMAGE J. According to the method of Martinez and Grenan (1999) we made the average leaf reconstruction of each cultivar.

Results and Discussion: The aim of this investigation was to classify the 14 cultivars in clusters according to the closeness of phyllometric characteristics. Two cluster analyses were made. For the first cluster analyses we used 19 phyllometric descriptors from the GENRES list of primary descriptors, part II. (IPGRI, UPOV and OIV. 1997 Grapevine descriptors). From the obtained results, making a diversification of cultivars at distance level v = 60, two groups were obtained (Fig. 1). In the cluster I were belong
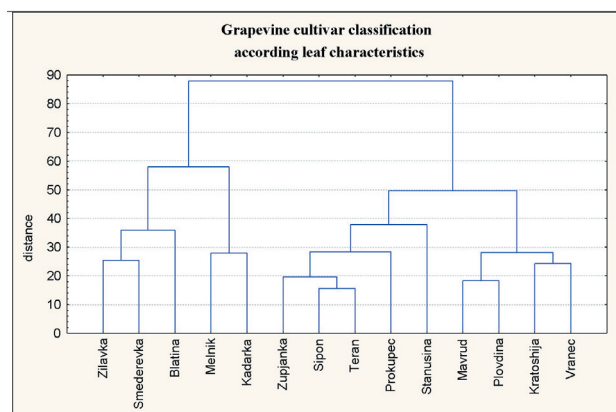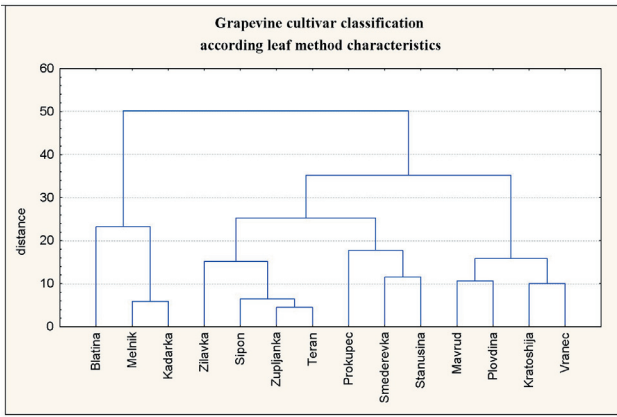

Fig. 1: Grapevine cultivar classification according to leaf characteristics (IPGRI *et al.* 1997).

cultivars 'Zilavka', 'Smederevka', 'Blatina', 'Melnik' and 'Kadarka'. All these cultivars have a closed petiole sinus (OIV 079-1) and this descriptor is a discriminant factor for level v = 60. All the other cultivars ('Zupljanka', 'Shipon', 'Teran', 'Prokupec', 'Stanushina', 'Mavrud', 'Plovdina', 'Kratoshija' and 'Vranec') belong to the second cluster. They have an open petiolar sinus. At a lower distance level (v = 28), according to the leaf characteristics, the cultivars 'Zilavka' and 'Smederevka'; 'Melnik' and 'Kadarka'; 'Shipon' and 'Teran'; 'Mavrud' and 'Plovdina' and 'Kratoshija' and 'Vranec' appeared to be the most linked. For the second cluster analysis the "leaf method" was adopted. In this method also the following parameters were included: leaf area, length of peduncle and width of leaf. Cluster analysis

Fig. 2: Grapevine cultivar classification according leaf method characteristics (SCHNEIDER, 1996).

will be comment only at level v = 26. Again we have a 4 classes division (Fig. 2). At the cluster I belong cultivars: 'Blatina', 'Melnik' and 'Kadarka'; to cluster II: 'Zilavka', 'Shipon', 'Zupljanka' and 'Teran'; to cluster III: 'Prokupec', 'Smederevka' and 'Stanushina' and to cluster IV: 'Mavrud', 'Plovdina', 'Kratoshija' and 'Vranec'. Only cluster IV did not change between the two classification methods. It probably means that the cultivars 'Mavrud' and 'Plovdina' and 'Kratoshija' and 'Vranec' have very similar leaf characteristics.

Conclusions: From the obtained results only preliminary conclusions could be stated. According to the phyllometric characteristics, the cultivars could be classified.

Only one group was coherent between the two methods of classification ('Mavrud' and 'Plovdina', 'Kratosija' and 'Vranec') suggesting similarity between these varieties.

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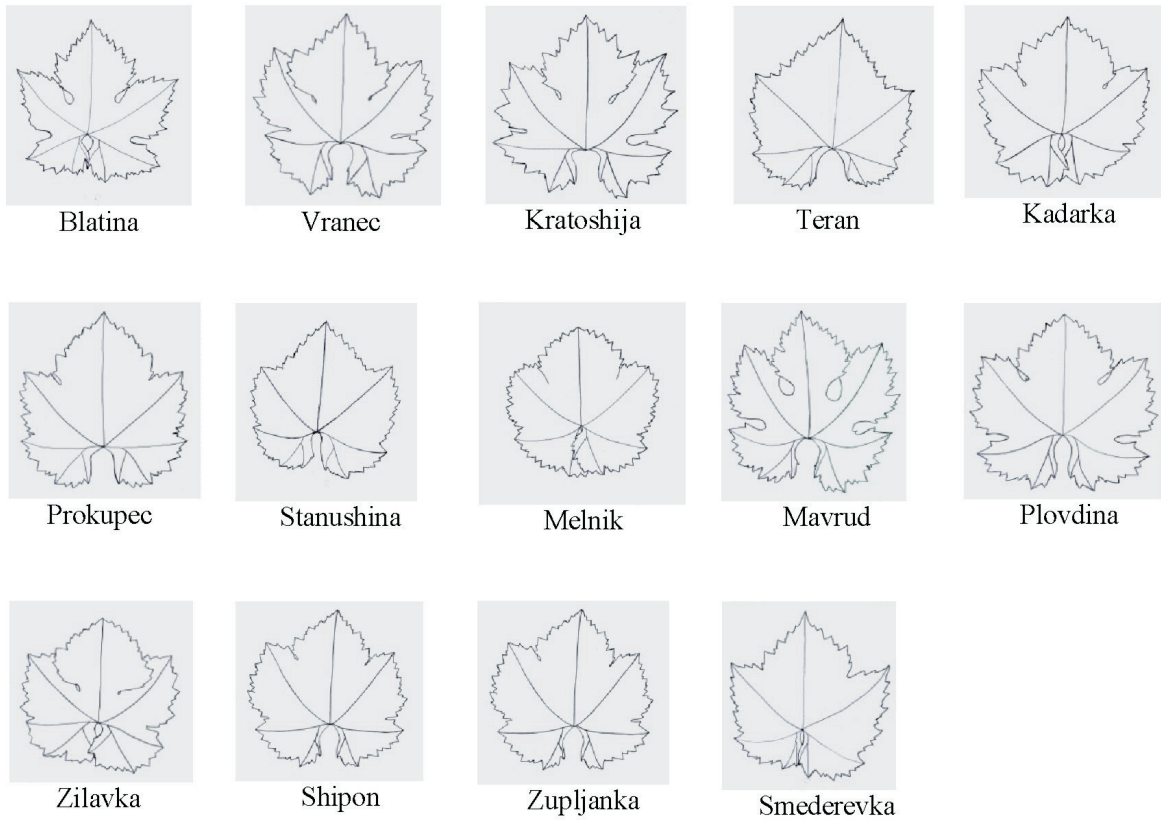
Fig. 3: Graphic reconstruction of the average leaf of each cultivar.