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THE VALUE OF RARE HISTORICAL — LOCAL AND TRADITIONAL — GRAPEVINE VARIETIES

Abstract: The noble wine grape (*Vitis vinifera* L. subsp. *vinifera*) is one of the oldest domesticated fruit crops and one of the most pleasant companions of human existence. It is estimated that 6000 to 8000 grape varieties exist in the world. Anderson and Aryal found 1.271 varieties in cultivation, from which Cabernet Sauvignon, Merlot and Tempranillo rank on the top with respect to red wine production and for white wine the rank list is headed by Airen followed by Chardonnay and Sauvignon blanc. The authors confirm the phenomenon of variety concentration.

On the other hand and since about twenty years rare traditional varieties experience a renaissance. Wine growers and consumers are curious to learn more about this neglected resource. Examples are Albarino from Galicia, Nero d'Avola from Sicily and Viognier from Rhone Valley.

Various aspects are described regarding the value of these minor varieties including cultural heritage, adaptation to the ecological conditions of their birth place, historical aspects comprising knowledge on origin, spread, migration route and synonymy. The recently rediscovered Blaue Zimmettraube an autochthonous variety of the historical region Untersteiermark, represented the missing link for the full parentage of Blauer Portugieser (Blaue Zimmettraube x Silvaner) indicating that the cradle of Portugieser is not Portugal but northeast Slovenia. Such findings support the marketing of wines from local varieties, representing specialties and niche products and thus providing a higher added value. Another considerable aspect is the creation of typicality, which is the inseparable alliance of denominations of autochthonous varieties with a region or a country.

The ECPGR Grant Scheme Activity "On-farm inventory of minor grape varieties in the European *Vitis* Database", promoting long-term preservation of minor varieties via the implementation of an European network is presented.

Key words: *diversity, grape, on-farm preservation, cultural heritage, marketing aspects*

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INTRODUCTION

The noble wine grape (*Vitis vinifera* L. subsp. *vinifera*) is one of the oldest domesticated fruit crops and one of the most pleasant companions of human existence. According to McGovern [1] its consumption was mind-altering, stimulating inspiration and thus advancing civilization achievements. It is estimated that 6000 to 8000 grape varieties exist in the world. Until recently a non-negligible part of this huge diversity, namely minor varieties were nearly forgotten. Reasons that contributed to the decline and abandon of these traditional varieties were *Phylloxera* invasion in the middle of the 19th century, clone selection, abandon of mixed plantings, restrictive national wine laws and the worldwide concentration on a still decreasing number of wine varieties.

Anderson and Aryal [2] found 1.271 wine varieties in cultivation, from which Cabernet Sauvignon (290.091 ha), Merlot (267.169 ha) and Tempranillo (232.651 ha) ranked on the top with respect to red wine production and for white wine the rank list was headed by Airen (252.180 ha) followed by Chardonnay (196.336) and Sauvignon blanc (110.138 ha). The authors confirmed the phenomenon of variety concentration. According to their compilation in 2000 only 21 and in 2010 only 15 varieties for wine production were planted on half of the world's grape area.

In the 1970s the loss of grape genetic resources became evident, mainly being due to man-made activities [3]. All kind of grape germplasm was concerned: *Vitis* species and derived cultivars resistant to biotic and abiotic stress factors, the ancestor of the cultivated grapevine *Vitis vinifera* L. subsp. *sylvestris* and in particular the rare traditional *Vitis vinifera* L. subsp. *vinifera* varieties, which had survived in old vineyards. In consequence the two institutions Organisation for Wine and Vine (OIV) [4] and Bioversity [5] created public awareness via resolutions and a set up of urgent tasks. Subsequently in the 1990s collecting, preserving and evaluating of neglected minor varieties started [6, 7, 8]. In the following years all over Europe collection of local grape genetic resources was pursued by a huge number of projects, supported by research and regional and national governments [9, 10, 11, 12].

Despite of the extensive spread of the three handfuls of renowned cultivars [2] and the rarity of minor traditional varieties they can be found to a certain extent in vineyards, which are maintained by elder growers and wine and grape enthusiasts preserving tradition. These historical relicts harbor a huge reservoir of useful traits with a high potential for diversification. This article will focus on cultural, historical and marketing aspects as well as on the intrinsic value of variability which was created since antiquity and more intensively during the past centuries.

DIVERSITY AND GENETIC EROSION

Presumably the simple vegetative propagation led to the early cultivation of grapevine in Transcaucasia or southeast Anatolia around 8000 years ago [1] and thus the species is considered as one of the first domesticated fruit crops [13]. Selected tasty genotypes were easily spread by cuttings, which is documented by archaeological findings [1, 14]. In the first millenaries after domestication new varieties might have been created. However, it can be assumed that the number remained small, given that first variety designations appeared in antiquity only. Vergil (70–19 B. C.), Columella (1st century AC) und Plinius the Elder (23–79 AC) mention around 100 different names, nevertheless indicating that much more varieties exist. On the other hand Columella recommends the farmers to grow the most appreciated variety and to use maximum four to five varieties in his property. In addition he suggests not mixing them but rather planting them separately [15]. Taking into account that during the Roman Empire quality aspects seem to have had high priority and that from the second century AD onwards until around 1.000 AD documentation about varieties is missing all over Europe, it is most likely that during these 900 years cultivated grapevine diversity was rather low. The increase of varieties in the 2nd millennium AD is supported by the analysis of genetic relationships revealing the existence of "founder"-varieties like Heunisch [16] in northern Europe and the female Heben [17] on the Iberian Peninsula. Being the principal variety in their areas they produced more than 100 offspring each with neighboring varieties, in particular Pinot and Alfrocheiro, respectively, pointing in addition to bottlenecks [18]. How varieties were created or selected is not documented and when this phenomenon stopped or culmination was achieved is not known. Decline of diversity started with the introduction of the mildew diseases and Phylloxera invasion in the 2nd half of the 19th century. Later the abandon of mixed plantings and strict clone selection contributed equally to the loss of the cultivated grape as well as restrictive wine legislation and concentration on noble varieties to mention the most important factors. Because the value of traditional varieties was recognized by research and politics, by wine growers and wine drinkers the speed of grape biodiversity decline slowed down.

The hypothetical curve in figure 1 illustrates how the diversity of the cultivated grape *Vitis vinifera* may have developed in time. To create a full picture about the preservation status of the germplasm of the species *Vitis vinifera* in Europe, the same figure visualizes also the situation of *Vitis sylvestris*. One hundred to one hundred and fifty years ago Vavilov [19] and Bronner [20] reported about dense populations in Transcaucasia and on northern Europe river banks, respectively. Since then in particular anthropogenic pressure on

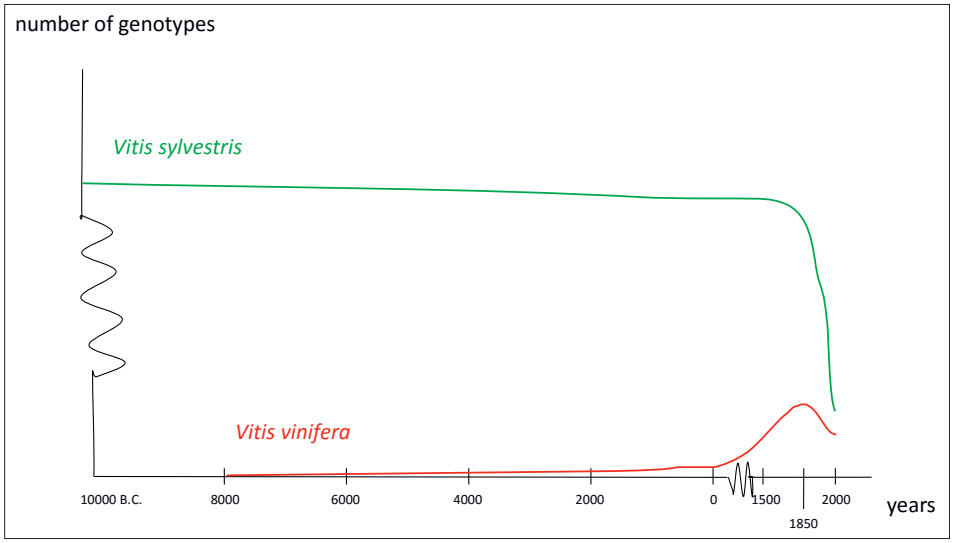

Figure 1: Hypothetical fluctuation of Vitis sylvestris individuals and Vitis vinifera varieties in Europe illustrated on a timeline

habitats and Phylloxera caused a severe loss of wild grape diversity [21, 22, 23, 24]. Nothing is known about the amount of variability at that time and even today the number of still existing individuals remains obscure. A glimmer of hope are the discovery of so far unknown populations of the wild subspecies in natural reserves or areas where human impact is moderate [25, 26, 27, 28].

VALUE OF LOCAL OR TRADITIONAL GRAPEVINE VARIETIES

In the following aspects were gathered illustrating how neglected varieties contribute to an enrichment also against the global trend and the spirit of time.

CULTURAL HERITAGE AND HISTORY

Most of the rare historical grape germplasm was cultivated and estimated by many generations of wine growers. Thus, it is part of our cultural heritage. The grape was maintained because of particular traits and because of tradition. In many cases their existence deals with past times and consequently by telling the variety's story and by drinking the relicts wine the past can be "touched", respectively, smelled and tasted. Even the plant itself is still alive and can be "touched". An example is given: Viticulture in Jena (Thüringen/Germany) is documented since 1185. Vineyards were established on the steep

slopes of Jenzig Mountain. In the 15th and 16th century around 700 ha of vineyards existed on the land of Jena and the renowned wine was exported to surrounding villages. Nearly every citizen of the town had some direct or indirect profit of this fruit crop. In the 16th century owing to frequent frost damages, loss of territory by wars and the high taxes which had to be paid now by neighboring cities, foundation of the university, followed by an increase of population and hence transformation of lowland vineyards in cereal fields, the decline of viticulture started. In addition it was easier to rent rooms to students than to cultivate vineyards on the mountains slope. Viticulture was completely abandoned at the end of the 19th century [29]. At the beginning of the 21st century members of the Jena wine association discovered around 200 tiny grape vines in the natural reserve of Jenzig. Identity of the plants was assessed via ampelographic and genetic analysis. Mainly Tauberschwarz, Heunisch weiss, Silvaner grün and Pinot noir were found. More interesting was the coexistence with Süssschwarz, Peridac and Lagler weiss. These varieties were found before as no-name-plants in more than 100 year old vineyards mainly in eastern Germany [9]. They were identified via ampelography using drawings and descriptions from the 19th century. Further analysis by using 24 SSR-markers for genetic fingerprinting revealed first and second degree genetic relationship to Traminer and first degree relationship to Heunisch weiss, see figure 2.

Besides these offspring it turned out that Traminer and Heunisch weiss are progenitors from further genotypes detected in old vineyards proving that the two varieties contributed highly to the development of the German variety assortment. The rediscovered Süssschwarz revealed to be the missing link in the pedigree of Affenthaler, Heunisch Schwarz and Tauberschwarz. Owing to its high presence on the Jenzig Mountain slopes (Photo 1), Tauberschwarz might have covered most of the area also centuries ago.

The combination of historical studies, prospection activities and maintenance of the terrain, ampelography and genetic analysis shed light on past

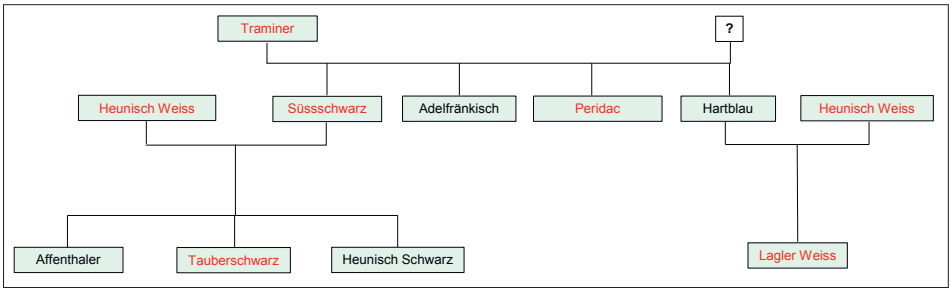

Figure 2: Pedigree involving varieties from old Jena-viticulture. Varieties in red letters were detected on the mountain slopes around Jena

Photo 1: Tauberschwarz vineyard, a relic of the Middle Ages. Rows are oriented diagonal to the contour line, probably to avoid erosion. Jena is in the background (Photo by Karsten Kirsch, Verein Jenaer Weinbau e. V.)

times and on an absolutely distinct variety composition than today. In addition the historical varieties around Jena witness the practice and preference of ancestral communities in context with their territory.

ADDED VALUE FOR WINE REGIONS

About 200 km south west from Jena is located the Tauber River valley, where in 1959 a Tauberschwarz vineyard with 400 plants was rediscovered. Since 1996 the grape is classified for Main-Tauberkreis and Hohenlohe. For that wine growing area Tauberschwarz was first mentioned in a decree of the Convent Würzburg in 1726. To safeguard the traditional variety and to enhance the support of winegrowers it was included in the Arche Noah of Slow Food® Germany in 2007. Being named after the river an inseparable alliance of the ancient variety with the region was created, called typicality. It represents a natural capital in the sense of a surplus for the local economy. The light red wine is marketed as a specialty of the Tauber. In the meanwhile around 10 ha of the variety do exist.

MARKETING ASPECTS

In times of increasing uniformity particular wine drinkers are seeking the outstanding and unique product. For these people a new wine variety which did not exist on the market before is special and notably attracting. In addition the integration of the "in days of yore" appreciated diversity represents an enrichment of the existing variety spectrum, promoted by attributes like "indigenous, historical, traditional, local, rare, neglected, threatened, forgotten,

lost or recovered". The narrow liaison to history calls nostalgic emotions. Grapevines telling a story inspire the communication between growers and consumers increasing the interest in the product. Wine tastings with these minor varieties and in combination with exclusive culinary events are "en vogue". The rariness of these niche cultivars allows higher prices and hence achieves a higher added value. For example wines from Grünfränkisch, Heunisch weiss or Orleans gelb cost around 15 Euro. Because Gänsfüsser was mentioned in a regulation by the Palatinian duke Johann Casimir in 1584, the bottle is sold for 15,84 Euro. A higher added value is achieved.

ORIGINAL PROPERTIES

In the past and today breeding and selection goals are high gustative properties and desired agronomic features like adaptation of the variety to ecological conditions. Some of the rare local varieties originated in the 12th and 13th centuries, when temperatures corresponded to the warm phase of today. Thus, with respect to climate change some of the forgotten varieties could be of interest today. Some of them are late ripening, therefore preserving acidity. Others accumulate less sugar and are thus suited to produce light wines. Owing to original aroma profiles and polyphenolic compounds each traditional variety contributes a distinct and supplementing taste to the organoleptic diversity existing in grapevine. These properties have the potential to create and offer a new and original product for the wine consumer. Besides marketing aspects the old germplasm is a rich source and reservoir of diversity for research and breeding also in terms of drought resistance and other abiotic or biotic stress factors.

UNRAVELING OF THE VARIETIES ORIGIN AND SPREAD

The origin of grape varieties, their spread, possible migration routes, synonymy and relatedness to other varieties is of further interest for the whole grape community. This knowledge contributes to a better understanding of the past for example with respect to evolution of the variety assortment, importance and geographical distribution, replacement of parents by better performing offspring and point to missing links when parents were not found and thus considered extinct. In the past centuries even millennia, hundreds of varieties travelled preferably from east to west [30]. In this context the most interesting cultivar is Heunisch weiss. Descendants are found from Moldavia to Greece in the East and Portugal in the west. More than 200 synonyms exist and by travelling from one region or country to the next it completely changed its name [31]. Figure 3 illustrates a hypothetical migration route and examples for distinct synonymous designations are given.

Figure 3: Hypothetical migration route of Heunisch weiss.
Local synonyms were placed in areas of common use

Full and half parentages assist to speculate about the region or country of origin of the variety. The recently rediscovered Blaue Zimmettraube, represented the missing progenitor for the full pedigree of Portugieser blau (Zimmettraube blau x Silvaner grün) and Blaufränkisch (Zimmettraube blau x Heunisch weiss). The Zimmettraube blau, bearing female flowers was cultivated in the 19th century in Lower Styria together with Silvaner grün and Heunisch weiss. Therefore, it was proposed that the cradle of Portugieser blau is not Portugal but rather north east Slovenia [32]. The progenitors of Merlot noir (Magdeleine Noire des Charentes x Cabernet franc [33]), Tempranillo (Albillo Mayor x Benedicto [34]) and Plavac mali (Primitivo x Dobricic [35]) were cultivated or detected via prospections near or within their distribution range Bordelais, Rioja and Dalmatia respectively. Magdeleine Noire des Charentes, discovered first in 1996 in Bretagne and later in Charante and Gers [36] revealed to be genitor of several varieties of south-west France, such as Cot and thus proving its potential as a gene donor for wine quality. The parent-offspring relationship between Vranac and Tribidrag (=Primitivo) proves that the cradle of Vranac most likely has to be sought in Montenegro or Croatia [16].

ON-FARM PRESERVATION

Since the end of the 20th century minor grape varieties gained increasing popularity. Wine growers and consumers got interested and wine journalists as well. In consequence some neglected varieties like Albarino from Galicia,

Nero d'Avola from Sicily and the Negro amaro from Apulia, Viognier from Rhone Valley, and Jarrosuelto from Spain attained reputation and were thus safeguarded. However, less known local cultivars, planted on a small area or grown in one or two vineyards only or maintained in a grapevine repository are subjected from a high up to an extremely high risk of extinction. The willingness of grape growers to include rare historical varieties in their variety assortment would disburden grapevine collections, where the maintenance is often restricted to a small number of vines. A higher number of plants and clones in a winery lead to knowledge about appropriate cultural practices through evaluation of agronomic features, oenological properties and wine quality. In addition a larger number of plants may assist to broaden the genetic basis by mutations, creating clone diversity.

ECPGR GRANT SCHEME ACTIVITY "GRAPEONFARM"

The ECPGR activity "On-farm inventory of minor grape varieties in the European Vitis Database" [37] aims at the documentation of on-farm preservation in the European Vitis Database (www.eu-vitis.de) and to create private and public awareness. The site is addressed to wine growers and wine consumers at once. The tool assists at monitoring preservation of the old and rare varieties, exchanging experience, facilitating access to propagation material and informing wine consumers where to find outstanding products that not everybody has. Further efforts are underway. Within the scope of the ECPGR-activity Vitis Working Group members established a table where different stages of vulnerability are defined and described. Four threat categories were set up: critically endangered, endangered, vulnerable and nearly threatened. The table is basic document for advancing the discussion on the improvement of the frame conditions for the legal growing of rare traditional grape varieties.

CONCLUSION

Genetic variability in general represents a huge treasure, a reservoir for useful traits and a high potential for diversification. The "Strategic Plan for Biodiversity 2011–2020 and its 2050 Vision" aiming as key purpose at slowing the rate of biodiversity loss adopted as part of the strategic plan the following vision: "Living in harmony with nature" where "by 2050, biodiversity is valued, conserved, restored and wisely used, maintaining ecosystem services, sustaining a healthy planet and delivering benefits essential for all people" [37]. All aspects can be adopted for grapevine as well.

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Erika MAUL

VRIJEDNOST ISTORIJSKI RIJETKIH LOKALNIH I AUTOHTONIH SORTI VINOVE LOZE

Sažetak

Plemenita vinova loza (*Vitis vinifera* L. subsp. *vinifera*) predstavlja jednu od najstarijih domaćih kultura i jednu od omiljenih biljaka koje prate ljudsku egzistenciju. Procjenjuje se da postoji između 6000 do 8000 sorti vinove loze na svijetu. Anderson i Aryal su otkrili da se gaji 1.271 sorta, od kojih su *cabernet sauvignon*, *merlot* i *tempranillo* vodeće sorte za proizvodnju crvenog vina, a za proizvodnju bijelih vina *airen*, zatim *chardonnay* i *sauvignon blanc*. Autori potvrđuju fenomen zastupljenosti sorti.

Sa druge strane, već dvadesetak godina vlada interesovanje za autohtone sorte i ono se konstantno povećava. Proizvođači vina i potrošači ponovo otkrivaju sorte vinove loze, od kojih nekima skoro da prijeti nestajanje. Primjeri su: *albarino* iz Galicije, *nero d'avola* sa Sicilije, *viognier* iz Doline Rone.

Opisani su različiti aspekti vrijednosti ovih manje zastupljenih sorti, uključujući kulturo nasljeđe, prilagođavanje ekološkim uslovima njihovog rodnog mjesta, istorijski aspekti koji obuhvataju znanje o porijeklu, širenju, migracijskom putu i sinonimima. Nedavno ponovo otkriveni *blaue zimmettraube*, autohtona sorta iz regiona Untersteiermark u sjeveroistočnoj Sloveniji, predstavlja nedostajuću kariku za potpuno roditeljstvo *blauer portugisera* (*blaue zimmettraube x silvaner*) i *blaufrankischa (blaue zimmettraube x weisser heunisch*). Ovakva otkrića su izuzetno korisna za marketing vina od autohtonih sorti, koja često predstavljaju specijalna vina i time omogućavaju visoku dodatu vrijednost. Drugi značajan aspekt je stvaranje tipičnosti, što označava karakterističnost autohtonih sorti u određenom regionu ili državi.

Aktivnosti granta šeme ECPGR pod nazivom, „Popis lokalnih *on farm* sorti vinove loze u evropskoj Vitis bazi podataka", skoncentrisane su na promociju dugoročnog očuvanja manje zastupljenih sorti, sa ciljem implementacije evropske mreže.

Ključne riječi: raznovrsnost, grožđe, čuvanje, marketinški aspekti