

П.К. Заманиди, д-р наук,  
Афинский институт виноградарства  
Е.М. Валвулиду, д-р наук,  
Афинский институт почвоведения, Афины, Греция  
Л.П. Трошин, д-р биол. наук, профессор  
Кубанский госагроуниверситет

## ПАНАГИЯ СУМЕЛА: НОВЫЙ ВЫСОКОКАЧЕСТВЕННЫЙ ВИННЫЙ МУСКАТНЫЙ ЧЕРНОЯГОДНЫЙ СОРТ ВИНОГРАДА С ОКРАШЕННОЙ МЯКОТЬЮ И СОКОМ

*Сорт Панагия Сумела является новым: выведен в Греции в результате творческого сотрудничества Афинских институтов виноградарства и почвоведения и Кубанского госагроуниверситета в 2004 году путем скрещивания сорта Кримбас с Аликантом Буше. Авторы: Пантелеи Заманиди, Евангелия Валвулиду и Леонид Трошин.*

*Гибридизация, сорт, молодой побег, лист, соцветие, гроздь, ягода, семя, урожайность, засухоустойчивость.*

*Hybridization, variety, young arm, leave, blossom, cluster, berry, seed, yielding capacity, drought-resistance.*

Сорт по морфофизиологическим характеристикам включен в группу сортов бассейна Черного моря (*convar. pontica subconvar. balcanica* Negr.). Продолжительность продукционного периода 146-155 дней. Рост побегов сильный. Степень вызревания лозы очень высокая. Урожайность 30-40 т/га. Процент плодоносных побегов более 90. Средняя масса гроздей 350 г. Отличается высокой зимостойкостью, засухоустойчивостью и повышенной устойчивостью к грибным болезням в сравнении с мускатными сортами *Vitis vinifera*. Распускающаяся почка распознается по рыжевато-желтоватому цвету с виннокрасными оттенками на верхушке. Верхушка молодого побега зелено-бронзового цвета с винно-красной каймой с сильным паутинистым опушением. Первый и второй листочки зелено-пепельного цвета, очень сильно опушенные с обеих сторон, 3 и 4 листья зеленые с бронзовыми оттенками с верхней стороны, со средним опушением на верхней стороне листа и с очень сильным – на нижней. Побег слабо опушенный. Лист симметричный. Площадь пластинки листа большая или средняя, темно-зеленого цвета, пятилопастная, средней рассеченности, пузырчатость верхней поверхности пластинки средняя. Краевые зубцы прямые по обе стороны. Верхние и нижние боковые вырезки закрытые с просветом. Форма черешковой выемки закрытая, лопасти пепельно-зеленого цвета с нижней стороны, перекрываются. Цветок гермафродитный, нормальный.

Introduction.

Global warming is expected to cause great changes in continental, biological and socioeconomic characteristics, giving rise to the need to create new varieties of grapevines distinguished by their high adaptation to altered ecological conditions so that the group of grapevine varieties in every ecological-geographical zone is improved. The new variety P. Soumela is an important development in agricultural production and can improve the quantity and quality of yield and profitability of production.

The main methods of breeding are hybridization, clone selection and artificial mutagenesis. Usually, selection has the purpose of creating new varieties improved in yield and quality compared to the best standard varieties. To attain this aim it is necessary to choose the initial material for selection and the methods to be used. The most effective way to produce new grapevine varieties is artificial hybridization, taking the best old high yielding home materials and recently introduced varieties of Europe and Asian grapevines from different ecological-geographical groups. Thus one genotype combines the desired properties of the parent components.

Selection of grapevines with the method of hybridization includes the following stages: search and choice of parents, practical cross-pollination (castration of flowers, isolation of inflorescence, stocking of paternal anthers variety, pollination), harvesting of hybrid seeds, growing of seedlings and their assessment, selection of candidates, their competitive tests, writing documents, etc. The process of creating new varieties through hybridization is very labor intensive, long and difficult,

because hybrid seeds have low germination and most of the seedlings have a long growing period. The period from sowing to the beginning of fruit-bearing is typically 3 to 7 years, though it may be up to 10 years or more in individual cases. For this reason, large plots must be occupied for many years as a hybrid nursery, for preserving the old plants, etc.

Perennial studies of the gene bank showed that the assortment of wine red varieties in the world is not large and is mainly represented by three with muscat aroma varieties: Muscat Hamburg, Muscat black and Muscat pink. These varieties do not produce wine with a deep red color [1].

#### Materials and Methods.

Vavilov N.I., the founder of theoretical exercises and methodological guidelines for breeding and genetics, has established (inherited) a basic rule of selection that any work on genetic improvement of varieties, from whatever plant species, must begin with a study of aboriginal assortment of the district for which it is conducted, the audit of what we leave to nature, centuries of natural and artificial selection (people's selection) [11].

Greece is one of the ancient hearths of genesis and formation of the cultivated grapevine. The ancient culture and the favorable natural conditions have contributed to the concentration in Greek territory of a great diversity of forms. During the long process of evolution of natural and artificial selection, frequently in closed conditions on the numerous islands, a variety of assortment occurred.

Studies over a long time period of the varieties *Vitis vinifera* L. subspecies *sativa* D.C. in the Collection Department of the Athens Grapevine Institute allowed a well-grounded scientific choice of parents for cross-pollination. To produce new varieties it is cross-pollinated within *Vitis vinifera* L. For a parent form it used varieties from different ecological-geographical groups. The new variety was created in the vineyards of the Athens Grapevine Institute, situated in the North-East part of Athens (37° 58' latitude and 23° 24' longitude), at an elevation approximately of 200 m. The climate of the region is subtropical, Mediterranean, with hot, dry summers and mild winters. The annual precipitation is 350-600 mm, with precipitation, mainly rain, falling during the winter months. The maximum temperatures reach +46°C in the shade (2007), and the critical point for the grapevine temperatures (+40°C and more) are reached in this zone every year. The soil is calcareous, with a sandy clay loam texture, gravely, well drained and with an slightly alkaline pH reaction, and low organic matter. The individual assessment of seedlings was carried out in 2001. A total of 2000 seedlings in different combinations of cross-pollination were investigated with the aim of determining the possibility of producing relatively drought-resistant seedlings of European-Asian origin. Great importance was attached to high quality, drought-resistance and other economically important properties. The assessment was carried out in comparison with the best standard variety *Vitis vinifera* L.

Traditional methods were used to study the genetic bank and determine economically valuable forms and variants, the choice of initial forms for cross-pollination, hybridization, collection and preparing seeds for sowing, the growing of hybrid seedlings, the choice of candidates,

preparation of wine and degustation, and assessment of the wine [4-9]. A detailed study of the new variety: origin, initial material, ecological-geographical group, description of the main botanical particularities, agro-biological and technological assessments and the final conclusions on recommended zones in which it can be cultivated was made by traditionally accepted methods [3, 8]. The morphological description with the following coding of peculiarities was made using the Methodology of the International Organization of Grapevine and Wines [2].

#### Results and discussion

Crosspollination in 2004 of the varieties Krimbas S Alicante Bouchet by the author P. Zamanidis produced the grapevine variant P. Soumela. Synonym: Soumela. The mother plant was a Greek high-yielding variety from the Black Sea coast named Krimbas [13], which has been accepted into the group of black sea grape varieties (*convar. pontica subconvar. balcanica* Negr.). Krimbas has the following characteristics. The production period is 146-155 days, the growth of shoots is 2,1-3,0 m. The average mass of cluster is 300 g and the grapes are medium, rounded. The percent of fruit-bearing shoots is 90 and the yield is very high, reaching 25-30 t/ha. It has higher resistance to frost, drought and fungal diseases than Muscat *Vitis vinifera* L. varieties. The flower is hermaphrodite, the ovary is low conical and the pollen is fertile.

The cluster is middle, conical, middle density. The berry is middle size, oval, black-blue color and the skin is thick. The juice is not colored with Muscat after taste. The paternal plant was a world-wide color variant Alicante Bouchet [10].

The new variety P. Soumela is similar in its morphological characteristics to the wild grapevine *ssp. silvestris* Gmel. and in its morphological-biological characteristics to the ecological-geographical group *convar. pontica subconvar. balcanica* Negr. var. *greek Zaman*. [12]. A description of variety follows (Figures 1-10):

- 001 – form of the young shoot tip: 7 – open;
- 002 – distribution of anthocyan coloration of tips of the young shoots: 2 – piping;
- 003 – Intensity of anthocyan coloration of tip of the young shoots: 1 – absent or very weak;
- 004 – density of prostrate hairs of tip: 9 – very dense;
- 005 – density of erect hairs of tip: 1 – none or very sparse;
- 006 – attitude of shoot: 1 – erect;
- 007 – color on dorsal side of internodes: 1 – green;
- 008 – color of ventral side of internodes: 1 – green;
- 009 – color of dorsal side of nodes: 1 – green;
- 010 – color of ventral side of nodes: 1 – green;
- 011 – density of erect hairs of the nodes: 1 – none or very sparse;
- 012 – density of erect hairs on internodes: 1 – none or very sparse;
- 013 – density of prostrate hairs on the nodes: 5 – medium;
- 014 – density of prostrate hairs on the internodes: 5 – medium;
- 015 – anthocyanin coloration of buds: 3 – weak;

016 – distribution of tendrils on the shoot: 1 – discontinuous;  
 017 – length of tendrils: 7 – long;  
 051 – colour of the upper side of the young leaf (before flowering): 1 – green;  
 052 – intensity of the anthocyanin coloration of 6 distalleaves: 3 – weak;  
 053 – density of prostrate hairs between veins: 5 – medium;  
 054 – density of erect hairs between veins: 1 – none or very sparse;  
 055 – density of prostrate hairs on main veins: 5 – medium;  
 056 – density of erect hairs on main veins: 1 – none or very sparse;  
 065 – size of mature leaf: 5 – medium;  
 066 – length of mature leaf: 5 – medium;  
 067 – shape of blade of the mature leaf: 3 – pentagonal;  
 068 – number of lobes of the mature leaf: 3 – five;

069 – color of the upper side of blade: 5 – medium green;  
 070 – anthocyanin coloration of the main veins on the upper side of the blade: 1 – absent or very weak;  
 071 – antocyanin coloration of the main veins on the lower side of the blade: 1 – absent or very weak;  
 072 – goffering of blade of the mature leaf: 1 – absent;  
 073 – undulation of blade between main and lateral veins of the mature leaf: 2 – only near the petiole;  
 074 – profile (cross-section elevation) of the mature leaf: 2 – striate;  
 075 – blistering of upper side of the mature leaf: 5 – medium;  
 076 – shape of teeth (end of leaf): 2 – both sides concave;  
 077 – length of of teeth: 5 – medium;  
 078 – length of of teeth compared with their width at the end of the base: 5 – medium;  
 079 – general form of petiole sinus of the mature leaf: 7 – lobes overlapping;  
 080 – shape of base of petiole sinus: 1 – U-shaped;



Figure 1-2 – Top of the yong shoots grape P. Soumela



Figure 3-4 – Grape leaf of P. Soumela

081 – particularities of petiole sinus: 1 – none;  
082 – shape of upper leaf sinuses: 3 – lobes slightly overlapping;  
083 – shape of base of upper leaf sinuses: 1 – U-shaped;  
084 – density of prostrate hairs between the veins (lower side): 5 – medium;  
085 – density of erect hairs between the veins (lower side): 1 – none over very weak;  
086 – density of prostrate hairs between the main veins (lower side): 5 – medium;  
087 – density of erect hairs between the main veins (lower side): 5 – medium;  
088 – prostrate hairs between the main veins (upper side): 1 – absent;  
089 – erect hairs between the main veins (upper side): 1 – absent;  
090 – density of prostrate hairs on petiole: 1 – none or very sparse;  
091 – density of erect hairs on petiole: 1 – none or very sparse;  
092 – length of petiole: 5 – medium;  
093 – length of the petiole compared to middle vein: 5 – equal;  
101 – cross (diametrical) section of woody shoot (after falling of leaves): 2 – elliptical;  
102 – surface of woody shoot: 3 – striate;  
103 – main color of woody shoot: 4 – reddish-brown;  
104 – lenticels of body shoot: 1 – absent;  
105 – density of erect hairs of nodes: 1 – none or very sparse;  
106 – density of erect hairs of internodes: 1 – none or very sparse;  
603 – aim of use: 4 – industrial (wine, juice, grape);  
604 – percentages of shoot ripeness, %: 9 – very high, more than 95%;  
605 – length of year old shoots: 7 – high;  
151 – sex of flower: 3 – hermaphrodite;  
501 – percent of berry set: 9 – very high;  
152 – insertion of the 1st inflorescence (first raceme): 2 – on 3<sup>rd</sup> or 4<sup>th</sup> node;  
153 – number of inflorescence per shoot: 2 – 1, 1 to 2 inflorescence (racemes);  
154 – length of the proximal inflorescence (first raceme): 5 – medium;  
201 – number of bunches per shoot: 2 – or 1, 1 to 2 bunches;  
202 – size of bunches (length and width): 5 – medium;  
203 – length of bunches: 5 – medium;  
204 – density of bunches: 5 – medium (compact);  
205 – number of berries per bunches: 5 – medium;  
206 – length of peduncle (stem): 5 – medium;  
207 – lignifications of peduncle (wooded stems): 3 – weak;  
220 – size of berry (length and width): 5 – medium;  
221 – length of berry: 5 – medium;  
222 – uniformity (homogeneity) of the size: 2 – uniform;  
223 – shape of berry: 5 – ovate;  
224 – berry cross-section: 2 – round;  
225 – color of skin pellicle: 6 – blue-black;  
226 – uniformity of skin color: 2 – uniform;  
227 – bloom of berry (wax film, with thickness of cuticle): 7 – strong;  
228 – thickness of skin (pellicle): 5 – medium;  
229 – hilum of berry: 2 – visible;  
230 – color of berry flesh: 1 – not colored;  
231 – intensity of color of flesh: 5 – medium colored;  
232 – juiciness of flesh: 1 – little juicy;  
233 – must yield (from 100 g berries): 7 – high;  
234 – firmness of flesh: 1 – soft;  
235 – degree of firmness of flesh: 5 – medium;  
236 – particular flavor (after-taste): 2 – muscat;  
237 – classification of flavor: 6-strong muscat;  
238 – length of pedicel (fruit-bearing stem): 5 – medium;  
239 – separation from pedicel: 1 – difficult;  
240 – degree of separation from pedicel: 5 – medium;  
241 – presence of seeds in berry: 3 – present;  
242 – length of seeds: 5 – medium;



Figure 5 – Inflorescence of grapevines P. Soumela



Figure 6-8 – Bunch, berries, seeds, pulp and juice of grapes of P. Soumela

- 243 – weight of seeds: 5 – medium;
- 244 – transversal ridges on dorsal side of seed: 1 – absent;
- 623 – number of seeds in the grape (berry): 5 – 2-3 seeds;
- 624 – shape of seeds: 3 – rounded, pear-like;
- 625 – relative length of the beak: 1 – short;
- 626 – location of chalazae: 2 – in the center of the fruit;
- 627 – shape of chalazae: 1 – round;
- 628 – expressiveness of chalazae: 2 – convex;
- 301 – time of bud burst (opening): 5 – medium;
- 302 – time of full bloom: 5 – medium;
- 303 – beginning of berry ripening: 5 – medium;
- 304 – physiological stage of full maturity of the berry: 5 – medium;
- 305 – beginning of wood maturity: 3 – early;
- 306 – autumn coloring of leaves: 2 – reddish;
- 351 – vigor of wood growth: 7 – strong ;
- 352 – growth on axillary shoots: 3 – weak;
- 353 – length of internodes: 7 – long;
- 354 – diameter of internodes: 5 – medium;
- 401 – resistance of chlorosis (iron): 7 – high;
- 402 – resistance of chlorides (salt): 7 – high;
- 403 – resistance of drought: 7 – high;
- 452 – degree of resistance of mildew on the leaves: 5 – medium;
- 456 – degree of resistance to Oidium: 5 – medium;
- 459 – degree of resistance of Botrytis (gray rot): 7 – high or very high;
- 501 – percentage of berry set: 7 – high;
- 502 – weight of a single bunch: 5 – medium;
- 503 – single berry weight: 5 – medium;
- 504 – bunch weight/ha, in tones (yield): 9 – very high, more than 12 t/ha;
- 505 – sugar content of must (grapevine juice): 9 – very high (>24%);
- 506 – total acid content (recalculated as wine acid, g/L): 5 – medium, 6-9;
- 598 – form of grapevine cluster: 3 – conical.



Figure 9-10 – Lignified vine stock (autumn) and eye grape (in spring) of P. Soumela

Agrobiological characteristics of P. Soumela. Variety P. Soumela enters into the first fruiting season sooner, with the laying in the vineyard, seedlings blooming and produce grapes at the second year after planting. The vegetation period (from the beginning of bud opening to harvesting) is 146 to 155 days. Woods are large up to 2,1 to 3,0 m. The percentage of ripening vines and the yield are very high, >95% and 30-40 tons/ha, respectively. The grapevine clusters require standardizing in order to get quality wine, and wine of fine vintage and of high quality can be expected with clusters <3 to 4 kg. The percent of the fruit bearing sprouts is more than 90, with 1 to 2 clusters on a sprout. In addition, raceme grows from the sleeping buds. The cluster is in the region of 800 g or more. The variety is undemanding as to soil, growing well on poor, dry, calcareous soils, and it is characterized by high drought resistance, medium resistance to mildew, botrytis and odium, and good affinity with understocks zoned (R-110, 41 B) in comparison with the traditional Muscat varieties of the region.

Training of grape variety. It is grown on Royal cordon system of pruning with height of the pillars of 60 to 80 cm in planted 1,0 to 1,2 m S 2,0 to 2,5 m. The clippings are made short on two buds, loaded to 12-14 fruit-bearing sprouts. The variety was good also when grown on formation of Roy chain with the pillars of 110 to 120 cm planted 1,0 to 1,2 m S 2,0 to 3 m. The clippings also are made on two buds, thus increasing the load to 14 to 16 fruit-bearing woods. Variety can make reloading harvest without weakening the growth of shoots. When studying the optimization of the buds loading in the experiments with the purpose of increasing loading to 4-6 buds, the average mass of the clusters also increased. The variety reacts favorably to fertilization and irrigation with much increased yield. Soumela responded positively to the introduction of elements of industrial technology, with increased productivity and improved quality.

Phenology. In the Attica climatic zone (Central Greece) the opening of buds starts during the first days of April, flowering starts at the end of May, the beginning of ripening in mid August, and full ripening of the berries occurs in late August.

Bunch characteristics. The bunch length is 35 cm, width 15 cm, length of leg 4 cm and the average mass of grapevine clusters is 350 g, while the mass of 100 berries is 190 g, and the mass of 100 seeds is 3,5 g. As a percent of the total mass of the cluster, that of the berries is 93%, the comb is 7%. As a percent of the total mass of the berries the mass of berry juice and fruit pulp is 88% and of the skin and seeds is 12%. The mass concentration of the sugars in the fruit juice is more than 230 g/100 cm<sup>3</sup>, with titrated acidity 5 to 9 g/L.

Wine technology. A red wine with the following characteristics was made from variety P. Soumela by the method of micro production: alcohol 14 volume percents, titrated acidity 5 to 7 g/L, sugars less than 2 g/100 cm<sup>3</sup>. The wine was very rich in color, dark ruby with purple hues, with good body, rich in phenols and light tannins, which allows it to be consumed at a young age. It has a rich aroma of grapes, in which a light muscat flavor mingled with the scent of wild berries (raspberries, strawberries, currants), and a pleasant mild after taste. Its quality is much higher than the control of Muscat Hamburg and Muscat black. The variety is also suitable for the manufacture of high-quality, dessert and sweet wines, juices, compotes and jams.

#### Conclusion

The cultivation perspectives of Variant P. Soumela in the dry zones of Europe, America, Africa, Australia is good to produce high quality red wines and may be used as a source of polygenes with valuable bio-economic characteristics for genetic improvement of black varieties. In the zoned assortment of varieties determined for production, P. Soumela varieties may be placed in the class of wines alongside Muscat white and Muscat Rose. The variety is promising for cultivation in all areas. It is necessary to test the P. Soumela variety in all zones of high quality red wine production under different eco-geographical zones of cultivation e. g in the Americas, Eurasia, Australia, and Africa, to reveal the influence of different environmental conditions on growth, development, quality and quantity of crop variety.

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*Заманиди Пантелей Константинович, д-р наук*

*Афинский институт виноградарства, Афины, Греция*

*Валвулиду Евангелия Мельтиадовна, д-р наук*

*Афинский институт почвоведения, Афины, Греция*

*Трошин Леонид Петрович, д-р биол. наук, профессор, , E-mail: [lpTROSHIN@mail.ru](mailto:lpTROSHIN@mail.ru), 8(861)21-59-04*

*Кубанский госагроуниверситет*