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STUDIUL DIVERSITĂȚII MORFOLOGICE LA UNELE GENOTIPURI DE PRUN ÎN CONDIȚIILE PEDOCLIMATICE DE LA PITEȘTI-MĂRĂCINENI

STUDY OF MORPHOLOGICAL DIVERSITY IN SOME PLUM GENOTYPES IN THE PEDOCLIMATIC CONDITIONS OF PITEȘTI-MĂRĂCINENI

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Abstract

During 2020 – 2022, observations and determinations regarding the growth and fruiting at 25 plum genotypes from the Pomological Collection of RIFG Pitesti - Mărăcineni were carried out in order to identify the phenological and morphological diversity, useful to the breeding program. The variability of phenological and morphological characters has a strong genetic determinism, in correlation with the evolution of pedoclimatic conditions. In the context of climatic changes, it has been essential to understand the mechanism of interaction between the genes involved in manifesting characters and traits responsible for the adaptability and productivity of the variety and the environmental conditions. The evaluation was carried out on 100 trees (4 trees/genotype), analyzing 3,000 leaves of leaves, fruits, shoots and flowers, the working volume being over 15,000 measurements and observations. Plum is a vigorous or semi-vigorous species, but 'Centenar' and 'Zamfira' show a fairly clear difference in vigor compared to the other varieties, and this can be an advantage for these varieties when used in high-density orchards. The beginning of flowering started early in the case of two varieties ('Lama' and 'Scolduș'), medium and late for most varieties and very late for 'Grase românești', 'Vinete românești' and 'Vinete românești cl. 300', while beginning of fruit ripening occurred very early for 'Early Rivers', early in the case of 7 varieties ('Centenar', 'Tita', etc.), medium or late for 14 varieties ('Anna Spath', 'Black Diamond', 'Stanley' etc.) and very late in 'Haganta', 'Topend' and 'Renclod Violet'. Also, most of the selected CPVO descriptors were polymorphic and showed more than two phenotypes a high diversity was observed between characters regarding the flower, leaf, shoots and tree habit of the 25 studied genotypes, proving that each of them presents special characters that can be useful in future breeding programs.

Cuvinte cheie: prun, genitori, variabilitate fenotipica, resurse genetice.
Key words: plum, genitors, phenotypic variability, genetic resources.

1. Introduction

Phenotypic information is of real value in breeding programs in order to improve the characteristics of trees, in the activity of identifying and recognizing some varieties or species, but also in the development of the orchard management plan. As is already known, the expression of phenotypic characters is controlled by a high number of genetic factors, and the accurate evaluation of these characteristics is of real importance in the selection of dominant genes and in marker-assisted selection. Although some characteristics are vital for the plant's development, current breeding programs have focused mainly on those traits that concern fruit quality and resistance to diseases and pests (Shamsolshoara et al., 2021) and less on aspects related to tree habit, type of fruiting, flower and pollination, leaf, features that can provide information and solutions related to resistance and the ability to adapt to the new conditions imposed by the new climate changes, the interception and maximum utilization of light or some aspects related to nutrition.

2. Material and methods

The research carried out in the period 2020-2022 aimed at observing some key morphological characters in 25 plum genotypes under the conditions of the Pitesti - Mărăcineni area, within the national plum collection, each genotype being found in 2 trees grafted on Mirobalan seedling (*Prunus cerasifera*), the trees being 22-24 years old at the time of starting the study.

The observations and measurements were carried out as follows: for the observation of the tree, one-year branches and buds, the period of vegetative dormancy was preferred; all flower observations were made

only on fully developed flowers at beginning of anther dehiscence; the leaves were harvested in summer, from the middle third of the shoots, and the collection of samples (20 randomly fruits) for fruits and seeds was carried out at maturity.

Fruit and stone weight was determined using the Kern EW electronic balance, fruit firmness was determined using the Bareiss non-destructive penetrometer, and a digital caliper was used for some measurements of fruit diameter, leaf and 1-year branch size.

In order to achieve a complete picture of all the phenotypic and morphological aspects of the plant, through this activity we proposed to approach a large number of characters related to the morphology of the fruit, tree, flower or leaf based on the descriptors defined by The International Union for the Protection of New Varieties of Plants (UPOV) and also used in Romania by the Romanian State Institute for Testing and Registration of Varieties (ISTIS), a good tool for the standardization of comparisons morphological characterization datasets across different environments (Table 1).

For uniformity all continuous dates were transformed into ordinal (Terzopoulos et al., 2010) and ranks were formed by dividing the range of continuous into equal parts characteristic of the UPOV descriptor.

3. Results and discussions

The external form of fruit trees and shrubs is valuable material for the recognition of species and varieties, and the study of the root, stem, buds, shoots, branches, crown, leaf, flower and fruit can establish certain characters by which they resemble and differ from each other the species, but especially the varieties of shrubs and fruit trees.

Plum is a vigorous or semi-vigorous species, and this is characteristic of most of the varieties studied in this project. However, 'Centenar' and 'Zamfira' show a fairly clear difference in vigor compared to the other varieties, and this can be an advantage for these varieties when used in high-density orchards (Table 2) and also can be added the fact that for the two varieties the density of the crown is average high. Moreover, this characteristic is common to most varieties, less so for 'Roman' and 'Lama' varieties with a low crown density. The annual branches generally have an erect or semi-erect position (less so in 'Timpurii de Țurlesti' and 'Grase românești' whose annual branches are slightly horizontal).

The leaf can be given multiple importances on the other hand in the plum the leaf has an important role in the identification of varieties. She is one of the most important plant organs. The structure and shape of the leaf is specially designed for photosynthesis, the process by which plants produce food using light, carbon dioxide (CO2) and water, takes place in leaves. Many other important interactions with the environment also happen through leaves. Some parts of the plant are responsive and react quickly to changes in the environment. The leaf is considered to be the most plastic plant organ. This feature makes it an ideal indicator of short-term, but also long-term changes in environmental stimuli, such as: light, water availability, temperature, nutrient availability or soil type. A large leaf implies a larger surface for photosynthesis, but at the same times a larger surface through which the plant can lose significant amounts of water, which implies supplementing the irrigation dose and implicitly the amount of fertilizers, water being the means by which the plant moves nutrients inside. The adaptation to the environmental conditions in the area of origin of the species or varieties was also achieved through some morphological adaptations of the leaf: in drier regions where sunlight exists in abundance and with relatively high temperatures, plants have smaller leaves; in wetter areas with lower temperatures, plants will have larger leaves. The length of the leaf in the varieties studied is a large average in most varieties and only for five of them the leaf length is very small compared to the others ('Dara', 'Haganta', 'Scolduș', 'Tuleu gras' and 'Zamfira' (Table 3). As for the width, it is in most cases medium or small, as is the length/width ratio.

The shape and size of the leaf has an important role in terms of flowering, in the growth and development of the tree with an impact on the quality characteristics of the fruit and can be an early indicator of other traits with high agronomic value. The variability regarding the shape of the leaf is higher (Table 3), in addition to the ovate shape found in the varieties 'Centenar', 'Romanța', 'Gras ameliorat', 'Dani', 'Stanley', 'Tita', 'Dara' or 'Topend', we can also deal with the obovate shape characteristic of 12 of the studied varieties or elliptical, common only to some of these such as: 'Grase românești', 'Vinete românești cl. 300', 'Timpurii de Țurlesti', 'Anna Spath' and 'Lama' (Table 3). Regarding the characteristics of the tip of the leaf, they divide the varieties into 3 approximately equal groups (Table 3), which correspond to the sharp, straight and obtuse forms of the apex. The truncated leaf base is characteristic only for 5 varieties ('Roman', 'Zamfira', 'Dani', 'Cacanska Lepotica' and 'Haganta') while for most varieties the leaf base is obtuse or pointed. Among all the varieties, the longest petiole is found in 'Timpurii de Ţurleşti', medium length is characteristic for 'Centenar',

'Early Rivers', 'Grase românești', 'Renclod Althan', 'Roman', 'Romanța', 'Stanley' and 'Tita' and small for all other varieties.

The ratio of petiole length to leaf length is medium or small for 24 of the varieties and high for 'Scolduş', while the presence of petioles on the lower part of the petiole is medium or strong for most varieties and weak only for six varieties: 'Centenar', 'Early Rivers', 'Renclod Althan', 'Romanța', 'Stanley and 'Timpurii de Ţurlesti'.

The intensity of the green color provides information about the chlorophyll content of the leaf, while the incisions of the edge in the upper part are important characters for identifying varieties. The green color of the upper part of the leaf (Table 3) can be light (in the case of 6 varieties – 'Centenar', 'Romanţa', 'Anna Spath', 'Black Diamond', 'Vinete românești cl.300' and 'Vinete românești',), medium light ('Renclod Althan', 'Stanley', 'Timpurii de Ţurlesti' and 'Scolduş') and dark for most varieties. A discordant note in this case is the Lama variety whose leaf is red. The diversity regarding the lateral incisions is lower, the leaf showed than two phenotypes, either crenate for most of the varieties, or serrate (in the case of 5 varieties).

The shine of the upper part of the leaf is weak only in the case of 3 varieties ('Centenar', 'Romanţa' and 'Early Rivers'), for all other varieties it is medium or strong. The presence of pubescence is an important adaptation of the leaf to conditions of prolonged drought they have the role of keeping moisture at the level of the leaf, creating a barrier that prevents water loss at the same time. This is characteristic of all varieties with 3 exceptions: 'Record', 'Lama' and 'Black Diamond', while 'Scolduş' is the only one where the petiole shows a strong pubescence on the underside. The absence of nectaries is a characteristic for approximately half of the varieties studied, while in the varieties where they are present, their position is at the base of the leaf (in 5 cases), both at the base of the leaf and on the petiole (for 3 varieties) or on the petiole (for 7 varieties) (Table 3).

The diameter of the flower is medium or large in most varieties, small flowers being found for 'Centenar', 'Dara', 'Timpurii de Ţurlesti' and 'Tuleu gras' varieties, the length of the pedicel was small for 8 of the varieties, medium for 10 of the varieties and large for 7 of the varieties (Table 4). Pedicel pubescence was a feature present in 10 of the 25 genotypes, in none of the cases were the sepals in contact with the receptacle, they being generally elliptic-oblong or elliptic and very rarely ovate or broadly ovate.

Five of the varieties stood out due to their large petals ('Early Rivers', 'Haganta', 'Record', 'Romanța' and 'Tita'), and in terms of their shape, the varieties were found in an almost equal percentage in one of the 4 possibilities (elliptically oblong, elliptical, round or obovate) as seen in Table 4.

All current plum breeding programs have focused on increasing the quality of the fruit, especially on some of its defining characteristics such as the size and firmness of the fruit. In stone species, the size of the fruits is generally more uniform within the variety than in seed species, this character thus having an even greater value for the determination and classification of the species. In the old landraces, the fruits are much smaller than in the improved varieties (Table 5).

The shape of the fruits showed great diversity (Bordeianu et al., 1963), varying between elliptic and obovate (Romanian consumers prefer elliptic and ovate for this attribute – Butac et al., 2011), and the color of the pulp also showed a wide palette, from yellow-green to red (Table 5), thus in most cases the shape of the fruits (in lateral view) was either elliptical (characteristic for 8 varieties) or ovate (8 varieties), less common spherical (6 varieties) or obovate (for 4 varieties), while 'Black Diamond' was the only variety whose fruits have had a flattened spherical shape (obovate), and the pulp color varied from greenish yellow ('Stanley', 'Cacanska Lepotica' and 'Topend') to red ('Black Diamond' and 'Lama') for most of the varieties (16), the characteristic color being yellow.

Firmness plays an important role especially when we are talking about fruits for fresh consumption. Resistance to handling, storage and long-distance transport are directly correlated with the firmness of the fruit at the time of harvest. To supply the local market, when the demand is high enough and fruit preservation is not necessary, the fruits can be harvested at the ripeness of consumption, which implies a lower firmness of the fruits. When long-distance transport or long-term storage is required, the fruit can be harvested at technological maturity when the fruit is firm enough to withstand repeated handling and instead can continue to ripen to the optimum level throughout this period. In terms of this character, the local varieties have a good behavior (Table 5), thus varieties such as 'Timpurii de Ţurlesti', 'Scolduş' or 'Tuleu gras' have fruit firmness superior to some old and well known varieties such as 'Anna Spath' and 'Early Rivers' and at a similar level of new varieties like 'Haganta' or 'Black Diamond'.

Adhesion of the seed to the pulp is an important characteristic to follow, both in the case of fruits intended for fresh consumption, but especially in the case of fruit processing to obtain jams, compotes, etc. and less important in the case of fruit distillation. Out of the 25 genotypes studied, only for 6 of them ('Black Diamond', 'Gras ameliorat', 'Grase românești', 'Lama', 'Renclod Violet' and 'Scolduș') the degree of adhesion to the pulp is very high, and for the other kernels it is non-adherent or semi-adherent (Table 5).

A great homogeneity of the studied character was observed in the case of the shape of the kernel seen from the side, 24 genotypes having the kernel elliptic-narrow or elliptic, and in only one case ('Black Diamond') the kernel was broadly elliptic.

The beginning of flowering started early in the case of two varieties ('Lama' and' Scolduș'), medium and late for most varieties and very late for 'Grase românești', 'Vinete românești' and 'Vinete românești cl. 300' (Table 5).

The beginning of fruit ripening occurred very early in the 'Early Rivers', early in the case of 7 varieties ('Centenar', 'Tita', etc.), medium or late for 14 varieties ('Anna Spath', 'Black Diamond', 'Stanley' etc.) and very late in 'Haganta', 'Topend' and 'Renclod Violet' (Table 5).

From these observations, a high homogeneity can be found regarding the symmetry of the fruit and the width of the seed base, and a medium or high diversity for the other analyzed characters.

4. Conclusions

The great diversity of the plum genotypes used in this study support the conclusion that Pitești Mărăcineni national plum collection is an important centre of diversity for *Prunus* species. This diversity may indicate the presence of important genes for future breeding purposes, especially for the improvement of some aspects related to the adaptation to the new climate changes. Morphological characterization of polymorphic traits from different organs is useful to identify a great variability among evaluated traits and to distinguish the most divergent variables which can help breeders in the future on the direction of interspecific crosses attempts.

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Tables

Table 1. Descriptors used for pomological traits of studied varieties

Tree: vigour (TV)	weak 3		medium 5		strong 7					
Tree: density of crown (TDC)	sparse 3		medium 5		dense 7					
One-year-old shoot: attitude (OYA)	erect 1	semi-erect 3		horizontal 5		drooping 7				
One-year-old shoot: thickness (OYT)	thin 3		medium 5		thick 7					
One-year-old shoot: length of internodes (OYL)	short 3		medium 5		long 7					
One-year-old shoot: pubescence (upper third) (OYP)	weak 3		medium 5		strong 7					
One-year-old shoot: number of lenticels (OYN)	few 3		medium 5		many 7					
One-year-old shoot: size of vegetative bud (OYB)	small 3		medium 5		large 7					
One-year-old shoot: shape of vegetative bud (OYS)	acute 1		obtuse 2		rounded 3					
One-year-old shoot: position of vegetative bud in relation to shoot (OYV)	adpressed 1		slightly held out 2		markedly 3					
One-year-old shoot: size of vegetative bud support (OYSu)	small 3		medium 5		large 7					
One-year-old shoot: decurrence of vegetative bud support (OYD)	absent 1		present 9							
Leaf blade: length (Lle)	short 3		medium 5		long 7					
Leaf blade: width (LWd)	narrow 3		medium 5		broad 7					
Leaf blade: ratio length/width (LLW)	small 3		medium 5		large 7					
Leaf blade: shape (LSh)	ovate 1		elliptic 2		obovate 3					
Leaf blade: angle of apex (excluding tip) (LAA)	acute 1		right-angled 2		obtuse 3					
Leaf blade: shape of base (LSB)	acute 1		obtuse 2		truncate 3					
Leaf blade: green colour of upper side (LGC)	light 3		medium 5		dark 7					
Leaf blade: glossiness of upper side (LGU)	weak 3		medium 5		strong 7					
Leaf blade: pubescence of lower side (LPL)	absent 1		present 9							
Leaf blade: incisions of margin (LIM)	crenate 1		serrate 2							
Petiole: length (PL)	short 3		medium 5		long 7					
Petiole: pubescence of upper side (PPU)	weak 3		medium 5		strong 7					
Leaf: ratio length of leaf blade/length of petiole (LBP)	small 3		medium 5		large 7					
Leaf: presence of nectaries (LPN)	absent 1		present 9							
Leaf: position of nectaries (LPO)	predominantly on base of blade 1		equally on base of blade and petiole 2		predominantly on petiole 3					
Flower: diameter (fully opened flowers) (FD)	small 3		medium 5		large 7					
Pedicel: length (PEL)	short 3		medium 5		long 7		very long 9			
Pedicel: pubescence (PEP)	absent 1		present 9							
Calyx: attitude of sepals (CAS)	adpressed to petals 1		touching neither petals nor receptacle 2		touching receptacle 3					
Sepal: shape (SES)	narrow elliptic 1	elliptic 2		ovate 3		broad ovate 4		triangular 5		
Flower: arrangement of petals (FAP)	free 1		touching 2		overlapping 3					
Petal: size (PES)	small 3		medium 5		large 7					
Petal: shape (PSH)	elliptic 1		broad elliptic 2		circular 3		obovate 4			
Petal: undulation of margin (PUM)	absent 1		present 9							
Stigma: position in relation to anthers (SPA)	below 1		at same level 2		above 3					
Anther: colour (just before dehiscence) (ACO)	yellowish 1		reddish orange 2							
Ovary: pubescence (OPU)	absent 1		present 9							
Fruit: size (FSI)	very small 1	small 3		medium 5		large 7		very large 9		
Fruit: shape in lateral view (FSL)	oblong 1	elliptic 2		circular 3		oblate 4		ovate 5		obovate 6
Fruit: symmetry (in ventral view) (FSV)	symmetric 1		asymmetric 2							
Fruit: depth of suture towards stalk end (FDS)	shallow 3		medium 5		deep 7					
Fruit: depression at apex (FDA)	absent or weak 1		intermediate 2		strong 3					
Fruit: pubescence at apex (FPA)	absent 1		present 9							
Fruit: depth of stalk cavity (FDC)	shallow 3		medium 5		deep 7					
Fruit: colour of (FCS) skin	greenish white 1	green 2	yellowish green 3	yellow 4	orange yellow 5	red 6	light violet 7	purplish violet 8	violet blue 10	dark blue 11
Fruit: colour of flesh (FCF)	whitish 1	green 2	yellowish green 3	yellow 4	orange 5	red 6				
Fruit: firmness of flesh (FFF)	soft 3		medium 5		firm 7					
Fruit: juiciness (FJ)	low 3		medium 5		high 7					
Fruit: degree of adherence of stone to flesh (FAS)	non-adherent 1		semi-adherent 2		adherent 3					
Stone: general shape in lateral view (SGS)	narrow elliptic 1		elliptic 2		circular 3					
Stone: shape in ventral view (SSV)	narrow elliptic 1	elliptic 2		broad elliptic 3		cuneate 4				
Stone: width at base (SWB)	narrow 3		medium 5		broad 7					
Stone: shape of apex (SSA)	acute 1		obtuse 2		rounded 3					
Time of beginning of flowering (TF)	very early 1	early 3		medium 5		late 7		very late 9		
Time of beginning of fruit ripening (TR)	very early 1	early 3		medium 5		late 7		very late 9		

Table 2. Tree and one-year-old shoot characteristics

Varieties	Tree		One-year-old shoot									
	TV	TDC	OYA	OYT	OYL	OYP	OYN	OYB	OYS	OYV	OYSu	OYD
Anna Spath	5	5	3	5	3	5	3	3	2	2	5	9
Black Diamond	7	5	3	3	3	3	3	3	2	1	3	1
Cacanska Lepotica	7	5	3	7	7	3	7	3	1	3	7	9
Centenar	3	7	3	5	5	5	5	3	1	3	5	9
Dani	7	5	3	5	5	5	5	3	1	1	3	1
Dara (sin. Milenium)	5	5	1	5	5	3	3	5	1	2	5	9
Early Rivers	5	5	1	5	7	3	5	3	1	3	3	1
Gras ameliorat	7	5	5	3	5	7	3	3	1	2	5	1
Grase românești	7	7	1	5	5	7	7	3	1	3	7	9
Haganta	5	7	1	3	3	5	5	7	2	2	7	9
Lama	7	3	3	3	5	7	3	3	2	2	3	9
Record	5	5	3	7	5	5	5	3	1	3	5	9
Renclod Althan	7	5	3	5	5	5	5	5	2	1	3	1
Renclod Violet	7	7	3	7	5	3	5	7	1	3	7	9
Roman	5	3	1	7	5	3	7	5	1	1	7	9
Romanța	5	7	1	5	3	3	7	5	1	2	7	9
Scolduș	5	5	3	7	3	7	7	5	2	2	5	1
Stanley	5	5	3	7	7	3	7	5	2	2	7	9
Timpurii de Țurlești	7	5	5	3	3	5	5	3	1	3	5	1
Tita	7	5	3	5	7	3	5	5	1	3	5	9
Topend	5	5	1	5	3	3	5	3	1	2	5	9
Tuleu gras	7	5	3	3	5	5	3	5	1	3	5	9
Vinete românești	5	7	1	3	3	3	3	3	1	1	3	9
Vinete românești cl. 300	7	7	3	5	5	3	3	5	2	2	3	9
Zamfira	3	5	1	5	3	3	5	5	1	1	7	9

Table 3. Leaf characteristics

Varieties	Leaf										Petiole		Leaf		
	Lle	LWd	LLW	LSh	LAA	LSB	LGC	LGU	LPL	LIM	PL	PPU	LBP	LPN	LPO
Anna Spath	5	3	7	2	1	1	3	5	9	2	3	5	7	9	1
Black Diamond	7	5	5	3	1	1	3	7	1	2	3	3	7	1	-
Cacanska Lepotica	5	7	3	3	2	3	7	5	9	1	3	3	5	9	2
Centenar	5	5	5	1	3	2	3	3	9	1	5	5	3	9	2
Dani	7	7	3	1	2	3	7	5	9	1	3	5	7	1	-
Dara(sin. Milenium)	3	3	3	1	3	2	7	5	9	1	3	3	7	9	3
Early Rivers	5	5	3	3	3	2	7	3	9	1	5	3	3	9	3
Gras ameliorat	7	5	5	1	1	2	7	5	9	2	3	5	7	1	-
Grase românești	7	5	5	2	2	2	7	5	9	1	5	5	5	9	3
Haganta	3	5	3	3	3	3	7	7	9	1	3	5	5	9	3
Lama	7	5	5	2	1	1	-	5	1	1	3	5	7	1	-
Record	5	7	3	3	3	2	7	7	1	1	3	3	7	1	-
Renclod Althan	7	5	5	3	3	1	5	5	9	1	5	5	3	9	3
Renclod Violet	7	5	5	3	2	2	7	7	9	1	3	5	5	9	1
Roman	7	7	5	3	3	3	7	7	9	1	5	5	5	9	3
Romanța	5	5	3	1	2	2	3	3	9	1	5	3	3	9	1
Scolduș	3	3	7	3	2	1	5	5	9	1	3	7	7	1	-
Stanley	5	5	5	1	3	2	5	5	9	2	5	3	3	9	3
Timpurii de Țurlești	5	3	7	2	1	1	5	7	9	1	7	3	3	9	2
Tita	7	7	3	1	2	2	7	5	9	2	5	3	5	9	1
Topend	5	5	5	1	2	2	7	7	9	1	3	5	7	9	1
Tuleu gras	3	5	3	3	3	2	7	5	9	1	3	5	5	1	-
Vinete românești	7	3	7	3	1	1	3	5	9	1	3	5	7	1	-
Vinete românești cl. 300	7	5	7	2	1	1	3	5	9	2	3	5	7	1	-
Zamfira	3	3	5	3	1	3	7	5	9	1	3	5	5	1	-

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Table 4. Flower characteristics

Varieties	Flower											
	FD	PEL	PEP	CAS	SES	FAP	PES	PSH	PUM	SPA	ACO	OPU
Anna Spath	5	5	1	2	1	1	5	2	9	3	1	1
Black Diamond	5	5	1	1	2	1	3	1	9	3	1	1
Cacanscka Lepotica	5	3	9	2	2	1	3	2	9	3	1	2
Centenar	3	3	1	2	2	1	3	2	1	3	1	2
Dani	3	3	9	1	1	1	3	2	9	3	1	2
Dara (sin. Milenium)	5	5	1	2	1	1	5	2	9	2	2	2
Early Rivers	7	7	1	2	3	3	7	4	9	3	1	1
Gras Ameliorat	5	3	9	1	3	3	3	3	9	2	1	1
Grase Românești	5	5	9	1	3	3	3	3	9	2	1	1
Haganta	5	5	1	1	4	1	7	2	9	2	2	2
Lama	5	5	9	1	2	1	5	2	9	3	1	1
Record	7	7	1	2	2	2	7	3	9	3	1	1
Renclod Althan	7	3	1	2	2	2	5	2	9	2	1	1
Renclod Violet	7	5	1	2	2	1	5	2	9	2	1	1
Roman	7	7	9	1	2	3	5	3	9	2	1	2
Romanța	7	5	1	1	1	1	7	4	9	3	1	1
Scolduș	7	3	1	1	2	1	5	4	9	2	1	2
Stanley	5	7	1	1	1	1	5	2	1	1	2	1
Timpurii de Țurlești	3	7	1	1	1	1	3	4	1	1	1	1
Tita	5	7	1	1	2	1	7	1	9	3	2	1
Topend	5	7	1	1	1	1	5	2	1	3	1	1
Tuleu gras	3	3	9	1	2	1	3	3	9	3	1	1
Vinete românești	5	5	9	1	1	1	3	1	9	2	1	2
Vinete românești cl. 300	7	5	9	1	1	3	5	1	9	1	1	2
Zamfira	5	3	9	1	2	2	3	1	9	2	1	1

Table 5. Fruit and stone characteristics

Varieties	Fruit												Stone					
	FSI	FSL	FSV	FDS	FDA	FPA	FDC	FCS	FCF	FFF	FJ	FAS	SGS	SSV	SSA	SWB	TF	TR
Anna Spath	5	3	2	3	1	9	3	9	4	3	5	1	2	2	2	3	5	5
Black Diamond	7	4	2	3	1	9	7	11	6	7	7	3	3	4	1	5	5	7
Cacanska Lepotica	7	5	2	5	1	1	5	11	3	5	5	1	1	1	2	3	5	3
Centenar	7	2	2	3	1	9	5	9	4	7	5	1	1	1	2	3	5	3
Dani	5	6	2	3	1	1	3	8	4	5	3	2	1	1	1	3	7	3
Dara (sin. Milenium)	9	5	2	5	1	1	5	8	4	7	7	1	2	2	1	3	7	3
Early Rivers	5	3	2	3	1	9	3	8	4	3	5	2	2	2	2	3	7	1
Gras Ameliorat	7	3	2	3	1	9	3	8	4	7	7	3	2	2	1	3	7	7
Grase Românești	5	2	2	3	1	9	3	9	4	5	7	3	2	2	1	3	9	7
Haganta	7	2	2	7	2	9	7	8	4	7	7	1	2	1	3	3	7	9
Lama	7	2	2	5	2	9	7	6	6	5	7	3	1	3	1	3	3	5
Record	9	5	2	5	2	9	5	8	4	7	7	1	2	2	1	3	7	5
Renclod Althan	7	3	2	3	1	9	3	8	5	3	5	1	2	2	2	7	7	7
Renclod Violet	9	2	2	5	2	9	5	8	5	7	5	3	2	3	2	3	7	9
Roman	7	2	2	5	1	1	5	8	4	5	7	2	2	3	2	3	5	3
Romanţa	7	5	2	5	2	9	3	8	4	7	5	1	2	2	2	3	5	5
Scolduş	3	3	2	3	1	1	3	8	4	7	5	3	2	3	3	3	3	7
Stanley	5	2	2	5	2	9	5	8	3	3	5	1	1	2	2	3	5	7
Timpurii de Ţurleşti	5	6	2	5	1	1	5	8	5	7	5	1	1	1	1	3	7	3
Tita	9	2	1	5	1	1	5	9	4	7	5	1	2	2	1	3	5	3
Topend	5	5	2	5	1	1	5	8	3	7	7	1	1	1	1	3	7	9
Tuleu gras	5	6	2	3	1	9	3	8	4	7	7	1	1	1	2	3	7	5
Vinete româneşti	5	5	2	3	1	1	3	8	4	5	5	1	2	2	2	3	9	7
Vinete româneşti cl 300	5	5	2	3	1	1	3	8	4	5	5	1	2	2	2	3	9	5
Zamfira	7	3	2	5	2	9	7	8	5	5	5	1	2	1	2	3	5	5