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CALITATEA FRUCTELOR LA UNELE SOIURI DE CIREȘ RECENT INTRODUSE IN CULTURĂ ÎN CONDIȚII DE FERTIRIGARE

FRUIT QUALITY AT SOME CHERRY VARIETIES RECENTLY INTRODUCED IN CULTURE UNDER FERTIGATION CONDITIONS

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Abstract

The present paper show the results of the quality study of some recently introduced cherry fruits varieties as regard the fruit biometric indicators (weight, diameter, color, firmness, pH) and biochemical (dry mater content % Brix, malic acid, citric acid, tartaric acid) at two years from planting. 'Vanda', 'Heartford', 'Areko', 'Penny', 'Karina', 'Kordia', 'Folfer' varieties were grafted on the Gi 5 rootstock. The plantation was established in 2016 at the Research Institute for Fruit Growing Pitesti.

Cuvinte cheie: substanţă uscată, pH, calitate fruct, fermitate, diametru
Key words: dry substance, pH, fruit quality, firmness, diameter

1. Introduction

Cherry is a valuable fruit crop, fruits quality being essential to establish a competitive and efficient product. The time of harvesting has the greatest impact on the fruit production and the desired qualities (Long et al., 2015), and the cherries color seems to be the best indicator to decide the harvesting moment (Crisosto et al., 2002; Tudela et al., 2005; Ivanovet al., 2015). The indicators fruits quality, soluble dry matter content and acidity are influenced by the contribution of water and fertilizers, the foliar surface value and, in particular, by the variety agro-biological traits (Tiu, 2014; Sumedrea, 2017).

2. Material and methods

'Vanda', 'Heartford', 'Areko', 'Penny', 'Karina', 'Kordia', and 'Folfer' varieties, grafted on the Gisela 5 rootstock were studied under fertilizing conditions. The plantation was established in 2016 at the the Research Institute for Fruit Growing Pitesti, at the planting distance of 4.0 x 1.4 m.

For these varieties, the following determinations were made:

- fruit size was determined by weighing all the fruits in a sample (25 fruits) and the average fruit weight in g / fruit, but also by measuring with the calibration ruler;
- firmness of the fruit pulp was measured using the HPE Qualitest non-destructive penetrometer with a 0.25 cm^2 measuring device, and expressed in HPE units;
- soluble dry matter content was determined by a digital refractometer using Brix scale.
- fruits content in malic, citric and tartaric acids was determined by the Minnautator - Hanna Instrument 84532. The titratable acidity was expressed in g / 100 g of fresh pulp or in percent.
- fruits colour was appreciated with the Konica Minolta colorimeter. The colour range CIE L * a * b * is a uniform colour scale, so the differences between the points, represented graphically in the colour space, corresponds to the visual differences between the graphically represented colours (Butac et al., 2013). The CIE L * a * b * colour space is organized as a cube, the L * axis represents brightness, the maximum value 100 is the white colour, and the minimum value 0 is the black colour. Axes a * and b * do not have specific numerical limits. Positive values a * shows red and negative green. The positive values for b * show the yellow colour and the negative ones the blue colour.

The data were statistically processed using the DUNCAN test.

3. Results and discussions

Cherries are the first fresh fruits of the year, and with the high content of vitamins, mineral salts, easily assimilable sugars, appealing appearance and pleasant refreshing taste are the subject of one of the most effective commercial activities taking place from the second part of May to the end of July (Budan and Gradinariu, 2000).

In terms of fruit weight, the values ranged between 9.0 g for the 'Kordia' variety and 14.0 g for the Areko variety.

The fruits content in soluble dry matter varied between 14.07% on 'Karina' and 17.17% on 'Vanda variety

Regarding the pulp firmness, determined with an unbreakable penetrometer HPE Qualitest, with an end device of 0.25 cm^2, it can be observed that the studied varieties had a good firmness of the pulp being over 35 HPE units. Non-destructive firmness is correlated with the fruit's skin thickness of the, so that among the studied varieties, 'Kordia' and 'Penny' varieties had a fruit firmness higher than all other varieties, namely 54.83 HPE units for 'Kordia' variety and 53.93 HPE units for 'Penny' variety, and the lowest value was recorded on 'Areko' variety (35.47 HPE units) (Figure 1).

In terms of acidity, the fruits content in malic, citric and tartaric acids recorded different values according to the variety, the lowest values being registered on Vanda and Folfer varieties, and the highest on Penny and Heartford.

Color is one of the most important characteristics that influences consumer choice of the fruits, and the bright red light is preferred (Tiwari et al., 2009a).

Fruit color, the CIE L * a * b * color range recorded positive values for all varieties of cherry fruits and are presented in Figures 2, 3 and 4. The results of the color parameters revealed significant differences between varieties from statistically point of view. L * (brightness) is the absolute color perception attribute, which refers to how a zone appears bright, and its mean values have been framed in two homogeneous classes of statistical significance and ranged from 26.65 on 'Penny' and 22,29 on 'Areko', except for the varieties 'Kordia', 'Heartford' and 'Vanda' which had intermediate values between the two homogeneous groups (Figure 2). The low values of the a * and b * parameters generally indicate the darker color of the fruits. Figures 3 and 4 show that the smallest values of a * and b * indicators have been recorded for 'Areko', 'Vanda' and 'Kordia' varieties which indicated the dark red color.

Analyzing indicators of dispersion or genetic and experimental diversity, in terms of fruit firmness, the mean sample was 46.05, the values being between 21.70 and 59.20. The asymmetric coefficient has a negative value, which shows that the values above the average predominate, and the distribution does not have a normal trend.

For dry matter, the sample average was 16.25, the values being between the minimum value of 13.30 and the maximum value of 20.60. The asymmetric coefficient shows that the values below the average predominate and the distribution is normal.

The malic acid content is between 0.34 and 0.59, the sample average being 0.44. The asymmetric coefficient shows the share of values below the average. The coefficient of vaulting (Kurtosis) is -0,993 which means that the distribution of values is normal.

For citric acid, the sample average was 0.42, with values ranging from a minimum of 0.33 to a maximum of 0.56. The asymmetric coefficient has a positive value and shows the share of values below the average. The coefficient of vaulting shows that the distribution of the values is normal.

As for tartaric acid, the sample average was 0.50 with values between 0.39 and 0.66. The asymmetric coefficient shows the share of values below the average. The vaulting coefficient was -1.01, which means that the distribution of the values is normal.

There is a significant negative correlation between the pH values of the analyzed varieties and the organic acid content. This is normal, given that the organic acids contained in the fruit are acidic substances that give fruit acidity (low pH), Figure 10.

4. Conclusions

The following conclusions were drawn from the study:

- All the studied varieties had large fruits with a mean weight over 10 g and a diameter of more than 28 mm, with the exception of the 'Kordia' variety which had slightly smaller fruits of 9,0 g and 27 mm in diameter;
- 'Kordia' and 'Penny' varieties have a higher fruit firmness than all other varieties;
- As regards the taste expressed by the sugar-acidity ratio, it was noted that most of the varieties had a balanced taste, with the exception of the Penny variety, which had a slightly higher content in malic, citric and tartaric acids.

References

1. Balan, V., 2015. Technologies in intensifying apple and cherry culture In: Akademos, nr. 2, pp. 74-79. ISSN 1857-0461.
2. Budan S., Grădinariu G., 2000. Cherry, Ed. Ion Ionescu de la Brad, Iaşi; pag. 9 – 26.
3. Butac M., Militaru M., Budan S., 2013. Evaluation of local plum varieties in terms of fruit quality. Fruit Growing Research, Vol. XXIX, Ed. INVEL Multimedia Bucharest, Romania, p. 12-17.

4. Crisosto, C.H., Crisosto, G.M., Ritenour, M.A., 2002. Testing the reliability of skin color as an indicator of quality for early season "Brooks" (*Prunus avium L.*) cherry. In: Postharvest Biology and Technology, Vol. 24, pp. 147-154.
5. Ivanov, I., Balan, V., Pascal, N., Vamasescu, S., 2015, Harvesting, quality and harvesting of cherry fruit. In: Scientific papers, UASM, vol. 42: Horticulture, Viticulture and Winegrowing, Forestry and Public Gardens, Plant Protection, pp. 183-188. ISBN 978-9975-64-269-9.
6. Jeni Veronica Tiu, Sorin Mihai Cîmpeanu, Valerica Tudor, Adrian Asănică. 2014, Outcomes of various technology options applied to the apple intensive culture systems in Moara Domneasca area. AgroLife Scientific Journal - Volume 3, Number 1, 20.
7. Sumedrea D., Alina Florea, Mihaela Sumedrea, Coman R., Mădălina Militaru, Chiţu E., Mădălina Butac, Marin F. C., Claudia Nicola, Mihaela Ciucu Mihaela, Daniela Veringa, 2017. Influence of different storage methods on apple fruits quality, Fruit Growing Research, Vol XXXIII, 85-94.
8. Tiwari S.K., Venkatakrishnan P., Gosain S., Joshi J., 2009. Effect of Polarimetric Noise onthe Estimation of Twist and Magnetic Energy of Force-Free Fields, ApJ, 700, 199-208, doi:10.1088/0004-637X/700/1/199.

Tables and Figures

Table 1. Physical attributes of fruits of studied cherry varieties grafted on Gisela-5 rootstock

Variety	Average weight (g)	Diameter (mm)
Vanda	10.2	31.00
Heartford	11.0	30.00
Areko	14.0	33.00
Penny	11.2	29.00
Karina	11.2	29.67
Kordia	9.0	27.33
Folfer	10.0	28.33

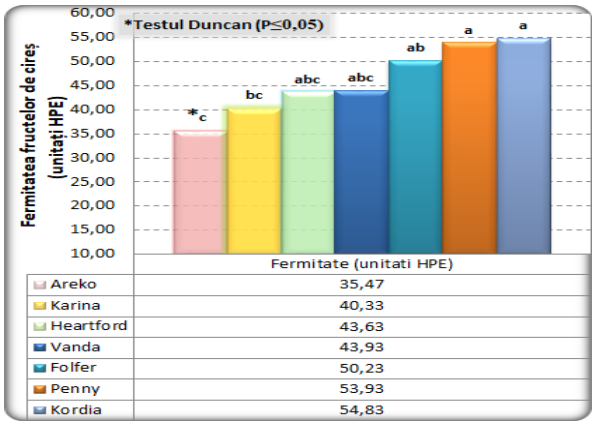

Fig. 1. Firmness of the fruits on the cherry varieties Gisela 5

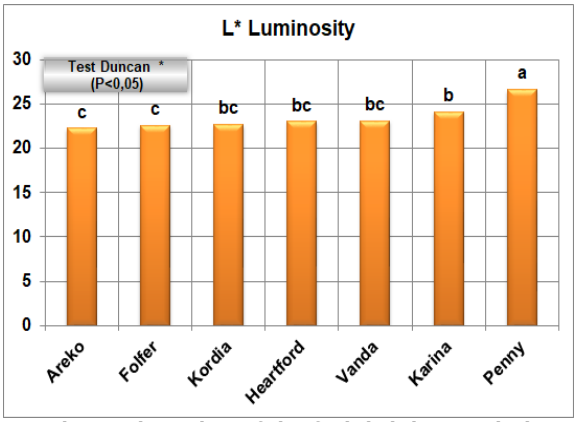

Fig. 2. The value of the fruit brightness index for cherry varieties

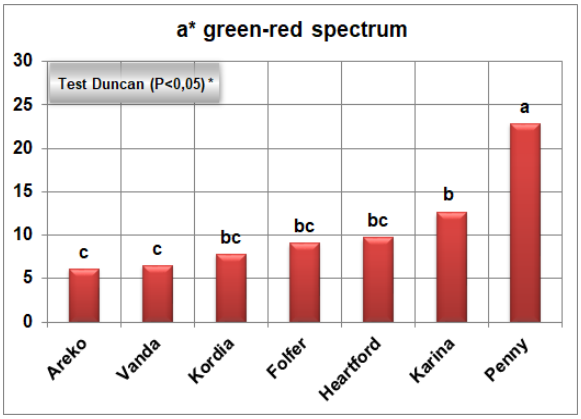

Fig. 3. The value of the a * index of fruit in cherry varieties

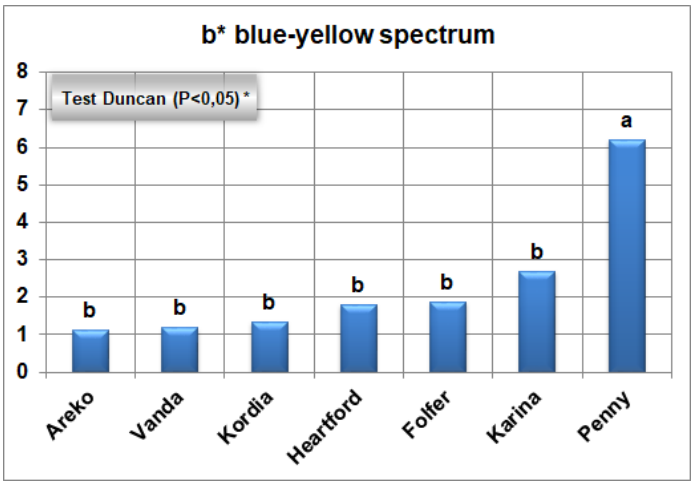

Fig. 4. Value of the b * index of the fruit in the cherry varieties

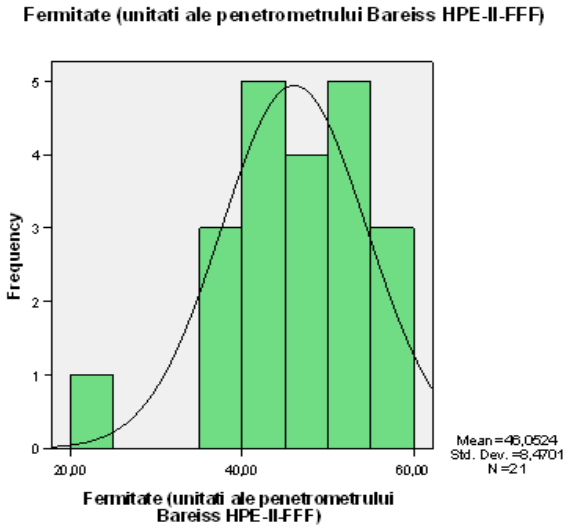

Fig. 5. Histogram of cherry fruits firmness values

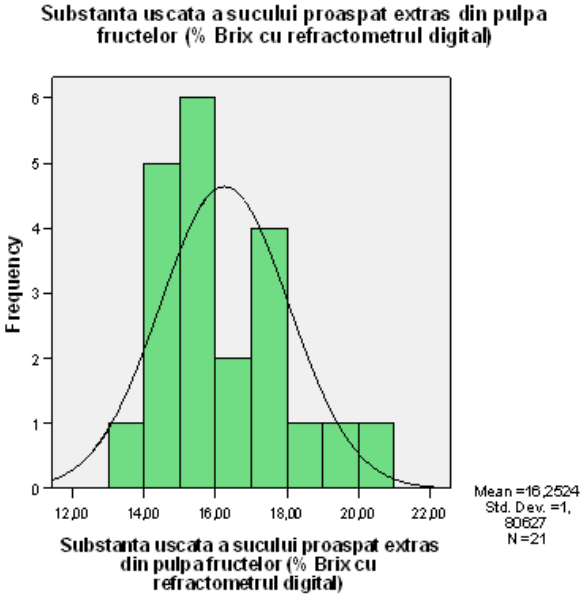

Fig. 6. Histogram of dry matter content (% Brix) of cherry fruits

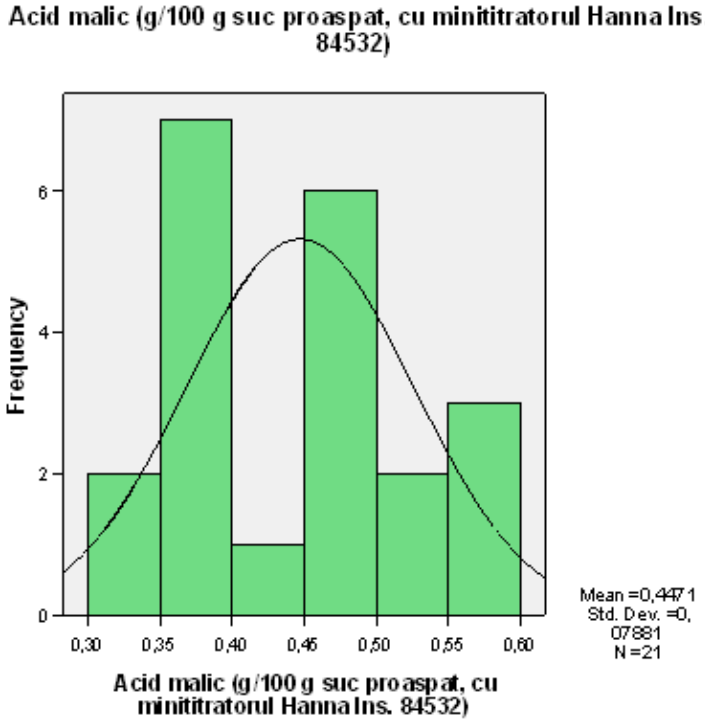

Fig. 7. Histogram of values of malic acid content of cherry fruits

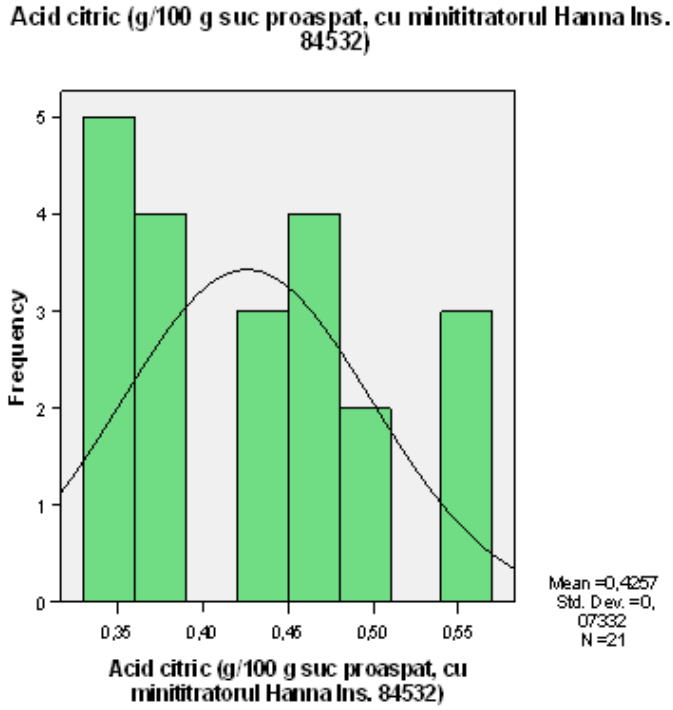

Fig. 8. Histogram of citric acid content of cherry fruit

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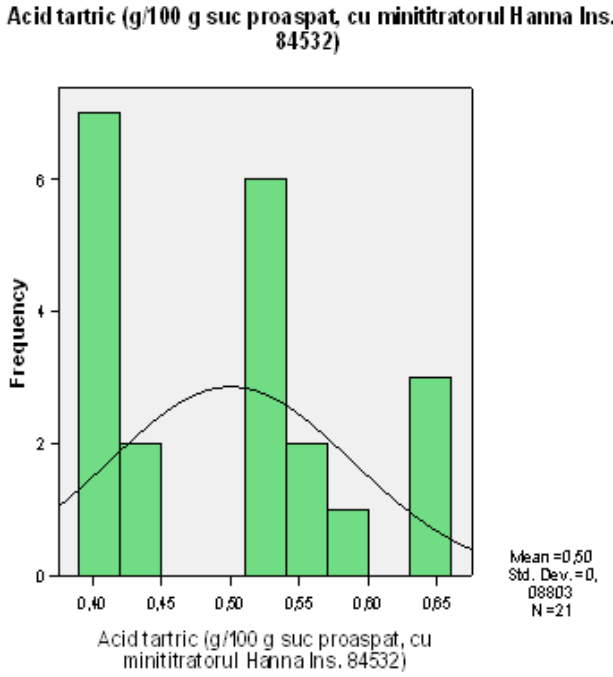

Fig. 9. Histogram of tartaric acid content of cherry fruits

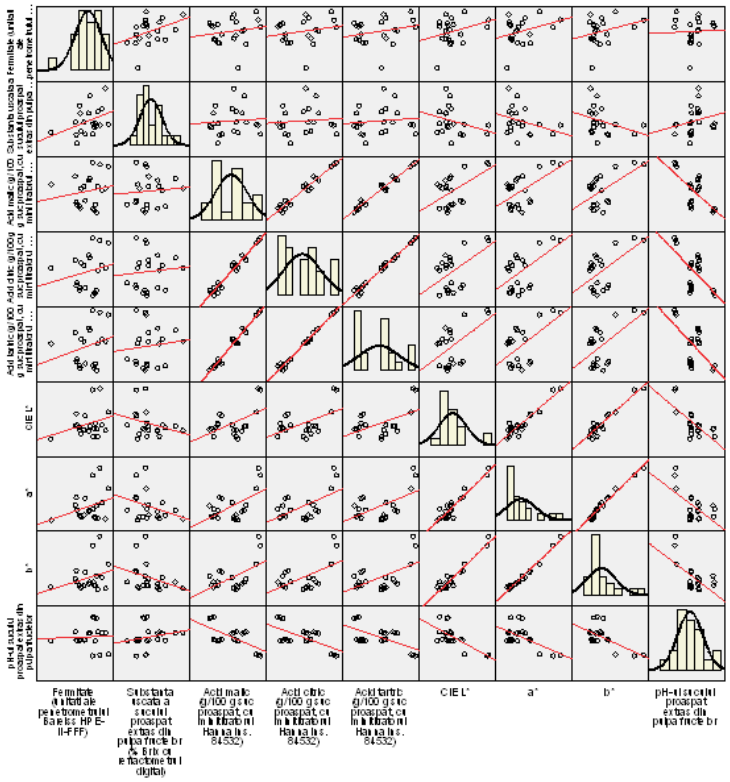

Fig. 10. Matrix of correlations between biochemical elements studied in cherry