

INFLUENȚA FERTILIZĂRII CHIMICE ASUPRA PROPRIETĂȚILOR FRUCTELOR LA CĂPȘUN

INFLUENCE OF CHEMICAL FERTILIZATION ON STRAWBERRY FRUIT PROPERTIES

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The worldwide trend of plantations fertilization imposed a new concept in this field. On one hand, it was abandoned the idea of using large amounts of fertilizer to force the obtaining of high yields, and on the other hand, increasingly require more and more application of organic and unpolluted fertilizers. In practice, the nutritional control of strawberry is very difficult, because a large number of factors influence the absorption and availability of nutrients through mechanisms that are not fully understood. Aim is to establish concrete measures for improving crop technology by applying optimum dose of fertilizers, leading to increased productivity and fruit quality of strawberry culture. The research was conducted during 2009-2010, in a two-way experience. It was located at the Research Institute for Fruit Growing Pitesti. Experimental factors were: A - cultivars: a1 – 'Onebor', a2 – 'Real', a3 – 'Elsanta', a4 – 'Mira', a5 – 'Alba', a6 – 'Premial'; B – Fertilizer with 6 graduations: b1 - unfertilized, and for graduations b2 - b6 were applied mixtures of the below fertilizers the amounts becoming increasingly larger, thus: b2 - 6.4 kg / ha / week, b3 - 14.3 kg / ha / week, b4 - 21.4 kg / ha / week, b5 - 28.5 kg / ha / week and b6 - 35.8 kg / ha / week. The fertilizers applied were: Polyfeed (N19: P19: K19), K nitrate (N12: P0: K43: Mg2) and Magnesia (N11: P0: K0: Mg15). Mixtures were applied at 2 weeks intervals, as follows: 1 April to 15 May (flowering), 2 applications, containing macroelements N: P: K: Mg 14:6,3:20,7:5,7 g / 100 g mixed fertilizers, May 15-June 15 (in the picking period), 2 applications of N: P: K: Mg 10,2:6,3:13,5:2,83 g/100 g blend fertilizer and August 1 to September 15 (2 applications) with N: P: K: Mg 12,2:6,3:20,7:31,6 g/100 g mixed fertilizers. Following determinations were made: average weight of fruit (g) by weighing a sample of 250 fruits, fruit soluble dry matter (%), refractive, total acidity (g of Malic acid/100 g fresh matter) iodometric method. Experimental treatments have led to differences in the acidity of the fruit. Thus, the analysis of fertilizer doses on the chemical components of the fruits of the six studied cultivars, we concluded that V5 and V6 treatments had a positive influence on pH of the fruits of 'Premial' cv. (3.460), 'Elsanta' (3.400) and 'Mira' (3.460). Treatments induced also, highest average fruit weight in variety 'Mira' (45,025 g), weight varies as compared to the control (32.795 g) and from other experimental versions of the same variety. Average dose of fertilizer belonging V4 and V5 variants showed the highest values of fruit dry matter content of the variety 'Premial' (65.55%), respectively (7.570%), higher values the witness variant and other variants analyzed.

Keywords: Onebor, Real, Elsanta, Mira, Alba, Premial, dry matter, acidity

Cuvinte cheie: Onebor, Real, Elsanta, Mira, Alba, Premial, substanță uscată, aciditate

1. Introduction

Applying nutrients to soil or foliar plant relies on the ability to take nutrients and transport them to their points of growth. Supplementing these elements are an important link in the technology culture. In the context of sustainable agriculture seeks to use those products besides eating plant also improve soil structure by stimulating the activity of microorganisms. Being an intensive culture from which to obtain high yields of fruit, strawberries require proper fertilizing. The unanimous opinion of those who have dealt with agrotechnics strawberry, is that by applying the complex of measures for ensuring a high density of plants per hectare, fertilization, irrigation and application of ordinary maintenance, ensure high and stable yields.

Taglavini M. et al. - 2000 studied the dynamics of nutrient consumption to two varieties of strawberry – 'Marmolada' and 'Idea'. To establish more rational fertilizer doses, depending on the requirements of plant nutrient consumption, was monitored for each species studied ('Marmolada', 'Idea'). The finding that optimal intake of nutrients for variety 'Marmolada' is the - 82 kg / ha Ca and K, 62 kg / ha N, 24 kg / ha Mg, 12 kg / ha P, and the variety 'Idea' - 106 kg / ha As K, 72 / ha N, 28 kg / ha Mg, 13 kg / ha P. Summarizing mentioned can be said that research has shown that nutrient absorption is strongly differentiated level of variety

2. Materials and methods

The research was conducted during 2009-2010, in a two-way experience. The experiment was located at the Research Institute for Fruit Growing Pitesti. Experimental factors were: Factor A - varieties: a1-'Onebor', a2-'Real', a3-'Elsanta', a4-'Mira', a5-'Alba', a6-'Premial', Factor B - fertilizer, 6 graduations: b1 - unfertilized, and for graduations B2 - B6 were applied fertilizer mixtures below the amounts becoming more so: b2 - 6.4 kg / ha / week, b3 14.3 kg / ha / week, b4 - 21.4 kg / ha / week, b5 - 28.5 kg / ha / week and b6 - 35.8 kg / ha / week. Fertilizers were administered: Polyfeed (N19: P19: K19), K nitrate (N12: P0: K43: Mg2) and Magnisia (N11: P0: K0: Mg15). Mixtures were applied at 2 week intervals, as follows: 1 April -15 May (flowering), 2 applications, containing macroelements N: P: K: Mg 14:6,3:20,7:5,7 g / 100 g mixed fertilizers, 15 May -15 June (in per. exploit), 2 applications of N: P: K: Mg 10,2:6,3:13,5:2,83 g/100 g blend fertilizer and August 1 to September 15 (2 applications) with N: P: K: Mg 12,2:6,3:20,7:31,6 g/100 g mixed fertilizers.

Experiences of this paper were placed on level ground and ground elevation is 287 m, argillic brown soil type is typical of sediments, with loam to clay-loam texture in the first 60-70 cm, and the depth texture is sandy. Soil structure is prismatic, friable, porous. Groundwater is at a depth of 4-6 m

The soil profile (0-100 cm) average pH is 5.7, it is 1.58 g/cm³ bulk density and average humus content is 1.05%. The main chemical components in soil profile (0-100 cm), values ranged from 0.4 to 1.64% for the index of nitrogen, P₂O₅ 1.00 -1.32 mg/100 g soil and 6.5 - 40.0 mg g sol.S K₂O/100. Following determinations were made: average weight of fruit (g) by weighing a sample of 250 fruits fruit soluble dry matter (%), refractive, total acidity (g of malic acid/100 g fresh matter) by iodometric method.

3. Results and discussions

The main chemical components are an essential element in assessing the influence exercised by chemical fertilizers on fruit. Analyzing the chemical composition of the fruit of the experimental variants, the period of the study, found that doses of fertilizers had a significant influence on the main chemical components of fruits namely solids and acidity. The results indicated a somewhat different accumulation of these components, depending on the variant of fertilization.

The 72 experimental sample values are the number of determinations of soluble dry matter (%). Sample mean was 6.125%, values ranging from a low of 4.17% and a maximum of 7.97%, with a amplitude of 3.8%. Asymmetry coefficient had a value of 0.24% is less than 1, not reject normality distribution of values. Analyzing vaulting coefficient is found that it has a value of 0.056% is less than 2, which shows that not reject normality. Analyzing the most powerful statistical test for checking normality Shapiro - Wilk (W statistic) was obtained value of W = 0.175 which shows that the distribution of values is normal asymmetry. Asymmetry is accepted normality test value W > 0.05.

Analyzing the histogram values expressed acidity pH values, strawberry varieties studied, it is found that the sample mean was 3.35, the amount ranging from a minimum of 3.10 and maximum of 3.58. Asymmetry coefficient had a value of 0.156 which does not reject normality distribution of values. Also vaulting coefficient has a value of -0.293, which does not reject normality. Applying the most powerful statistical test for testing the normality of distribution, Shapiro-Wilk, we obtained a value W = 0.293, which shows that the distribution of values is normal asymmetry.

Regarding the histogram values average fruit weight of strawberry varieties under study, it is found that the sample mean was 25.67 g, ranging from a low of 15.15 g and 45.79 g maximum asymmetry coefficient had a value of 0.993 g which does not reject normality. Coefficient reaches 1.108 vaulting which also rejects normality, being below the 2.

Applying however, the most powerful statistical test for testing normality was obtained value of W = 0.001 which shows that normality is rejected.

Commenting environmental effect on fruit dry matter content in Figure 4, the average fertilization variants, is observed statistically differences between the varieties studied. Thus, genotype 'Premial' the highest value of soluble solids (6.943%) and 'Alba' lowest content in this indicator (5.346%). Intermediate positions on fruit dry matter content of dealing sorts 'Elsanta' (5.970%), 'Real' (6.181%), 'Mira' (6.017%) and 'Onebor' (6.294%), the differences from the first two varieties being statistically. (Fig. 1).

In variant V1, V2, V3 and V6 disappeared the differences between varieties, and V4 and V5 to store differences between varieties found on average variants (Figure 4). To put this out thereit is an interaction between fertilizer doses and plant factor: lower doses of fertilizer applied in variants 1, 2 and 3 and very high in version 6, the differences diminished content in soluble solids of varieties induced fertilization variants V4 and V5.

Commenting on the influence of fertilization variant soluble solids of fruit juice, on average, in Figure 5, it was observed that increasing doses of fertilizer application did not significantly affect fruit content in soluble solids. Lack of response to fertilization and genotypes store 'Alba', 'Premial', 'Real', 'Mira' and 'Onebor'. A significant effect of version 4 of fertilization is revealed only 'Elsanta' variety, which

increase the dry matter content of fruit achieved is significant compared to the control (7.57% to only 6.33% in the unfertilized control).

Fruit acidity, an important indicator of quality of fruits which help to define the taste, the fruit content was quantified by organic acids. They are important in terms of organoleptic through relationships that are the sugars and tannins, which determines the characteristic taste of horticultural products (Ionica Mira, Cristina Bantam, 2002). Throughout the experimental group, in Figure 6, there were differences statistically on fruit acidity. Thus, the variety 'Onebor' was more acidic fruits (pH 3.278) as compared to 'Elsanta' and to 'Premial' (pH 3.387) and 'Mira' (pH 3.374). Also 'Elsanta' genotype had significantly higher pH (3.427) to 'Alba' (3.339), 'Real' (3.316) and 'Onebor' (3.278). From Figure 6, it was found that high doses of fertilizers (V5 and V6) induced the appearance of differences between varieties of fruit acidity. Comparing varieties together in V6 notice differences statistically between genotypes 'Onebor' (pH 3.310) and 'Elsanta' (pH 3.550).

Results on the influence of different fertilizers on soil application on fruit pH are shown in Figure 7, where the average values of the six varieties of fruit acidity showed that there are differences between variants of fertilization. It was found that high doses of fertilizer application reduces the acidity of the fruit. Thus, low doses of fertilizers V2 and V3 induced a higher fruit acidity (pH 3.222) than V6 (pH 3.418). Each of the six varieties studied in both years were found to not induce fertilization variants reveal differences statistically.

Acidification is an advantage because it gives harmonious taste varieties ensuring a balance between sugar and acidity.

Lacertosa et al., 1999, quoted by Aalbergts E., 2002, found that soil pH, organic matter content and texture are correlated with the absorption of nutrients for the plants of strawberry. Following research conducted by referring to some indicators of quality fruit, it concludes that between sugar content, acidity and fruit nitrogen content is an inverse correlation, but an adequate supply of this element can improve fruit quality. Our results in this experience are consistent with those obtained by Lacertosa et al., 1999.

Throughout the experimental group, in Figure 8, it was found that there are differences between the average mass of the six varieties of fruit. Thus, 'Mira' genotype had larger fruit (33.695 g) compared to other varieties. The small fruit varieties were recorded 'Premial' (20.447 g) and 'Elsanta' (20.952 g).

Comparing the differences between the average weight of the fruit of six varieties for each variant of fertilization in hand, it was found that the unfertilized variant and those with small doses of fertilizer (V2 and V3), they are great. The fertilizer doses were higher (V4-V6), the mass differences between fruit varieties were lower. It was finally the maximum dose of fertilizer application six varieties of fruit weight is homogeneous.

Commenting Figure 9, it was found that increasing doses of fertilizer application did not affect average fruit weight of the six varieties studied. It is noted, however, that the 'Mira' genotypes and fertilizer application induced 'Onebor' achieve mass variation in fruit. When applying a medium dose of fertilizer (V4) the variety 'Onebor' were obtained larger fruit (29.28 g) than control variant (20.92 g).

4. Conclusions

At RIFG Pitesti was tested for two years (2009, 2010) in a strawberry crop planted in strips of two rows and using the polyethylene mulch film, the influence of increasing doses of NPK fertilizers, administered in combination on the most important chemical characteristics of strawberry fruit varieties 'Alba', 'Premial', 'Elsanta', 'Real', 'Mira' and 'Onebor'.

It was found that, in terms of fruit acidity, high doses of fertilizer (V5, V6) induced statistically reveal differences between genotypes, varieties 'Elsanta', 'Premial' and 'Mira' fruits with an acidity lower than 'Onebor' variety with fruits the more acidic (pH 3.278). High doses of fertilizers (V6) generally decreased acidity of fruit varieties tested.

In terms of dry matter content of the fruit, it was noted that lower doses of fertilizer applied in versions 2 and 3 and very high in version 6, have diminished the differences between varieties. These, however, were higher fertilization variants 4 and 5, remarking variety 'Elsanta' the highest values. Analyzing the effect of doses of fertilizers, fertilization variant 4 favored increasing the solids content of the fruit only 'Elsanta' genotype (7.0%) compared with untreated control (5.37%).

Mira genotype had larger fruit (33.695 g) than the other varieties. The small fruit were recorded at 'Premial' (20.447 g) and 'Elsanta' (20.952 g) varieties. The fertilizer doses were higher; the mass differences between varieties were lower.

At 'Mira' genotypes and fertilizer application induced 'Onebor' achieve mass variation in fruit. When applied a medium dose of fertilizer (V4) the variety 'Onebor' obtained larger fruit (29.28 g) than control variant (20.92 g).

5. References

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Tables and Figures

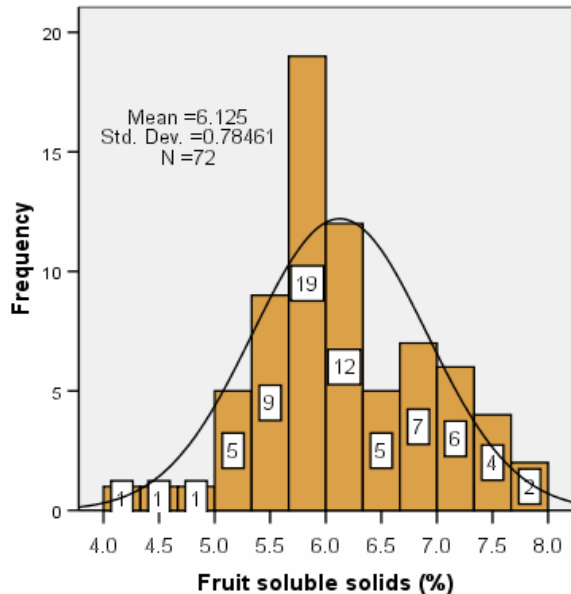


Fig. 1. Fruit soluble solids histogram

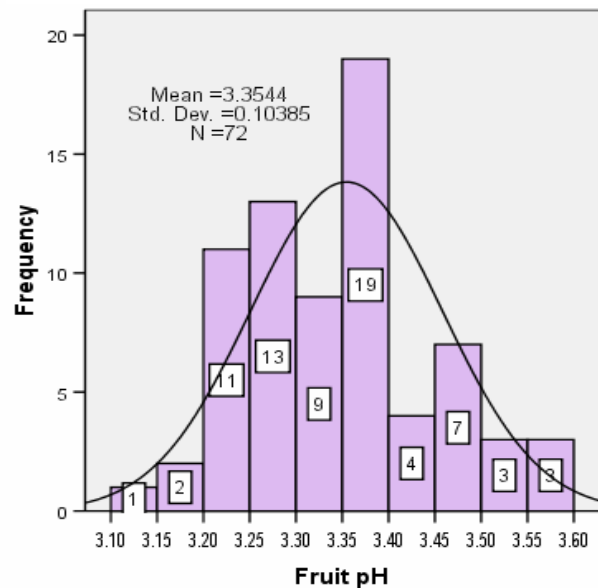


Fig. 2. Fruit pH histogram

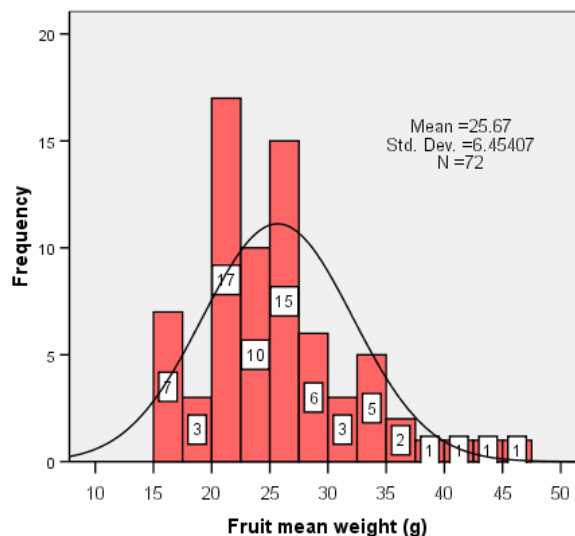


Fig. 3. Fruit mean weight histogram

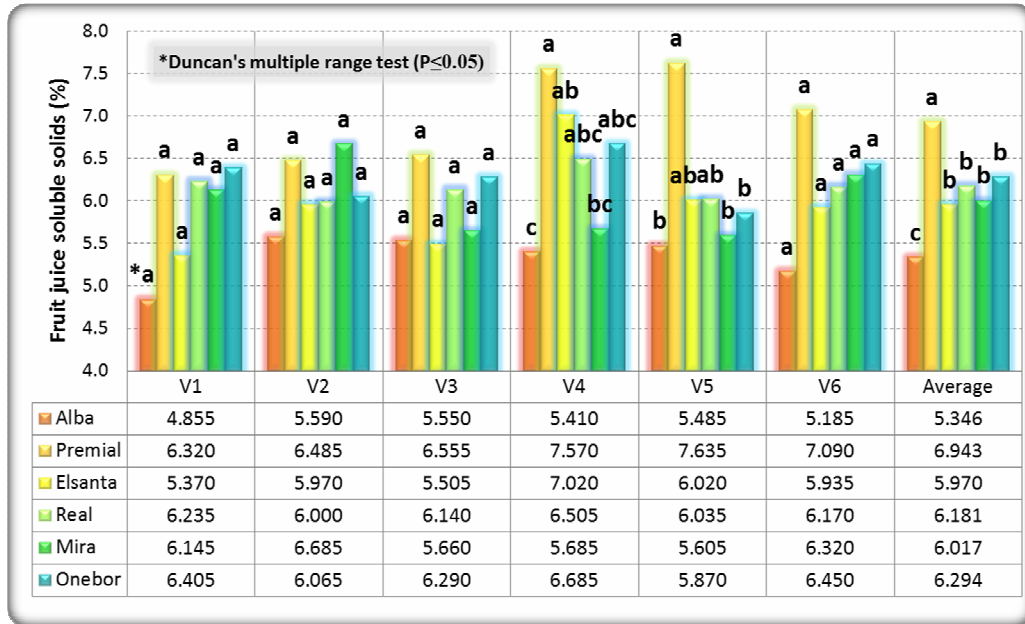


Figure 4. The influence of genotype on dry matter content of fruit juice, within different fertilization treatments

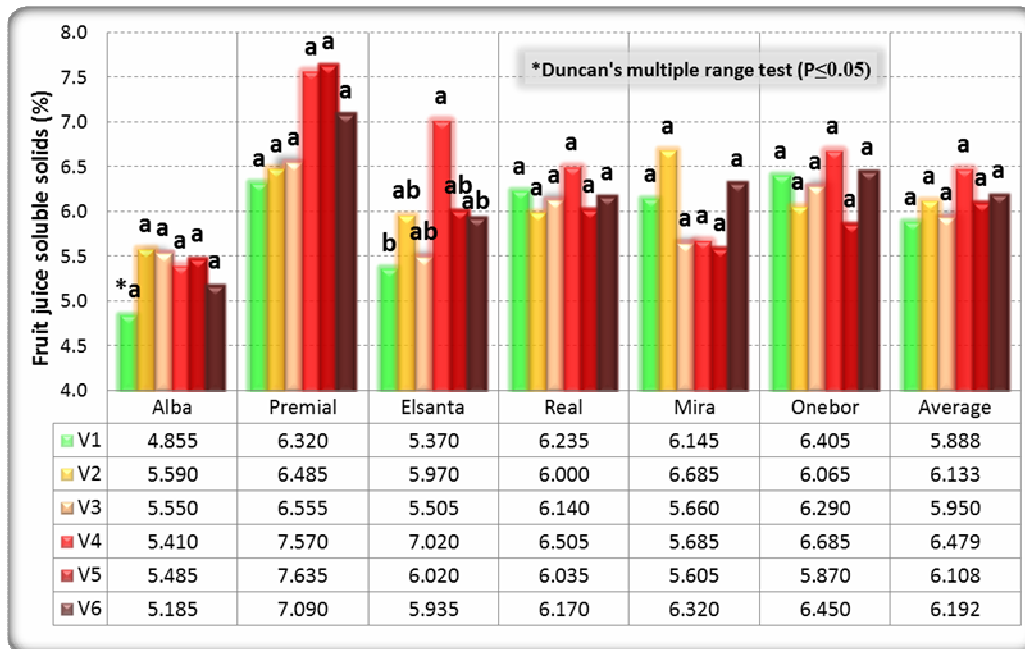


Figure 5. The influence of fertilization variant on dry matter content of fruit juice, within different cultivars

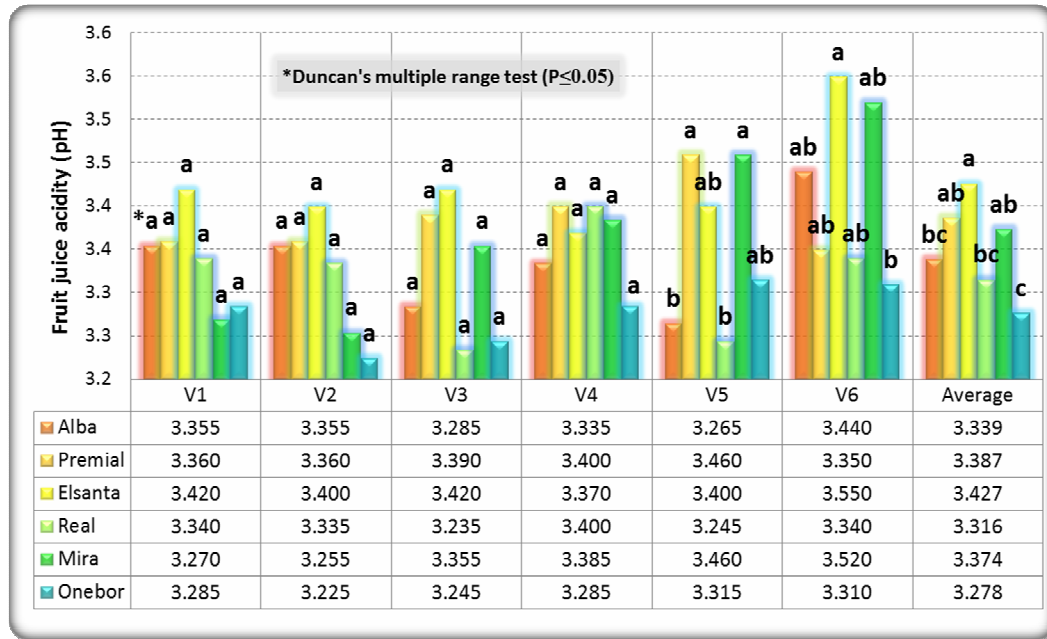


Fig. 6. The influence of genotype on fruits juice acidity, within different fertilization treatments

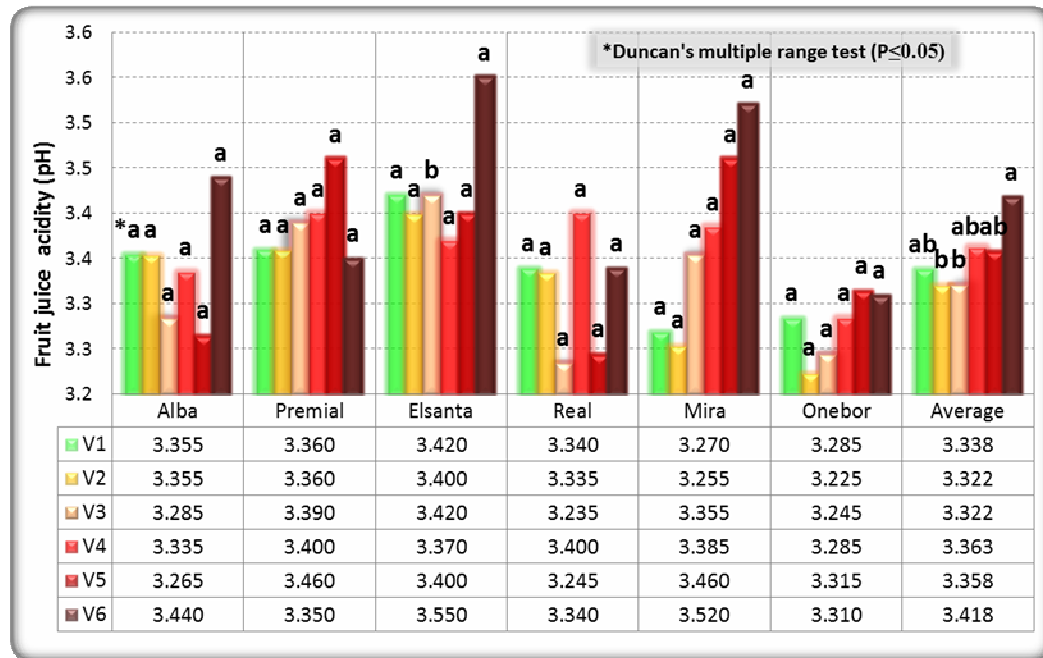


Fig. 7. The influence of fertilization variant on fruit juice acidity, within different cultivars

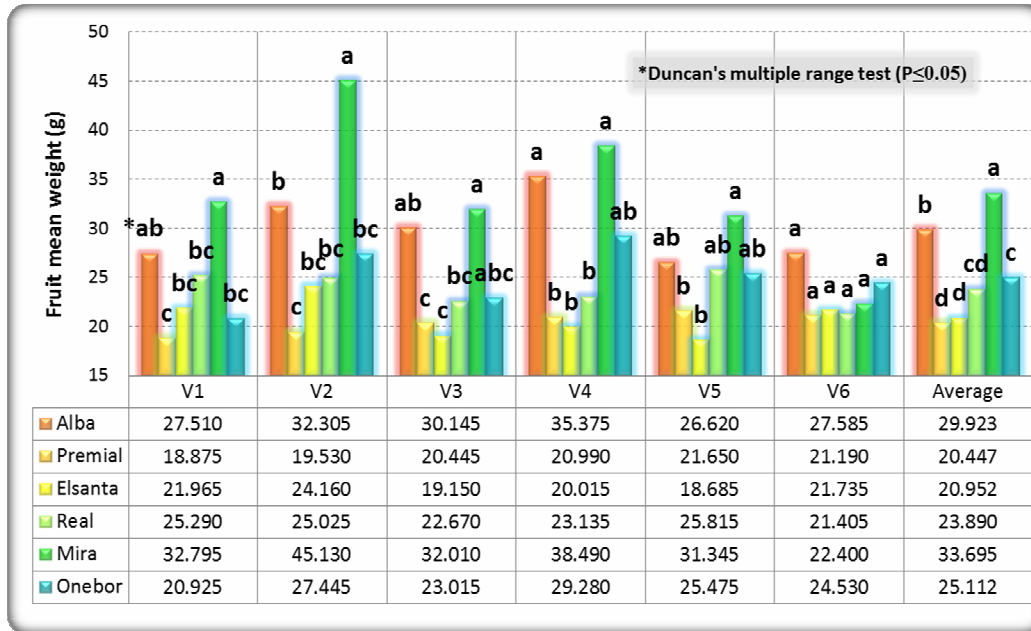


Fig. 8. The influence of genotype on mean fruit mass, within different fertilization treatments

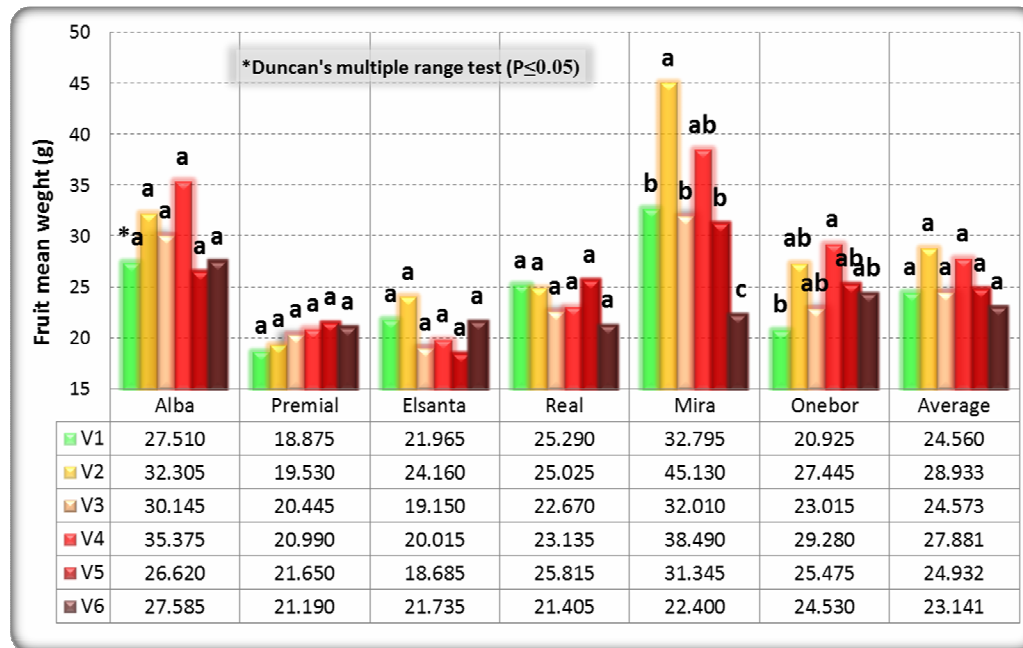


Fig. 9. The influence of fertilization variant on mean fruit mass, within different cultivars