

THE INFLUENCE OF FERTILIZER DOSES ON SOME INDICATORS OF STRAWBERRY FRUITS CULTIVATED AT POLOVRAGI, GORJ COUNTY

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ABSTRACT

Strawberry, a small fruit species, is highly valued for its rich fruit with a special nutritional and therapeutic value. In order to establish how the different doses of fertilizers influence the degree of assimilation of nutrients in strawberry plants and fruit quality, we performed a series of chemical and biochemical determinations on strawberries grown in Polovragi, Gorj County under the influence of the following fertilizer doses: 51-36-75, 102-72-150, 136-96-200, 54-70-75, 102-140-176, 153-210-240, 81-72-50, 162-142-100, 243-214-150 (NPK). The soil on which the experiment was placed is a skeletal cambic nigrosol. The Yara Mila Power complex fertilizer type 17-12-25 was used, supplemented with simple fertilizers with nitrogen, phosphorus and potassium to reach the appropriate dose.

INTRODUCTION

Among the fruit species with nutritional, therapeutic and economic value cultivated in our country, strawberry occupies one of the first places.

That is why world strawberry production has almost doubled in the last 15-20 years, reaching from 2772.5 million tons to 4,308 million tons. The cultivated area also underwent changes, increasing but not in the same ratio with the production from 21.6819 ha to 24.2371 ha. Production per hectare has obviously increased from 12.78 t to 17.8 t.

The largest strawberry grower in the world, USA annually produces 1,313 million tons of strawberries on an area of 23,264 ha, achieving an average production of 56.44 t / ha.

At present, using tunnel cultivation is obtained frequently a production of 60-70 t / ha (FAO Statistics, 2019). 20 years

ago, our country cultivates 1,318 ha with strawberries, achieving an average production of 9.63 t / ha. At present, the surface cultivated with strawberries in our country exceeds 3,000 ha, achieving in recent years a global production of 60.32 million tons, ie 19-20 t /ha (MADR, 2018).

It can be seen, therefore, a growing interest for this culture, especially in Oltenia, where due to the special ecological plasticity of the strawberry, it has taken on a special dimension even in Gorj County.

That is why we proposed to study the quality of strawberry fruits in Gorj county, Polovragi commune, by studying some common biochemical indicators as well as how nutrients from the soil are assimilated as a result of fertilization with different doses of complex fertilizers.

deposits, sandy-loam with a groundwater depth of 10 m. Agrochemical properties of soils are a key factor in determining the degree of fertility, so their productive potential and also to develop measures to improve agrochemical and increasing

MATERIAL AND METHOD

The experiment was located on a skeletal cambic nigrisol (after SRTS 2012) formed on alluvial-proluvial

fertility through the use of chemical and organic fertilizers (Dodocioiu et al, 2013). The main physico-chemical properties of this soil in the Au horizon are: coarse sand 43.4%; fine sand 9.8%; dust 27.7%; clay 22.3%; textural class LL; pH 5.39; humus 3.64; P_{AL} 31.2 ppm; K_{AL} 76.0 ppm. The soil is therefore weakly acidic, has a medium loamy texture, medium supplied with nitrogen, phosphorus and potassium.

The Yara Mila Power 17-12-25 complex fertilizer was used in an experiment located according to the block method with 10 variants in 4 repetitions as follows: unfertilized variant (V1), N₅₁P₃₆K₇₅ (V2), N₁₀₂P₇₂K₁₅₀ (V3), N₁₃₆P₉₆K₂₀₀ (V4), N₅₁P₇₀K₇₅ (V5), N₁₀₂P₁₄₀K₁₇₆ (V6), N₁₅₃P₂₁₀K₁₇₆ (V7), N₈₁P₇₂K₅₀ (V8), N₁₆₂P₁₄₂K₁₀₀ (V9), N₂₄₃P₂₁₄K₁₅₀ (V10).

The surface of the plot was of 25 sqm comprising 125 plants respectively 50,000 plants/ha, planting distance 80/25. The cultivated variety was Premial.

The following determinations were made:

- at leaves: content of N, P, K %, in the flowering phases and fruit binding.
- at fruits: total dry matter% (TDM) in the oven; soluble dry matter % (SDM) refractometrically; total sugar content(%) was assayed colorimetric with 3,5 dinitrosalicylic acid reagent at 540 nm (Babeanu et al, 2017).; ascorbic acid (mg/100 g d.m) iodometric method (Dinu et al, 2017).; total acidity (g ac. Malic/100 g) titrimetric.

RESULTS AND DISCUSSIONS

The results obtained following the laboratory analyzes performed regarding the influence of fertilizer doses on the N, P, K content of leaves and soil are presented in figure 1 and 2.

The total nitrogen content in all tested variants is in the range of 0.140 - 0.175, which corresponds to the average degree of soil supply with nitrogen, which resulted from the humus content and nitrogen index (H-3.64%, IN = 2, 7).

Higher nitrogen content is recorded in variants with higher doses of nitrogen 0.175% at the dose of N₂₄₃, 0.170% at N₁₅₀ and 0.169 at N₁₀₂ compared to 0.140 for the unfertilized variant.

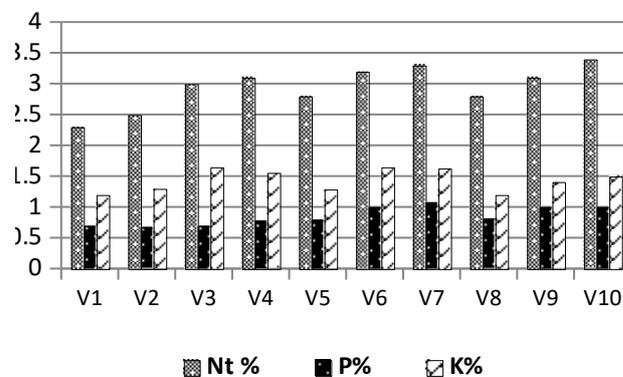
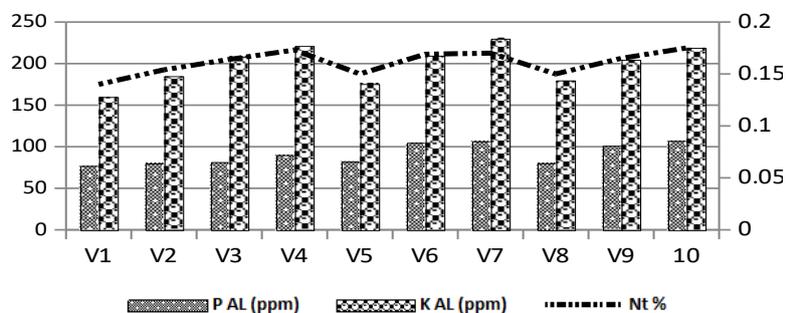


Figure 1. The average content of N, P, K in soil as a result of the use of different doses of fertilizers

The mobile phosphorus content is also directly influenced by the dose of phosphorus used. Thus it is 77.2 ppm for the unfertilized variant and reaches values of 105.1; 106.8 and 107.4 ppm P



in variants fertilized with P₁₄₀, P₂₁₀ and P₂₁₄.

Figure 2. The average content of N, P, K in leaves as a result of the use of different doses of fertilizers

The assimilable potassium content has higher values where higher doses of potassium were used: 230.3 ppm at K₂₂₅, 221.6 ppm for the K₂₀₀ compared to 160.2 ppm for the unfertilized variant.

Regarding the chemical composition of the leaves, the following findings were made:

- the total nitrogen content was higher in the variants N₂₄₃P₂₁₄K₁₅₀ (3.4%), N₁₅₃P₂₁₀K₂₂₅ (3.3%) and N₁₃₆P₇₂K₂₀₀ (3.1%), falling within the optimal level of 2.5 - 3.2% presented by Borlan, 1992 and Roson, 2001.

- potassium is in normal amounts 1.2 % in the unfertilized control sample and where low doses of potassium K50 are applied it has values of 1.65% (N₁₀₂P₇₂K₁₅₀) and 1.56 % in N₁₃₆P₉₆K₂₀₀.

The main biochemical indicators of strawberry fruits under the influence of different doses of fertilizers applied

The treatments applied by different doses of fertilizers had a direct influence on the quality of fruit production which were quantified by:

- content in total and soluble dry matter,
- sugar content,
- ascorbic acid content and total acidity.

All these determinations are listed in figure 3 and 4.

A careful look at the data in this figures highlights the following:

-total dry matter has obviously increased as a result of the application of different doses of fertilizers from 8.5% to 13.6%, the highest values being recorded following the application of doses N₁₆₂P₁₄₂K₁₀₀ (13.6%); N₁₀₂P₁₄₀K₁₇₆ (12.3%) and N₁₀₂P₇₂K₁₅₀ (12.9%).

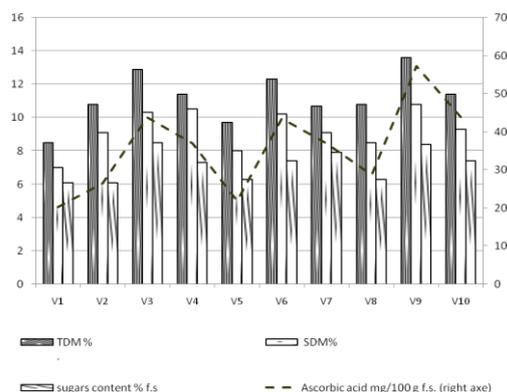


Figure 3. The effect of different doses of fertilizers on biochemical indicators of strawberry fruits

The same evolution has the soluble dry matter increasing from 7% to 10.8%

when using doses of N₁₆₂P₁₄₂K₁₀₀ or 10.3% when using N₁₀₂P₇₂K₁₅₀.

The sugar content increased following the use of different doses of fertilizers from 6.1 to 7.9 - 8.5 g /% f.s. at dose N₁₀₂P₇₂K₁₅₀, the increase is usually higher at higher doses of potassium, which is unanimously recognized by Lacatusu, 2006; Sala, 2008.

The value of ascorbic acid is doubled especially where doses of N₁₆₂P₁₄₂K₁₀₀ and N₂₄₃P₂₁₄K₁₅₀ have been used.

The acidity of the fruit also has double values, especially after using the following doses of fertilizers: N₂₄₃P₂₁₄K₁₅₀, N₁₅₃P₂₁₀K₁₇₆, N₁₀₂P₇₂K₁₅₀, so also at high doses of potassium.

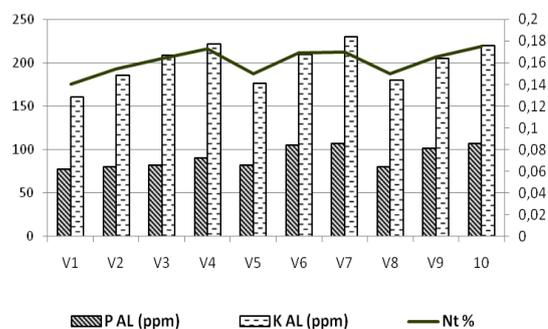


Figure 4. The effect of different doses of fertilizers on total acidity of strawberry fruits

CONCLUSIONS

The strawberry culture has a very high ecological plasticity, adapting well to the skeletal cambic nigrisol from Polovragi. This is proven by good nutrition with nutrients and the quality of production obtained under conditions of fertilization with doses of complex fertilizers.

The content of soil in nutrients has improved as a result of the use of different doses of fertilizers, increasing both the content of total nitrogen and that of mobile phosphorus and assimilable potassium, creating a good reserve for strawberry nutrition in the soil.

The quantities of nutrients assimilated in the strawberry leaves at

flowering are within normal limits, they ensure the premises of a good production.

The quality of the fruits is much higher than the unfertilized ones, increasing the TDM and SDM content, the sugars have higher values and the total acidity and the ascorbic acid in the fruits have double values.

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