

TOMATO CROP FERTILIZATION -A UNDISPUTED BENEFIT FOR EFFICIENT PRODUCTION AT AN EXPECTED LEVEL

FERTILIZAREA CULTURILOR DE TOMATE – UN BENEFICIU INCONTESTABIL AL EFICIENTIZĂRII PRODUCȚIILOR LA NIVEL SCONTAT

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Abstract. *Because the plant is a symbiosis of two systems, one heterotroph with one autotroph, respectively the root with the aerial part, it is the projection of a somewhat differentiated and yet unitary metabolism, and at the same time, a "barometer" of the nutrition state. The nutritional disorders are thus, in close agreement with the vegetation but also nutrition factors, especially in relation to the fertilization practices. Along with the dosage of the movable elements in the soil, the foliar diagnosis represents the main and efficient method to complete the necessary elements. nutrition, in different developmental phenomena. The paper presents results of foliar diagnosis, at a crop of tomatoes in the field, at two critical moments of nutrition, before flowering and at the beginning of ripening. The obtained results, regarding the state of ensurance with macroelements, certify the need for additional fertilizer intervention and guarantee the obtaining of harvests at an expected level.*

Key words: foliar diagnosis, fertilization, nutritional disorders

Rezumat. *Deoarece, planta este o simbioza a doua sisteme, unul heterotrof cu unul autotrof, respectiv rădăcina cu partea aeriană, ea este proiecția unui metabolism oarecum diferențiat și totuși unitar și în același timp, un „barometru” al stării de nutriție. Dereglările de nutriție sunt astfel, în strinsă concordanță cu factorii de vegetație dar și de nutriție, mai cu seamă în relație cu practicile de fertilizare. Alături de dozajul elementelor mobile din sol, diagnoza foliară reprezintă metoda principală și eficientă de a completa necesarul de elemente de nutriție, în diferite faze de dezvoltare. Lucrarea prezintă rezultate de diagnoză foliară, la o cultură de tomate în câmp, la două momente critice de nutriție, înainte de înflorit și la începutul coacerii. Rezultatele obținute, vis a vis de starea de asigurare cu macroelemente, certifică necesitatea intervenției fertilizante suplimentare și garantează obținerea de recolte la nivel scontat.*

Cuvinte cheie: diagnoză foliară, fertilizare, dereglări de nutriție

INTRODUCERE

The diagnosis of the deficiencies of nutrition, by methods of dosing in the laboratory of the macroelectrodes, in total forms, of the vegetal material (leaf, petiole, tendril, stalk) (Davidescu and Davidescu, 1992), represents a process applied

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especially to the intensive cultures. Based on the results, the nutritional deficiencies can be predicted and fertilization recommendations can be made, in order to return to a nutritional balance appropriate to the species, variety or hybrid, age and eco-pedological conditions.

The quantitative analysis (the total analysis) is the basis of the foliar diagnosis, thereby establishing the intensity and quality of nutrition or other characteristics, which give an image on the state of supply with nutrients (Volf *et al*, 2007).

The applied fertilizers, as a result of finding nutritional deficiencies, in optimal doses and ratios, balance the global nutrition balance and lead to high and sustained yields.

MATERIAL AND METHOD

In 2016, 2017 and 2018, a foliar diagnosis study was performed, in a private farm in Golaesti, Iasi county, belonging to two relatively close locations. The culture under study was that of field tomatoes, a summer-autumn culture. The varieties chosen for the analysis were Arges F1 and Carolina, characterized by a relatively high productive potential, of 40-60 t/ha and 40-55 t/ha respectively, both having a vigorous growth.

The soils representative for the analyzed area are the carbonate and leachate chernozems, characterized by the cumulative character, well humified (at a depth of 80-100 cm the humus content exceeds 1%) structured and loose (molic), with a humidity regime - periodically percolative and non-percolative and a neutral or weak alkaline reaction.

The basic fertilization consisted in the administration of 40 t/ha of manure fertilized in location I in the autumn of 2015 and respectively 35 t/ha in location II, the same year. Annually, in the autumn there were administered under the basic plowing, 180 kg/ha a.s. of concentrated superphosphate for location I and 150 kg/ha respectively. concentrated superphosphate, for location II. Potassium fertilizers were provided by the autumn administration of 200 and 180 kg/ha respectively in the form of Kalimag I, works performed annually. During vegetation, complex fertilizers, respectively Cx 16-48 and Cx 15-15-15, were administered in doses of 150 kg/ha a.s. , for both locations, administered radically, at two moments - before flowering and at the beginning of fruit formation.

There were collected samples of vegetative material, respectively leaf, limb, according to the standard methodology, on analytical units. The moment of harvesting was before flowering and fruit formation. The samples prepared by washing, drying and calcining were subjected to analysis.

The following were determined:

- total nitrogen content (Nt%) - method in the variant of mineralization with sulfuric acid, distillation and titration of ammonia;
- total phosphorus content (Pt%) - dosing method with ammonium molybdate and reduction with tin chloride, colorimetric dosing (after Nicolov, 1976),
- total potassium content (Kt%) - method by mineralization with sulfuric and perchloric acid, flame photometry dosing with atomic absorption.

The values of the diagnostic results represent the average for the three years of analysis.

RESULTS AND DISCUSSIONS

By administering basic and phase fertilizers, the fund of nutritional elements is provided to the crop plants. These by an absorption mechanism, either active or passive, are translocated into the plant and used in metabolism, the final product being harvested. Due to dysfunctions that interfere with the technological flow in the production practice but also due to eco-pedological factors, often the supply of plants with fertilizing elements becomes deficient. Thus, nutritional disorders appear, leading to decreased production.

The purpose of the study was to detect early nutrition deficiencies through foliar diagnosis, a precision procedure that completes soil analysis and can be used for vegetation fertilization recommendations, by changing the NPK ratio to fertilization, in certain phenophases and critical moments of nutrition.

The total nitrogen, phosphorus and potassium content of the plant material, before flowering (N_t , P_t and K_t -%) (fig. 1)

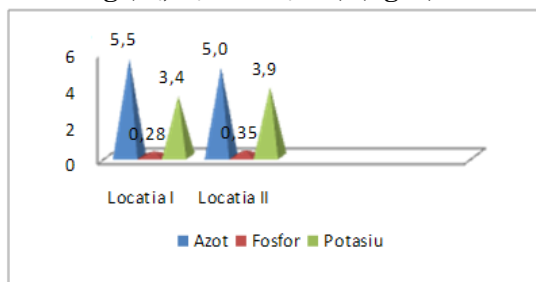


Fig. 1 Content of N_t , P_t and K_t from the plant material, before flowering

Analyzing the values of nitrogen, phosphorus and potassium content, total forms, before flowering, (fig. 1) the value of 5.5% for N_t represents an optimum value, for P_t the value of 0.28% falls under the optimum state of assurance; also, for K_t , the value 3.4% represents the upper limit of the normal state of ensurance with this element.

The total nitrogen, phosphorus and potassium content of the plant material, when fruit is formed (N_t , P_t and K_t -%) (fig. 2)

For the phenophase of "after fruit formation" (fig. 2), in the first location, the values of 3.0%, 0.25% and 2.8% of N_t , P_t and K_t contents were registered, which comparatively with the data from the specialized literature, it places nitrogen and phosphorus at low ensurance, while potassium at the supply exceeds optimum, with 0.3%, the exceedances being not significant.

For location II, the values at N_t of 3.5% are optimal, while the phosphorus exceeds by 0.3% the values of the optimal ensurance and the potassium at 2.5% provides optimum nutrition.

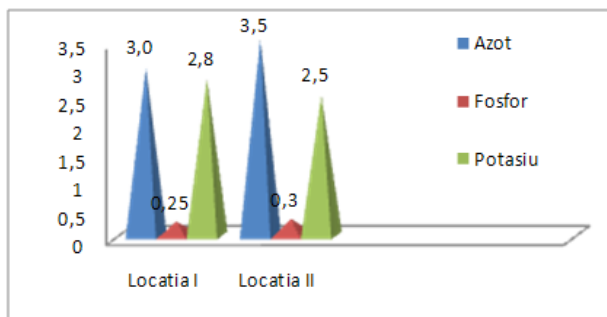


Fig. 2 Content of N_t, P_t and K_t from plant material, after fruit formation

CONCLUSIONS

1. The foliar diagnosis is an additional method of investigation, together with the dosage of the macoelements accessible from the soil, which offers data that can lead to the revision of the fertilization system and its adaptation, depending on the nutritional needs of the species, integrated and on phenophases.

2. The values of total nitrogen, phosphorus and potassium content, at the two vegetation moments and in the two locations, are optimally, with small deviations, which denotes that the applied fertilization system (doses, assortment, NPK reports) is a beneficial and judiciously applied.

3. For location II, at the moment "after fruit formation", slight fluctuations of macronutrients are observed, below and above optimum, recommending as good practices, possible additional fertilization with foliar fertilizers, rich in nitrogen and phosphorus, of type F 231

4. Both basic and supplementary fertilizers, they bring the nutrients in the soil, necessary for the specific consumption and represent the sine-qua-non condition for the development of a complete metabolism, which leads to high and stable yields.

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