

## VARIATION OF ELEMENTARY CHEMICAL COMPOSITION AT A CULTURE OF CHEMICALLY FERTILIZED POTATO IN AN AREA BELONGING TO TCE 3 BRAZI, GIROV, NEAMT COUNTY

### VARIAȚIA COMPOZIȚIEI CHIMICE ELEMENTARE LA O CULTURĂ DE CARTOF FERTILIZATĂ CHIMIC, ÎNTR-UN AMPLASAMENT APARTINÂND TCE 3 BRAZI, GIROV, JUDEȚUL NEAMȚ

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**Abstract :** *The elementary composition of plants varies in relation to several factors, but fertilization is a restrictive and limiting factor. The study has in view this aspect and highlights the impact of fertilizer doses, but also their chemical composition, on elementary chemical composition, on a potato culture produced in climatic and soil conditions in Neamt county. A fond fertilization with 375 kg / ha with NPK and an additional fertilization in vegetation with a formula of 16-20+18-46+Kristalon, achieves an accumulation in haulm of 0.43; 0.56 and 3.76% N, P, K in d. s. (ensuring medium to normal), and in tubers an accumulation of 1.04; 0.59 and 1.80% NPK in d.s. (ensuring normal to very good). Corroborated with soil fertility status as well as with other eco-pedo-climatic factors, these results are recorded in a register of the favorability of culture in the context of this scheme of fertilization.*

**Key words :** elementary chemical composition, fertilization, fertilizers

**Rezumat :** *Compoziția elementară a plantelor variază în raport cu o serie de factori, însă fertilizarea reprezintă un factor restrictiv și limitativ. Studiul întreprins se raportează la acest aspect și reliefează impactul dozelor de îngrășăminte dar și compoziția chimică a acestora, asupra compoziției chimice elementare, la o cultura de cartof, produsă în condiții climatice și de sol din județul Neamț. O fertilizare de fond cu 375 kg/ha s.a NPK și o fertilizare suplimentară în vegetație cu o formulă de tip 16-20+18-46+Kristalon, reușește o acumulare în vreji de 0,43; 0,56 și 3,76 % N,P,K din s.u ( asigurare medie spre normală ), iar în tuberculi, o acumulare de 1,04; 0,59 și 1,80 % NPK din s.u.( asigurare normală spre foarte bună ). Coroborate și cu starea de fertilitate a solului dar și cu alți factori eco-pedo-climatici, aceste rezultate se înscriu într-un registru al favorabilității culturii, în contextul acestei scheme de fertilizare.*

**Cuvinte cheie:** compoziție chimică elementară, fertilizare, fertilizanți

## INTRODUCTION

Creating certain nutritional preferences appropriate to crops, is a prime factor in obtaining large and constant quantitative and qualitative production. The

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use of fertilizers in balanced reports for satisfying the metabolic processes of plants is reflected in the elementary chemical composition of the vegetative parts, but especially of the recoverable parts. In potatoes, nitrogen fertilizers have moderate efficacy, with potassium being the most effective and less influenced by climatic conditions, followed by phosphorus with the least efficiency (Ianos, 1980). The process of vegetative formation as well as the additional consumption of fertilizing elements can be stimulated by foliar treatments, thus maintaining the plant active over a longer period of time (Loon, 1984). An inadequate supply with only one of the essential elements produces a worsening of the assimilation of other elements but also of the conditions of plant growth and development (Davidescu, 1980).

## MATERIAL AND METHOD

The research is a continuation of the studies undertaken within TCE 3 Brazi, Girov, Neamt County, in 2015, on a potato culture. The experience with chemical fertilizers was organized on an area of 0.5 ha, following the subdivision blocks method, in 4 rehearsals. As a precursor plant, the potato had a corn crop, the variety being Castrum.

The climate in which the potato was produced is a pronounced continental temperate climate in which the average temperature is  $8.4^{\circ}\text{C}$  and the sum of the average annual rainfall is 635.5 mm distributed in a number of 89.5 days, favourable conditions for potato cultivation.

The soil on which the crop is located is a gleic proxicalcarus aluvisol with a pH of 5.54-5.8, a hydrolytic acidity of 3.12-4.32 me/100g of soil, a humus content of 1.86-2.58% and a saturation degree in bases of 71-76%.

The basic fertilizations were made with urea (46.6%), concentrated superphosphate (50% sa) and potassium salt (40%), administered in progressive doses of 110 kg/ha a.s. to 75 kg/ha a.s. of  $\text{P}_2\text{O}_5$  and 45 Kg/ha of  $\text{K}_2\text{O}$ , respectively 135 kg/ha a.s. of N, 95 kg/ha a.s. of  $\text{P}_2\text{O}_5$  and 70 kg/ha a.s. of  $\text{K}_2\text{O}$  and the third level of fertilization 160 kg/ha a.s. of N, 120 kg/ha a.s. of  $\text{P}_2\text{O}_5$  and 95 kg/ha a.s. with  $\text{K}_2\text{O}$ .

Phaseally, two solid complex fertilizers Cx 16-20-0 and Cx 18-46-0 produced by SC Arvi Agro SRL were used at 25 kg/ha a.s. for fertilization I and 50 kg/ha a.s. for fertilization II, and two foliar fertilizers, Fertcomplex and Kristalon in doses of 5 L/ha a.s. fertilization I and 7 L/ha a.s. fertilization II. The moments of phase fertilization were at the beginning of vegetation, respectively 10-15 leaves and before flowering.

The complexes 16-20 and 18-46 have a granulometric structure of 3% (fraction of the total mass of granules of size  $\leq 1$  mm)

Fertcomplex and Kristalon foliar fertilizers have a pH of 6.6 and 6.5 and a content of 80,80 and 75 g/L N, P, K - Fertcomplex and 180,180 and 180 g/L N, P, K - Kristalon. They also contain a number of other macro and micro elements such as S, Mg, Mn, Mo, Zn, Fe.

Samples of whole plants were taken at technological maturity, according to the standard methodology in force, on analytical units. The laboratory analyzes have been prepared and subjected separately, the recoverable part from the non-worthable part (haulm/tubers) The following were determined:

- total nitrogen dosing, sulfuric acid mineralization, distillation and ammonium titration with  $\text{H}_2\text{SO}_4$ ;

- total phosphorus dosing - wet mineralization, ammonium molybdate and chlorine reduction, colorimetric dosing (after Nicolov, 1976);
- total potassium dosing by mineralization with sulfuric acid and perchloric acid mixture and flame photometry dosing.

## RESULTS AND DISCUSSIONS

From the researches carried out, which aimed at the effectiveness of the basic and phasic chemical fertilization, on the accumulation of fertilizing elements in the potato plants, it results that, under the conditions studied, the fertilizers have a major impact on the nutrient accumulations in the plant, both in the profitable part and in the unvalued one (tab. 1, tab. 2).

The elementary chemical composition in haulm varied in relation to the fertilizer doses used as agrofonds as well as the chemical composition of fertilizers used additionally during vegetation. The maximum total nitrogen, phosphorus and potassium content was recorded in the case of the three agrofonds, by using during the vegetation the additional fertilizations in the combination 16-20 + 18-46 + Kristalon, with insignificant differences from one agrofond to another.

Table 1

Elementary chemical composition (% N, P and K from d.s.) - haulm

Var/agrofond	110-75-45 kg/ha NPK s.a			135-95-70 kg/ha NPK s.a			160-120-95 kg/ha NPK s.a		
	Nt %	Pt %	Kt %	Nt %	Pt %	Kt %	Nt %	Pt %	Kt %
<b>Control</b>	0.20	0.30	2.20	0.20	0.30	2.20	0.20	0.30	2.20
<b>16-20-0</b>	0.29	0.33	2.29	0.30	0.35	2.34	0.33	0.38	2.56
<b>18-46-0</b>	0.31	0.38	2.28	0.35	0.41	2.36	0.35	0.44	2.60
<b>16-20+18-46</b>	0.33	0.43	2.30	0.38	0.46	2.35	0.39	0.50	2.62
<b>Fertcomplex</b>	0.30	0.35	2.50	0.35	0.37	2.69	0.37	0.40	2.72
<b>Kristalon</b>	0.35	0.40	2.90	0.35	0.44	3.10	0.40	0.49	3.30
<b>16-20+18-46+ Fertcomplex</b>	0.35	0.40	2.55	0.38	0.46	2.71	0.38	0.52	2.70
<b>16-20+18-46+ Kristalon</b>	0.37	0.45	3.10	0.40	0.50	3.40	0.43	0.56	3.67

In the case of elementary chemical composition NPK in tubers, the same tendency is noticed, with the observation that, from one agrofond to another, the increases are significant for the same additional fertilization, ie the use of 16-20 + 18-46 + Kristalon combination.

Table 2

**Elementary chemical composition (% N, P and K from d.s.) - tubers**

Var. /agrofond	110-75-45 kg/ha NPK s.a			135-95-70 kg/ha NPK s.a			160-120-95 kg/ha NPK s.a		
	Nt	Pt	Kt	Nt	Pt	Kt	Nt	Pt	Kt
	%	%	%	%	%	%	%	%	%
<b>Control</b>	0.26	0.15	0.55	0.26	0.15	0.55	0.26	0.26	0.55
<b>16-20-0</b>	0.30	0.25	0.57	0.35	0.29	0.60	0.44	0.30	0.75
<b>18-46-0</b>	0.34	0.30	0.60	0.38	0.40	0.59	0.45	0.45	0.77
<b>16-20+18-46</b>	0.45	0.39	0.61	0.50	0.49	0.63	0.60	0.50	0.77
<b>Fertcomplex</b>	0.37	0.37	0.55	0.45	0.46	0.59	0.59	0.47	0.69
<b>Kristalon</b>	0.44	0.40	0.65	0.49	0.49	0.75	0.60	0.51	0.80
<b>16-20+18-46+ Fertcomplex</b>	0.59	0.45	0.70	0.61	0.50	0.82	0.75	0.55	0.99
<b>16-20+18-46+ Kristalon</b>	0.70	0.46	0.85	0.87	0.55	1.33	1.04	0.59	1.80

**CONCLUSIONS**

1. The potato produced under intensive conditions within SC TCE 3 Brazi Girov and benefiting from the ecological conditions of the area, is responsible for their fertilization, certified by the results of the analysis of the elementary composition of the plants.

2. By providing a sustained and balanced NPK agrofond and the use of phasial fertilizers, we note the improvement of the elementary chemical composition, both in the unvaluable and the recoverable part, the dosages being within the limits of a medium-to-normal insurance quoted by the literature, for the essential macroelements, nitrogen, phosphorus and potassium.

3. Additional fertilization with Kristalon, for all three agrofond, brings in nitrogen, phosphorus and potassium content compared to additional fertilization 16-20 + 18-46 + Kristalon.

4. With the variant 16-20 + 18-46 + Kristalon, on the agrifond 160-120-95 kg/ha a.s. with NPK, there are obtained the potato tubers with maximum nitrogen, phosphorus and potassium content, i.e. 1.04; 0.59 and 1.80% of d.s.

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