

INFLUENCE OF FERTILIZATION ON SOME ADDITIONAL ELEMENTS OF FOLIAR DIAGNOSIS AND PRODUCTION AT THE VINEYARD

INFLUENȚA FERTILIZĂRII SUPLIMENTARE ASUPRA UNOR ELEMENTE DE DIAGNOZĂ FOLIARĂ ȘI ASUPRA PRODUCȚIEI LA VIȚA DE VIE

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Abstract. *The strategy of adopting a balanced fertilization system is an essential condition in the normal course of growth and development processes of vines, being reflected in the level and quality of crops. Starting from the fertility status of the soil, together with the foliar diagnosis and in accordance with a series of other factors that interfere, the setting of doses of NPK fertilizers and reports, all these are a priority. The paper examines the impact of two types of complex fertilizers, Cx 15-15-15 and Cx 5-15-25, phasally administered in varying doses on the accumulation of nutrients in the plant and on the production. The assortment Cx 15-15-15 in the dose of 200 kg / ha, achieved optimal content of nitrogen, phosphorus and total potassium in plants at optimal levels, of 2,7 % N_t, 0,23 % P_t and 1,4 % K_t and production increases of 1360 kg / ha, compared to the unfertilized control.*

Key words: foliar diagnosis, fertilization, NPK

Rezumat. *Strategia adoptării unui sistem de fertilizare echilibrat reprezintă o condiție esențială în desfășurarea normală a proceselor de creștere și dezvoltare a viței de vie, reflectându-se în nivelul și calitatea recoltelor. Pornind de la starea de fertilitate a solului, coroborată cu diagnoza foliară și în concordanță cu o serie de alți factori ce interferă, stabilirea de doze de îngrășăminte și rapoarte NPK, reprezintă o prioritate. Lucrarea analizează impactul a două sortimente de îngrășăminte complexe Cx 15-15-15 și Cx 5-15-25, administrate fazial, în diferite doze, asupra acumulărilor de nutrienți în plantă și asupra producției. Sortimentul Cx 15-15-15 în doză de 200 kg/ha, realizează conținuturi optime de azot, fosfor și potasiu total în plante la nivele optime, de 2,7 % N_t, 0,23 % P_t și 1,4 % K_t și sporuri de producție de 1360 kg/ha, față de materialul nefertilizat.*

Cuvinte cheie: diagnoză foliară, fertilizare, NPK

INTRODUCTION

The foliar diagnosis of nutrition through chemical analysis is an extended process by analyzing some vegetative parts (especially leaves but also leaf veins, petiole, young shoots or one-year branches) (David, 1992), determining that the plant analyzed has all the nutrition elements, to detect situations of: deficiency or excess

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(Volf, 2007), forecasting the nutritional deficiencies during the vegetation, setting recommendations for fertilization (Paraschiv, 2008), evaluating the export of nutrients with the crop aiming at their returning and maintaining the soil fertility.

MATERIAL AND METHOD

In 2014 an experience was started on an area of 1.9 ha, in the Farm No. 18, belonging to SC. Vincon SA, Husi Vineyard, using for additional fertilizing of the Chasselas Dore variety, two types of complex fertilizers Cx 15-15-15 and Cx 5-15-25, produced and marketed by SC Arvi Agro SRL. The soil where the experience was set up was a cambic chernozem, with a $pH_{(H_2O)}$ ranging from 7.5 to 8.0, an IN of 2.08, a content of P-AL and K-AL of 23 ppm, 350 ppm respectively, a high base saturation (V%) of 96.2%. There were administered doses of 100, 150 and 200 kg/ha a. s. from these two types, in two phenophases of vegetation, at bursting of buds and in the phase of intensive growth of offshoots, on a background of 150 kg/ha a. s. of superphosphate and 200 kg / ka a. s. calcium bicarbonate 30%. Prior to blooming there were taken vine leaves, which underwent tests after drying and calcination. We determined: the content of total nitrogen ($N_t\%$) - the method with the version of mineralization with sulphuric acid, distillation and ammonia titration, content in total phosphorus ($P_t\%$) - the method of dosage with ammonium molybdate and reduction with stannous chloride, colorimetric dosage (after Nicolov, 1976), total potassium content ($K_t\%$) - the method through mineralization with sulphuric acid and perchloric, photometry dosage of flame with atomic absorption. During vegetation measurements were performed, regarding the total number of shoots, the number of fertile shoots, the number of clusters on the vine, the average weight of a grape (g), the weight of the grapes/vine.

RESULTS AND DISCUSSIONS

On the context of phasic fertilizations with complex fertilizers, the determinations regarding the macronutrient content of plant material aimed at determining whether they need this type of fertilization, the data being compared with the unfertilized control. Also, the values obtained were reported in the specialized literature, the data being considered optimal intervals.

The content of total nitrogen, phosphorus and potassium from plant material (N_t , P_t and K_t - %)

By administering both types of complex fertilizers, we noticed an evolution of total forms of macronutrients in the plant material, values that increase gradually together with the increase of doses. The elements of foliar diagnosis determined at the time, “before blossoming”, confirms that during this period of nutrition, the consumption of nutrients is highest in vines and comparable with the data cited in the specialized literature.

We ascertain a maximum content of total nitrogen in version Cx 15-15-15 200 kg/ha a.s., with a difference from the control of 1.2% N_t , slightly higher than the optimum value (2.2-2.6 %), while the same dose Cx 5-15-25 barely manages to bring the content of total nitrogen in the lower optimum (tab.1).

The total phosphorus from the plant material recorded the maximum in the version Cx 5-15-25, respectively 0.29% with 0.17% more than the control and

places the value in slightly over-optimum parameters, for the flowering phenophase (0.19 to 0.25). For this assortment of fertilizer and it is found that the same as with the smaller doses, respectively 100 and 150 kg / ha a.s. it manages to bring the values of total phosphorus in leaves within the optimum range. The Cx 15-15-15 assortment, being more balanced, determines an optimal content of phosphorus in leaves in all three variants (tab.1).

The total potassium from plant material registers spectacular values of 1.40% and 1.50% for the dose of 200kg/ha a.s. at both types of fertilizers, surpassing the optimum values at blossoming (0.9%). Although over-optimal, these values did not harm, not appearing external signs (spots, browning) of nutritional excess, the vines managing to completely metabolize this item (tab.1).

Table 1

Content of total nitrogen, phosphorus and potassium from plant material
(N_t , P_t , K_t - %)

Variant of fertilization (kg/ha a.s.)	Fertilizer					
	Cx 15-15-15			Cx 5-15-25		
	N_t %	P_t %	K_t %	N_t %	P_t %	K_t %
Control	1.5	0.12	0.85	1.5	0.12	0.85
100	2.1	0.19	0.97	1.8	0.20	0.90
150	2.4	0.22	1.10	2.0	0.25	1.30
200	2.7	0.23	1.40	2.2	0.29	1.50

The elements of fertility (Cfr and Cfa) and productivity (Ipr and Ipa) of vines are genetic determinants but are also influenced by the cultural techniques applied in correlation with the whole complex of ecological factors. Fertilization as indispensable link of the technology of the vine culture plays a role that should not be neglected (tab. 2).

The analysis of these indicators, in accordance with the applied doses, points out the dose of 200 kg / ha for Cx 15-15-15 when Cfr is 1.4, Cfa 1.40, Ipr 168 and Ipa 168 which is closer to the values cited in the specialized literature, for the climate zone belonging to Husi vineyard.

Table 2

Values of relative and absolute fertility coefficients (Cfr, Cfa) and the relative and absolute productivity indices (Ipr, Ipa) for the Chasselas dore variety

Variant of fertilization (kg/ha a.s.)	Fertilizer							
	Cx 15-15-15				Cx 5-15-25			
	Cfr	Cfa	Ipr	Ipa	Cfr	Cfa	Ipr	Ipa
Control	0.9	1.10	108	132	0.9	1.10	108	138
100	1.1	1.24	132	149	1.0	1.15	120	138
150	1.3	1.31	156	157	1.1	1.25	132	150
200	1.4	1.40	168	168	1.2	1.31	144	157

Influence of fertilization on yields

The problem of fertilization is major and important due to numerous factors of inter-influence, being reflected in the annual consumption of nutrients, in the optimal foliar nutrition and in getting the planned production of grapes.

The analysis of productions in relation with the doses and the type of fertilizer used clearly outlines their impact. The gradually increasing doses influence the productions, both types yielding for variant 200 kg/ha, the maximum productions of 9860 and 9790 kg/ha grapes. At this dose, the production growth is of 1360 kg/ha at the administration of Cx 15-15-15 and of 1290 kg/ha at Cx 5-15-25 (tab.3).

Table 3

Productions (kg/ha) for Chasselas dore variety

Variant of fertilization (kg/ha s.a)	Cx 15-15-15			Cx 5-15-25		
	Production (kg/ha)	Production growth (kg/ha)	Diff.from de Mt %	Production (kg/ha)	Production growth (kg/ha)	Diff.from de Mt %
Control	8500	-	-	8500	-	-
100	9250	750	108.8	9120	620	107.2
150	9670	1170	113.7	9560	1060	112.4
200	9860	1360	116.0	9790	1290	115.1

CONCLUSIONS

1. The prognosis of probable changes of the nutritional status in a negative way (deficiencies, excesses) by foliar diagnosis, offer the possibility to review and adapt the fertilization system in an integrated way and on phenophases for a better management of nutrients in the soil-plant system.

2. The two complex fertilizers, administered in the phenophase of flowering, contributed to improving the nutrient content in plant and ensuring the proper conduct of fruition processes in optimum quantities.

3. The Cx 15-15-15 fertilizer being more balanced in comparison to NPK, manages to bring an optimal content of total nitrogen, phosphorus and potassium in plant material used optimally at all doses used, which gives truthfulness in administration.

4. The harvests obtained are specific to the area and the variety and falls to the maximum 200 kg/ha a.s. for the same Cx 15-15-15 at 9860 kg/ha, confirming that the NPK ratio of 1; 1: 1 is beneficial for the fructification of vines.

REFERENCES

1. **Davidescu D., Davidescu Velicica, 1992** – *Agrochimia horticola*. Editura Academiei Române, București.
2. **Paraschiv Nicoleta Luminita, Mariana Volf, 2008** – *Anatomical modifications which appear in irrigated Lolium perenne L. culture after nitrogen fertilization*. Proceedings of „42th Croatian and 2th International Symposium on Agriculture”, University of Zagreb, Croatia, pp. 688-693, ISBN 978-953-6135-67-7
3. **Volf Mariana, Chelariu Elena Liliana, Paraschiv Nicoleta Luminița, 2007** - *The use of residual sources , zeolites tuf , for tomatoes and beans cultures fertilization* , New Methods in Agricultural Research, Dubna – Russia, 10-14 September, Book of abstracts, pp. 98, ISBN 5-9530-0159.