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The Importance of Extraradicular Fertilization in Cherry Species

Florentina Dobrinescu
Orchard Development Research Station Baneasa Bucharest, Romania.
Corresponding author email id: florentina_dobrinescu@yahoo.com

Abstract **– This paper presents data on the influence of applying some types of complex foliar fertilizers in the conditions of Calugareni (Giurgiu County), in a cherry plantation. The composition of these nutrients meets the nutritional needs of the species. The application of different types of foliar nutrients has led to significant increases in yield. In 2020 and 2021, three foliar fertilization variants were studied and the results were compared with the control variant. Extraradicular treatments with various products have persistent positive effects on the growth and development processes of trees.**

Keywords **– Foliar Fertilizer, Increased Production, Nutrition Requirements, Extraradicular Fertilization.**

I. INTRODUCTION

The demands of the cherry on the ground are high. Prefers medium and light, permeable, suitably moist soils, which heat up easily with a maximum calcium content of 6% [2]. The most favorable soils are those with a weakly acidic to neutral reaction (pH 5.8-7.4) [6].

The fertilization system in orchards is coordinated with the methods of maintenance of the intervals (as a black field, occupied field, grassy strips, or as a black field, and in the second part of the summer sown with cover plants for green manure). In dry areas the intervals in the plantations are maintained as a black field [6].

The application of fertilizers to trees correlates with the biological characteristics of each species, in our case it is cherry, but also in the case of the same species or variety differs with the rootstock and the vegetation phases, age periods, root system peculiarities, production load and the reaction to different forms of fertilizers [3]. So it cannot be a single fertilization system that is valid for any plantation and under any conditions [1].

The rational use of fertilizers requires knowledge of the particularities of each phenophase of growth and fruiting. The doses and type of mineral fertilizers are established correctly only after the chemical analysis of the soil from the respective plantation, performed at the establishment of the plantation, completed annually by the foliar diagnosis [6].

In the context of European norms and the green pact for sustainable development, extra-root fertilization in fruit tree plantations becomes practically mandatory. Fertilization schemes with innovative products determine large, constant and quality productions.

II. MATERIAL AND METHOD

Starting from the observation that the extraradicular application, in certain phases of plant growth and development, of complex fertilizers, can stimulate the activity of metabolic processes in plants, such as chlorophyll assimilation, whose yield increases, causing additional consumption of nutrients from the soil and from fertilizers applied to the soil, the agro-technical consequences for the agro-ecosystem can only be beneficial [5].

In general, production increases usually incorporate amounts of nutrients, much higher than those applied wi-

-th foliar treatments, thus highlighting a higher productive consumption of nutrients from the soil reserve, which ensures a reduction in nutrient loss in the soil, contributing Obviously when the degree of chemical pollution of the plant development environment decreases [4].

It can be seen that extraradicular treatments with various products have persistent positive effects on tree growth and development processes, materialized in final production increases, thus contributing to the achievement of increased levels of nutrient exports from all sources, which can cause an effect ecological protection against chemical pollution of the environment [5].

The pedoclimatic conditions, not among the most favorable for the growth and development of fruit trees, existing in the farm from Calugareni (with long periods of drought, associated with very hot summers) have negatively influenced the growth and development of plants. Under these conditions, the application of foliar fertilizer treatments, during the vegetation cycle of the trees, determined a spectacular increase in fruit production.

The main products used were Energevo, VitaFer B and PowerFruits. Energevo has a compositional formula specially adapted to the conditions in Romania. Phosphorus provides the energy needs of the plant at critical times, starting with the first stages of vegetation. Contains activators that improve physiological processes and increase resistance to biotic and abiotic stress. The applied dose was 3 kg / ha.

VitaFer B is a liquid fertilizer, concentrated, for preventing and combating boron deficiency quickly and effectively. A dose of 1.5 liters per hectare was applied in the cherry plantation.

PowerFruits is a biostimulator formulated based on organic matter (organic carbon) from potassium humate (fulvic and humic acids) and trace elements. The product acts quickly, immediately after application, naturally stimulates the growth and development of fruits, stimulates the process of protein synthesis and strengthens the immune system of trees making it very resistant to leaf diseases and fruit diseases. The applied dose was 4 liters / ha.

It was found that the effect of applying in this way the various preparations is highlighted by the harvest increases obtained in each year of experimentation, which are provided from a statistical point of view. For the period 2017-2019, the first three products, which led to the largest increases in fruit production, were Energevo, with an increase of 3.55 t / ha (27%), VitaFer B, with an increase of 2.61 t / ha (20%) and Folifag, with an increase of 2.59 t / ha (almost 20%).

The harvest differences that were registered between the years of experimentation were largely due to the influence exerted by the climatic conditions specific to the analyzed year. The low harvest levels recorded in the years (2018, 2019) are a consequence of the lack of precipitation, associated with very high temperatures during the summer period, which led to the accentuation of the process of physiological fruit fall. In 2017, the most favorable conditions for tree growth and development were met, which was reflected in the particularly high levels of fruit production.

III. Results and Discussions

The average yield increases ranged between 2.26-3.55 t / ha (17-27%), the results regarding the levels of fruit production obtained in the experimental cycle 2017-2019 were highlighted in Table 1. It can be noted that at the

same physical consumption per unit area, the Energevo product resulted in a higher production increase than the Polimet and Folifag complex foliar fertilizers. Completely different climatic conditions from year to year have had their say, influencing the level of production as a whole. Thus, it can be seen that 2017 was favorable for the growth and fruiting of the cherry species, the level of production in the non-fertilized foliar version being relatively high. The application of the Energevo product determined an average production increase of 27%, VitaFer B achieved an average production increase of 20%, and when applying the PowerFruits foliar fertilizer, the registered increase was 19%.

Table 1. Experimental data on the effect of extraradicular fertilization on fruit production (t / ha), for the Amara cherry variety, in the conditions from Calugareni (2017-2019).

Foliar Treatment	2017	2018	2019	Average Production		Increase
				t/ha	%	t/ha
Blank	12,74	13,70	13,14	13,19	100	-
Polimet	15,62	15,95	14,78	15,45	117	2,26
Folifag	16,15	16,09	15,11	15,78	120	2,59
PowerFruits	16,80	15,83	14,51	15,71	119	2,52
VitaFer B	17,12	15,37	14,93	15,80	120	2,61
Energevo	17,86	16,47	15,91	16,74	127	3,55

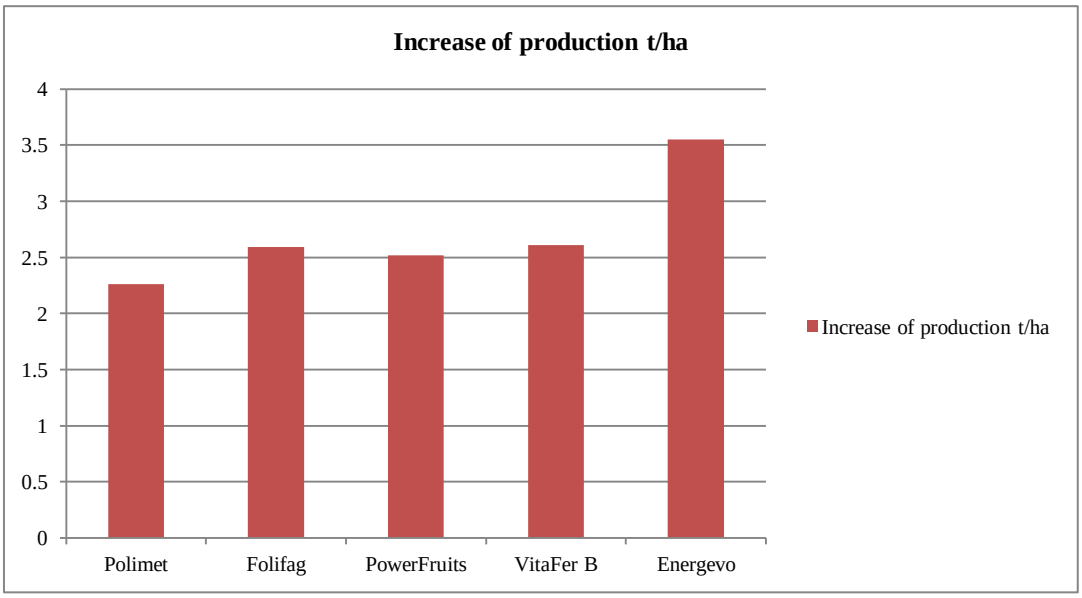

Fig. 1. The average increase of production registered for the Amara cherry variety, in the conditions from Calugareni (2017-2019).

Table 2 shows the effect of extraradicular fertilization on the fruit crop, obtained under experimental conditions in Calugareni, in 2020. Although this year was unfavorable from a climatic point of view (very high temperatures accompanied by a poor rainfall regime during the summer associated with a pronounced pedological drought), the level of production was quite high, but with lower quality characteristics, as an effect of nutritional imbalances that manifested themselves especially in fruits.

Extraradicular fertilization determined the achievement of production increases between: 5% and 30%. The production increase achieved by Energevo, in absolute figures, was 3.29 tons per hectare.

Table 2. Experimental data on the effect of extraradicular fertilization on fruit production, cherry (Calugareni, 2020).

Foliar Treatment	Cherry		
	X	Dif. Blank	%
	t/ha		
Blank	10,91	-	100
PowerFruits	11,50	0,59	105
VitaFer B	12,82	1,91	117
Energevo	14,20	3,29	130

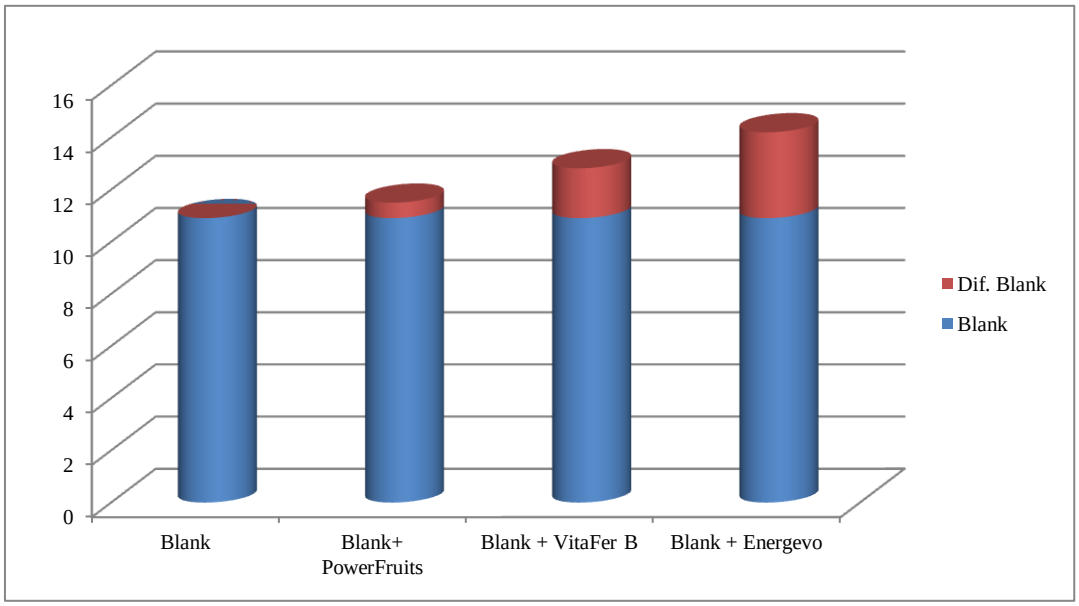

Fig. 2. The effect of extraradicular fertilization on fruit production, Calugareni, 2020.

The year 2021, much more favorable in terms of climatic conditions, compared to 2020, with a normal rainfall regime, balanced relative air humidity (85%), favorably influenced the growth and fruiting of cherry trees, with favorable effects on the level and production quality. The applied foliar treatments determined important production increases, which varied between 17-31% (table 3). Vita Fer B determined an increase of 3.42 tons per hectare, and Energevo 3.99 tons per unit area.

Table 3. Experimental data on the effect of extraradicular fertilization on fruit production (Calugareni, 2021).

Alternative Experimentation	Cherry		
	X	Dif. Blank	%
	t/ha		
Blank	13,11	-	100
PowerFruits	15,34	2,23	117
VitaFer B	16,53	3,42	126
Energevo	17,10	3,99	131

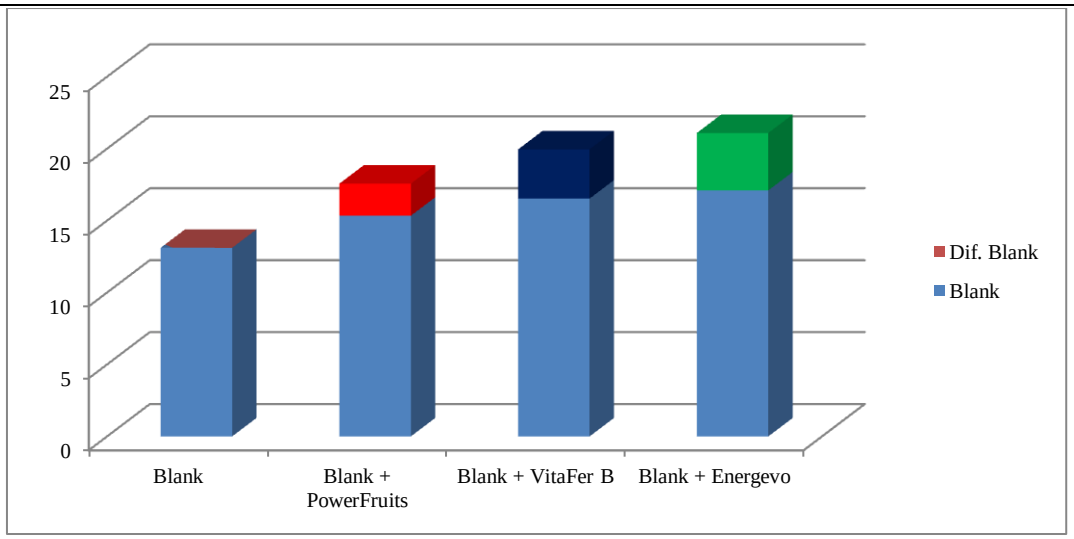

Fig. 3. The effect of extraradicular fertilization on fruit production, Calugareni, 2021.

IV. CONCLUSIONS

The rational use of fertilizers requires knowledge of the particularities of each phenophase of growth and fruiting. The doses are established correctly only after the chemical analysis of the soil from the respective plantation, performed at the establishment of the plantation, completed annually by the foliar diagnosis.

Extraradicular treatments with various products have persistent positive effects on the growth and development processes of trees, materialized in large production increases.

For the period 2017-2019, the first three products, which led to the highest average increases in fruit production, were Energevo, with an increase of 3.55 t / ha (27%), VitaFer B, with the increase of 2.61 t / ha (20%) and Folifag, with an increase of 2.59 t / ha (almost 20%). In 2020 and 2021, Energevo also achieved the largest increases, 30% and 31%.

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AUTHOR'S PROFILE

Florentina Dobrinescu, She was born in 1977. He graduated from the Faculty of Agrotourism Management and works at Orchard Development Research Station Baneasa Bucharest, Romania.