TECHNICAL ACTIONS ON THE APEX OF TREES TO OBTAIN ANTICIPATED BRANCHING IN THE AREA OF CROWN FORMATION IN THE FRUIT NURSERY

ACȚIUNI TEHNICE ASUPRA APEXULUI POMILOR PENTRU A OBȚINE RAMIFICAȚII ANTICIPATE IN ZONA FORMARII COROANEI ÎN PEPINIERA DE POMI

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Abstract.

In order to determine the reaction of Gala Schniga SchniCo Red grafted on the biotype M9T337 to different intervention techniques on the tree apex to increase the degree of bud emergence of the anticipated shoots in field II of the tree nursery, the following variants were studied: 1. Free growth (control); 2. Progerbalin LG, 25 ml; 3. Progerbalin LG, 25+25 ml; 4. Progerbalin LG, 25 ml + apical leaf break; 5. Progerbalin LG, 25+25 ml + apical leaf breakage. It was established, that the higher number of anticipated branches in the area of crown formation was registered in the variant treated with the product Progerbalin LG, 25+25 ml (8.0 pcs), as well as their total length was higher in this variant (373.6 cm).

Key words: Apex, variety, treatment, branching.

Rezumat.

Pentru stabilirea reacției soiului Gala Schniga SchniCo Red altoiți pe biotipul M9T337 la diferite tehnici de intervenție asupra apexului pomului pentru sporirea gradului de emitere a lăstarilor anticipați în câmpul II al pepinierii de pomi au fost studiate următoarele variante: 1. Creștere liberă (martor); 2. Progerbalin LG, 25 ml; 3. Progerbalin LG, 25+25 ml; 4. Progerbalin LG, 25 ml + ruperea frunzelor apicale; 5. Progerbalin LG, 25+25 ml + ruperea frunzelor apicale. S-a stabilit, că număr mai mare de ramuri anticipate în zona formării coroanei a fost înscrisă în varianta tratată cu produsul Progerbalin LG, 25+25 ml (8,0 buc), precum şi lungimea lor însumată a fost mai mare în varianta respectivă (373,6 cm).

Cuvinte cheie: Apex, soi, tratare, ramificare.

INTRODUCTION

The Horticulture Development Program for the years 2021-2025 and the Action Plan regarding its implementation consists in the gradual replacement of old-type orchards with new high-density plantations, with a modern assortment, advanced technologies, ecologically balanced, with productions of up to 50-60 t/ha of quality

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fruits destined for export [Babuc *et. al.*, 2013; Peşteanu and Bostan, 2019].

A modern intensive apple plantation is characterized by the implementation of high-performance cultivar/rootstock associations, the use of branched planting material, with superior biological values, which ensure early entry of the trees into fruit and a high, constant productivity of quality fruits [Babuc *et. al*. 2013; Gudumac *et. al*., 2010; Peşteanu and Gudumac, 2010].

The formation of the crown of trees in the nursery from early shoots is the technological operation that determines the height of the trunk and the shape according to which the tree will be led in the orchard [Babuc *et. al*., 2013; Peşteanu and Bostan, 2019].

If it is planned to form the crown from early shoots on apple trees in field II of the apple nursery, a decisive role is played by the hereditary ability of the varieties to emit anticipated shoots [Babuc *et. al.* 2013; Gastol *et. al*., 2012; Peşteanu and Bostan, 2019].

Currently, in countries with advanced fruit growing, to form early shoots in the crowning zone, various technical methods are used such as: breaking the apical leaves of the tree or spraying with growth regulators [Basak and Sozcek, 1986; Gastol *et. al*., 2012; Peşteanu and Bostan, 2019].

In order to increase the degree of emission of early shoots at the base of the crown in apple trees in field II of the orchard, it was proposed to combine the breaking of the apical leaves with the treatment with the growth regulators Progerbalin LG and Gerba 4LG and to study the influence of these techniques on the mentioned index [Basak and Sozcek, 1986; Gastol *et. al*., 2012; Hrotko *et. al*., 1996; Peşteanu and Bostan, 2019].

MATERIAL AND METHOD

The research was carried out during the years 2021-2022 by establishing an experience in the fruit tree nursery of the LLC "Vindex Agro" enterprise, Mălăiesti village, Orhei district. The trees of the Gala Schniga SchniCo red apple variety, grafted on the M 9 rootstock, served as the object of research.

Planting of the rootstocks in field I was carried out in the spring of 2021, in open wells with the help of the hydraulic perforator. The rootstock M9, used for grafting, was of the certified biological category, free of viruses, being imported from the Netherlands. The grafting method used in field I of the tree nursery was the eyelet in plywood. Planting distance – 80x35 cm.

In order to establish the reaction of the variety to different techniques of intervention on the apex of the tree to increase the degree of emission of anticipated shoots in field II of the tree nursery, the variants were studied: V-1. Free growth (control); V-2. Progerbalin LG, 25 ml; V-3. Progerbalin LG, 25+25 ml; V-4. Progerbalin LG, 25 ml + breaking of apical leaves; V-5. Progerbalin LG, 25+25 ml + breaking of apical leaves. The treatment was carried out with the help of a sprayer.

The research was carried out according to the methods recommended for carrying out the experiments under field conditions in the fruit nursery. Each variant of the experiments included 4 repetitions of 20 plants each.

The main results obtained were processed statistically by the dispersion analysis method

RESULTS AND DISCUSSIONS

The development of apple trees in the nursery has an obvious importance on the quality of this planting material, as well as on its behavior after planting in the orchard.

The data obtained regarding the height of the Gala Schniga SchniCo red trees show that the index studied is influenced by the crown formation method (Table 1). Lower values of the studied index were recorded in the control variant (177.0 cm) compared to the other variants (186.0-210.0 cm). Within the variants with a different crown formation method, higher values were obtained in the variants treated with the Progerbalin LG product and where the apical leaves were additionally broken (203.0-210.0 cm) compared to those where regulators of height (186.0-191.0 cm). Within the variants treated with the product Progerbalin LG, a higher height of the trees (210.0 m^3) was recorded when two treatments of 25 ml each plus the breaking of the apical leaves were performed.

The trunk height recorded higher values in the control variant (60.1 cm), while in the variants with the use of different crown formation methods in the school of trees no significant difference was recorded, and the studied index varied from 54.7 to 57.9 cm.

The length of the crown formation zone was directly correlated with the number of anticipated branches formed in that zone. Smaller length of the crown formation zone on the stem was registered in the control variant (15.3 cm), but in the variants where the apex was intervened by various methods, the index in the study varied from 23.0 to 30.1 cm. Lower values of crown formation area within the product Progerbalin LG were recorded within the variants V 4 (23.0 cm) and V 5 (24.1). Within the variants V 2 and V 4, the length of the crown formation zone was 27.8 and 30.1 cm, respectively.

Table 1

The structure of the tree stem by height depending on the method used to form the crown

The method of forming the crown	Tree height	Trunk height	The lenght of the crown zone	The length of the arrow
V 1 (m)	177.0	60.1	15.3	101.6
V 2	186.0	55.0	27.8	103.2
V 3	191.0	54.7	30.1	106.2
V 4	203.0	56.8	23.0	123.2
V 5	210.0	57.9	24.1	128.0
LSD 5%	7.01	2.43	1.23	4.73

The length of the arrow of the trees on the variants taken in the study was correlated with the height of the trees, the length of the trunk and the zone of crown formation and varied from 101.6 to 128.0 cm. Lower values of the index under study were entered in the V 1 variants; V 2; V 3 (101.6-106.2 cm) but higher parameters were obtained in V 4 and V 5 variants (123.2-128.0 cm).

Since the purpose of the research is to obtain trees with a crown formed by anticipated branches through various interventions on the apex, the diameter of the rootstock below and of the graft above the eyes, such as below the first branching and above the last branch in the crown, was studied.

The diameter of the rootstock (19.0-22.0 mm) recorded higher values within the structure of the tree. Within the variants studied, a smaller diameter was obtained in the trees of the control variant (19.0 mm) and Progerbalin LG 25ml + the breaking of apical leaves, and larger in the variants V 2 (22.0 mm) V 3 (21.0 mm) and V 5 (22.0 mm) (Table 2).

Table 2

The diameter of different elements in apple trees of the Gala Schniga SchniCo red variety, in field II of the nursery depending on the crown formation method

The method of forming the crown	Diameter			
	rootstocks	grafted	under the crown	above the crown
V 1 (m)	19.0	14.0	11.0	10.0
V 2	22.0	14.0	13.0	11.0
V 3	21.0	16.0	15.0	11.0
V 4	19.0	14.0	13.0	11.0
V 5	22.0	14.0	13.0	9.0

Further studying the influence of the crown formation method on the investigated index, we note that the trees from the variants where the product Gerba 4LG was used (22.0-26.0 mm) had a more developed diameter compared to the growth regulator Progerbalin LG (19.0 -22.0 mm).

Higher values of the diameter of the graft were obtained within the variant treated with the product Progerbalin LG in the variant V 3 (16.0 mm).

The study carried out on the diameter recorded under the crown of the tree highlights a decrease in the index taken in the research, but the legality previously exposed is valid (11.0-15.0 mm).

The diameter of the axis above the crown recorded the lowest values (9.0-11.0 mm) and was correlated with the development of the trees, but also with the number of branches in the area of crown formation. The larger diameter above the crown was recorded within the product Progerbalin LG in the variants V 2, V 3 and V 4, where the studied index was 11.0 mm.

A lower number of anticipated branches was obtained in the control variant (2 pcs/tree), where it was not recorded on the apex of the eyelet, it grew freely. Higher numbers of branches compared to the control variant were recorded in all the other variants studied, ranging from 4.0 to 8.0 pieces/tree (Table 3).

More obvious effectiveness on the formation of anticipated branches in the crown area of the trees in the Gala Schniga SchniCo red variety was obtained in the V 3 variant, when the apex of the tree was treated 2 times with the product Progerbalin LG in a dose of 25 ml. The single treatment with the product Progerbalin LG in the dose of 25 ml recorded lower values than in the previous

version (6.0 pcs/tree).

The variant treated once with Progerbalin LG in a dose of 25 ml (V4) and twice (V5) with the same amount of product plus the breaking of the apical leaves in both variants had a negative influence on the formation of lateral branches, constituting 4.0 and, respectively, 5.0 pcs/tree.

Results obtained in the framework of the research carried out in the Republic of Moldova by Pește anu A., Bostan M. (2019) within the varieties Golden Reinders, Gala Buckeye and Red Jonaprince grafted on the M9 rootstock, where the tree was intervened by breaking the leaves in the area only once the apex when the height of the tree was 65-70 cm in combination with the application of two treatments with the growth regulator Gerba 4LG in a dose of 25 ml/liter of water, the number of anticipated branches formed in the area of crown formation was 8.0; 10.0 and 12.0 pcs/tree, respectively.

A lower value of the average length of the annual branches was recorded in the control variant (27.0 cm) compared to the variants where the Progerbalin LG product was used. This increase in average length is explained by the fact that the product Progerbalin LG consists of two active substances as 1.8% BA and 1.8% GA4+7, where gibberellic acid intensifies the growth vigor of the anticipated branches formed in the area of crown formation.

The method of crown formation based on the number of treatments carried out with the product Progerbalin LG in a dose of 25 ml/liter of water, and in some variants also through additional intervention on the apical leaves, led to obtaining in the area of crown formation the anticipated branches with different developmental length. Shorter length of the anticipated branches within the crown formation zone was obtained in the V 2 variant (39.7 cm) then in the growth was placed the V 5 variant (41.2 cm), the V 3 variant (46.7 cm) and variant V 4 (54.5 cm).

Table 3

The number of anticipated branches, their average and total length in field II of the tree nursery depending on the method of crown formation in the variety Gala Schniga SchniCo red

The method of forming the crown	Number of anticipated branches, pcs/tree	Length of anticipated branches	
		Average, cm	Total, cm/tree
V 1 (m)	2.0	27.0	54.0
V 2	6.0	39.7	238.2
V 3	8.0	46.7	373.6
V 4	4.0	54.5	218.0
V 5	5.0	41.2	206.0
LDS 5%	0.26	1.91	10.15

The total length of anticipated branches formed in the coronation zone is directly correlated with the number of branches in that zone and their average length. Within the variants treated with the product Progerbalin LG, higher values of the index taken in the study and confirmed by statistical data were recorded when

the apex of the trees was treated with a single treatment at a dose of 25 ml/liter of water (238.2 cm) and with two doses of 25 ml/liter of water at an interval of 5 days from the previous one (373.6 cm). The previously mentioned variants, but additionally the breaking of the bee leaves was carried out before the treatment, essentially decreased the values of the index taken in the study (206.0 - 218.0 cm).

CONCLUSIONS

The producers of apple trees in the second field of the tree nursery, in the variety Gala Schniga SchniCo red to the formation of the base of the crown from branches anticipated to intervene on the apex of the tree when it is 60-65 cm high by treating twice with the growth regulator Progerbalin LG in the dose of 25 ml/liter of water.

When planning a larger number of anticipated branches in the area of crown formation, to intervene on the apex of the tree by apical breaking of the terminal leaves when it has a height of 60-65 cm plus treatment twice with the growth regulator Progerbalin LG in a dose of 25 ml/liter of water. The first treatment to be carried out simultaneously with the breaking of the apical leaves, and the next at an interval of 5-7 days from the previous one.

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