

THE EFFECT OF GROWTH REGULATOR AMOUNT AND SHOOT THICKNESS ON THE ROOTING CAPACITY OF SEMI-HARDWOOD CUTTINGS

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Abstract.. *This article presents data on the effect of growth regulator concentration and shoot thickness on the rooting capacity of semi-hardwood cuttings of Eureka 99, Myrobalan 29C, Fortuna, and Krymsk-5 rootstocks.*

Keywords: *Semi-hardwood cutting, growth regulator, rootstock, Eureka 99, Mirobalan 29 C, Fortuna, Krymsk-5.*

Introduction

Currently, rootstocks play an incomparable role in establishing intensive orchards and producing high-quality yields in both global and local horticultural practice. Therefore, the rapid propagation of vegetative rootstocks for stone fruit species is considered one of the most urgent tasks of modern nursery management. Today, the method of using semi-hardwood cuttings is becoming widely popular to obtain a large number of saplings in a short time while preserving varietal characteristics. However, rooting these cuttings is a complex physiological process that depends on the influence of various external and internal factors. In this regard, the correct use of growth regulators is considered a decisive factor.

According to results recorded in scientific research, growth regulator amounts show varying degrees of effectiveness on different rootstocks. Additionally, the specific part of the shoot from which the cutting is taken (tip, middle, base) affects its regeneration potential. Based on the above, scientifically substantiating the optimal agrotechnical methods for the promising Eureka-99, Myrobalan-29, Fortuna, and Krymsk-5 rootstocks is of great practical importance. [1,3].

Materials and Methods. The research was conducted based on the methodological guidelines of F.Y.Polikarpova, “Размножение плодовых и ягодных культур зелеными черенками”(1990). [5].

Research Results. The experiments studied the correlation between various amounts of growth regulator (IBA) (30, 45, 60, 75, 90 mg/L) and the thickness level of cuttings

(tip, middle, base) using four types of rootstocks (Eureka 99, Myrobalan 29 C, Fortuna, Krymsk-5) as examples.

For the Eureka 99 rootstock, the rooting degree of cuttings in the control (water) variant was relatively low, amounting to 40.6–43.1% depending on the cutting thickness. When the growth regulator was applied, the indicators increased significantly. Specifically, at an IBA amount of 30 mg/L, rooting was in the range of 50.3–63.7%, while at 45 mg/L, this indicator rose to 66.2–68.9%. The highest efficiency was observed at a concentration of 60 mg/L, with results of 69.7% for tip cuttings, 69.4% for the middle part, and 74.2% for the thick basal part. When the concentration was increased to 75 and 90 mg/L, a slight decrease in indicators (down to 62.2–65.4%) was observed.



Figure 1. The root section of semi-hardwood cuttings.

The Myrobalan 29 C rootstock showed a result of 41.3–45.2% in the control variant. When 30 mg/L IBA was applied, the results did not differ sharply from the control (47.7–48.7%). However, positive changes appeared as the concentration increased. Specifically, in the 45 mg/L variant, basal cuttings rooted up to 77.5%, but the indicator for the middle part remained low (53.5%). The most stable and high result was determined at a concentration of 60 mg/L, achieving 67.7% rooting in the tip part, 73.3% in the middle part, and 78.2% in the basal part. At a concentration of 90 mg/L, rooting dropped sharply, especially in basal cuttings (52.3%).

The Fortuna rootstock had relatively higher indicators in the control variant compared to others (45.2–49.4%). At growth regulator amounts of 30 and 45 mg/L, the indicators grew proportionally (up to 59.3% and 66.2%, respectively). The highest point in the study was observed at a concentration of 60 mg/L: 68.5% in the tip part, 70.3% in the middle part, and 74.6% in the basal part. While results decreased slightly when the dose

reached 75 mg/L, this decrease was clearly evident at 90 mg/L, where the indicator for tip parts was recorded to have dropped to 57.7%.

For the Krymsk-5 rootstock, the lowest results in the control variant (36.6–45.4%) were recorded specifically in this rootstock. However, this variety demonstrated high sensitivity to the stimulator effect. At 30 mg/L, results exceeded

Table 1. The effect of growth regulator amount and shoot thickness on the rooting capacity of semi-hardwood cuttings

Rootstocks	Variants	Parts of cuttings (thicknesses))		
		Tip (2-4mm)	Middle (4-6mm)	Base (6-9mm)
Eureka 99	Water (Control)	40,6	43,1	40,6
	IBA - 30 mg/l	55,4	63,7	50,3
	IBA - 45 mg/l	68,9	68,8	66,2
	IBA - 60 mg/l	69,7	69,4	74,2
	IBA - 75 mg/l	65,4	65,3	73,2
	IBA - 90 mg/l	64,8	62,2	65,4
Myrobalan 29 C	Water (Control)	41,3	45,2	42,7
	IBA - 30 mg/l	48,7	47,7	48,3
	IBA - 45 mg/l	58,6	53,5	77,5
	IBA - 60 mg/l	67,7	73,3	78,2
	IBA - 75 mg/l	64,5	67,3	74,6
	IBA - 90 mg/l	54,2	64,6	52,3
Fortuna	Water (Control)	45,2	47,6	49,4
	IBA - 30 mg/l	56,5	57,4	59,3
	IBA - 45 mg/l	60,4	63,3	66,2
	IBA - 60 mg/l	68,5	70,3	74,6
	IBA - 75 mg/l	67,5	68,7	71,4
	IBA - 90 mg/l	57,7	64,2	68,5
Krymsk-5	Water (Control)	36,6	41,9	45,4
	IBA - 30 mg/l	52,8	54,3	50,5
	IBA - 45 mg/l	62,3	68,3	55,3
	IBA - 60 mg/l	71,2	77,5	75,2
	IBA - 75 mg/l	69,2	75,3	52,7
	IBA - 90 mg/l	58,5	69,6	47,6

50%, while at 45 mg/L, cuttings from the middle part reached 68.3%. The optimal result was observed at a concentration of 60 mg/L, achieving 71.2% rooting in the tip part, 77.5% in the middle part, and 75.2% in the basal part. The high concentration of 90 mg/L had a negative effect, with rooting of the thick basal cuttings recorded to have dropped to 47.6%.

Conclusion. As a result of the conducted research, it was determined that the concentration of the growth regulator (IBA) and shoot thickness are of significant importance in rooting green cuttings of Eureka-99, Myrobalan-29 C, Fortuna, and Krymsk-5 rootstocks. Analysis of the experimental data showed that for all studied rootstocks, an IBA growth regulator amount of 60 mg/L was considered the most optimal and effective rate. Specifically, when using this concentration, the highest rooting results were achieved: 78.2% for the basal part of Myrobalan-29 C rootstock, 77.5% for the middle part of Krymsk-5 rootstock, 74.6% for the basal part of Fortuna rootstock, and 74.2% for the basal part of Eureka-99 rootstock. Generally speaking, it was scientifically substantiated that by treating cuttings prepared from the basal (6-9 mm thickness) and middle parts of the shoot with a rate of 60 mg/L, it is possible to obtain, on average, 30-35% higher and higher-quality rootstocks compared to the control variant.

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