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Filipova L., PhD in Agricultural Sciences, Associate Professor

Shyta O., PhD Student, Assistant

Matskevych V., DSc in Agricultural Sciences, Associate Professor

Bila Tserkva National Agrarian University

lorafilipova@ukr.net

EFFECT OF MEDIUM ACIDITY ON RHIZOGENESIS OF SWEET ALMOND (*PRUNUS DULCIS* (Mill.) D.A.Webb) IN VITRO

The acidity of the medium significantly influences the ontogenesis of plant organisms, particularly the rooting of sweet almond regenerants in vitro. It has been established that the optimal pH for stimulating rhizogenesis in NAM and NRM media is 6.0–6.2.

Keywords: nutrient medium, alkalinity, acidity, root formation, hyperhydration, cultivation

Traditional propagation of sweet almond is challenging and time-consuming due to high heterozygosity and long generational cycles. This process can be accelerated through genetic transformation technologies, which require the prior development of in vitro micropropagation methods [1]. Rooting is one of the most challenging stages in the micropropagation of almonds [2]. For several decades, international researchers have studied ways to improve in vitro rhizogenesis of almonds [3, 4], including the effect of medium pH on this process [5, 6].

It is well known that the absorption and metabolism of mineral elements, as well as exogenous biologically active substances, depend on the concentration of H^+ and OH^- ions in the medium [7]. H^+ ions influence hormonal signal transmission, hormone transport, and other biochemical processes. Changes in pH can activate some enzymes while inhibiting others, thereby affecting overall metabolism. These metabolic changes, in turn, determine morphological characteristics, particularly the formation of adventitious roots.

In acidic media (pH 5.4–5.6), calcium ion uptake is impaired, negatively affecting the transport of metabolites, auxins, and the activity of several enzymes [7]. According to Tsipouridis C. and Thomidis T. [6], an alkaline environment also hinders rhizogenesis.

Our study analyzed the effect of pH on rhizogenesis in regenerants of the Georgia cultivar grown on NAM, NRM, QL, MS, and DKW media [8] (Table 1) in the presence of BAP (0.100 mg/L) and IBA (0.500 mg/L). The donor explants were pre-cultivated in hormone-free MS medium. Experiments were conducted under standard conditions at the Interdepartmental Plant Biotechnology Laboratory of BNAU [9].

Our results indicate that both the composition of mineral elements in different media and pH levels influence rhizogenesis. Changes in acidity had the most significant impact on less suitable media for almonds (MS, DKW).

Table 1. Effect of pH on the number of regenerants with root systems in vitro in Georgia almond cultivar after 45 days of cultivation with 0.500 mg/L IBA

pH	NAM	DKW	QL	MS	NRM
5.4	23	-	12	6	19
5.6	63	1	39	9	54
5.8	77	3	54	57	61
6.0	85	4	64	60	63
6.2	89	9	72	61	77
6.5	56	6	50	41	74
6.8	47	3	39	11	51

The highest number of regenerants was observed in NAM and NRM media, where pH fluctuations were less pronounced. The QL medium ranked between MS, DKW, and NAM, NRM in terms of the number of regenerants with roots.

Symptoms of low pH were visually evident as tissue hyperhydration, excessive leaf blade growth, apex darkening, and necrosis. At higher pH levels (above 6.2), problems with iron and magnesium absorption were observed.

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