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EFFECTS OF THE DIFFERENT (2IP) CONCENTRATIONS ON CITRUS LEMON L. SHOOT MULTIPLICATION AND IBA ON ROOTING IN VITRO

Ali Mohammed NOORI
Department of Horticulture and Landscape - College of Agriculture - University of Kirkuk – IRAQ
aloky1515@uokirkuk.edu.iq

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Abstract:

The researchers wanted to see how varying concentrations of (2iP) affected the growth and multiplication of Citrus shoots in vitro. This study was conducted in the Horticulture and Landscape Department, College of Agriculture, University of Kirkuk 2020's plant tissue culture laboratory. Citrus explants were grown on MS media supplemented with different quantities of (2iP) 0, 1.0, 1.5, 2.0, and 2.5 mg L-1, according to the design (CRD). The results suggest that (2iP) had an effect on in vitro growth and multiplying shoots, with the largest number of shoots being 1.8 and 2.0 shoot.explant-1 at 2.50 mg. After 4 and 8 weeks of culture, L-1 2iP was obtained. In addition, the concentration exceeded 2.5 mg.L-1 in the rate of length (1.2, 1.6) cm and number (1.2, 1.6)cm after 4 and 8 weeks of cultivation, cm and number of leaves (3.3,4.3) leaf.explant-1 were measured, compared to 0 concentration, which had the lowest rate

Keywords: In vitro, lemon, 2iP, multiplication, IBA.

INTRODUCTION

Citrus fruits are one of the world's most widely grown and consumed fruit crops, with a significant economic value. Citrus fruits are perennial crops of the Rutaceae family that have a great resilience to a variety of climatic conditions, making them suitable for production in a wide range of countries. Citrus cultivation has spread throughout the tropics and subtropics. (Carota *et al.*, 2020). Citrus is a genus that includes fruit like oranges, mandarins, grapefruits, and lemons. Each group has a variety of species, variations, and strains. (Zhang , Ismeil 2004, Noori et al., 2019; Hasan et al.,2019). Citrus trees are propagated in main methods: sexually through seeds, which are commonly used to produce rootstocks for grafting, and asexually by using vegetative elements such as roots, stems, or leaves. In citrus propagation, this strategy is extensively utilized. (Hartmann et al., 1997 , (Fentahun et al., 2017, Al-Bakkar et al., 2021).

When compared to traditional propagation methods, tissue culture technology is a biotechnology which has played a key part in plant propagation because of its ability to generate a large number of plants in a short amount of time with low costs and free of viruses and illnesses. The most important applications of plant tissue culture are plant breeding and improvement, the synthesis of medicinal and aromatic compounds, and rapid propagation for the development of virus-free plants. (Kasumi et al., 2004 , Gupta et al., 2006 and Al-Bakar et al., 2020).

Phytohormones are the most significant endogenous compounds for modulating physiological and molecular responses, which is essential for plant life. Following their transit, phytohormones act at their synthesis sites or elsewhere in plants. (Majid,2018), Cytokinines promote cell division and growth control. It has an impact on the polarity of mineral components and nutrients produced by plants. (Saadoon,2012) , 2iP: N6-(2-Isopentenyl) is a form of cytokine that is an organic base with a large molecular weight that is employed in plants at low concentrations to produce an impact. Cell division and differentiation, as well as inhibition of apical dominance and lateral bud formation, were all aided by cytokines in plant tissue culture. (Shukri and Moaqil, 2013 , Hussein et al., 2020).

The purpose of the research was to see how varied (2iP) concentrations affected the number of shoots per explant and rooted shoots obtained by tissue culture.

MATERIALS AND METHODS

In the year 2020, this experiment was carried out in the Plant Tissue Culture Laboratory of the Department of Horticulture at the University of Kirkuk. Explants of citrus lemons were collected from local trees. The explants were washed for 15 minutes with tap water, then cleaned for 5 minutes with washing powder, then DW, then sterilized for 5 minutes with NaOCl 6 percent, then washed three times with distilled sterilized water at a pace of 5 minutes each time. Then single nodal cultured in glass bottles containing MS medium with the different concentrations of (0.0, 1.00, 1.50, 2.0, 2.50) $Mg.L^{-1}$ of 2iP. And rooting shoots by culturing on ½MS media supplemented by (0.0, 0.25, 0.50, 0.75 and

1.00)mg.L^{-1} of IBA (Martini & Papafotiou, 2014) The explants were incubated under temperature of 25 ° C ± 2 ° and intensity of lighting 3000 lux for 16 hours.day^{-1} followed 8 hours.day^{-1} darkness . The experiment was carried out using the (CRD) with ten repetitions, the findings were analyzed using a statistical program, and the means were compared using (LSD) 0.05. (Alrawy and khalafallah, 1980).

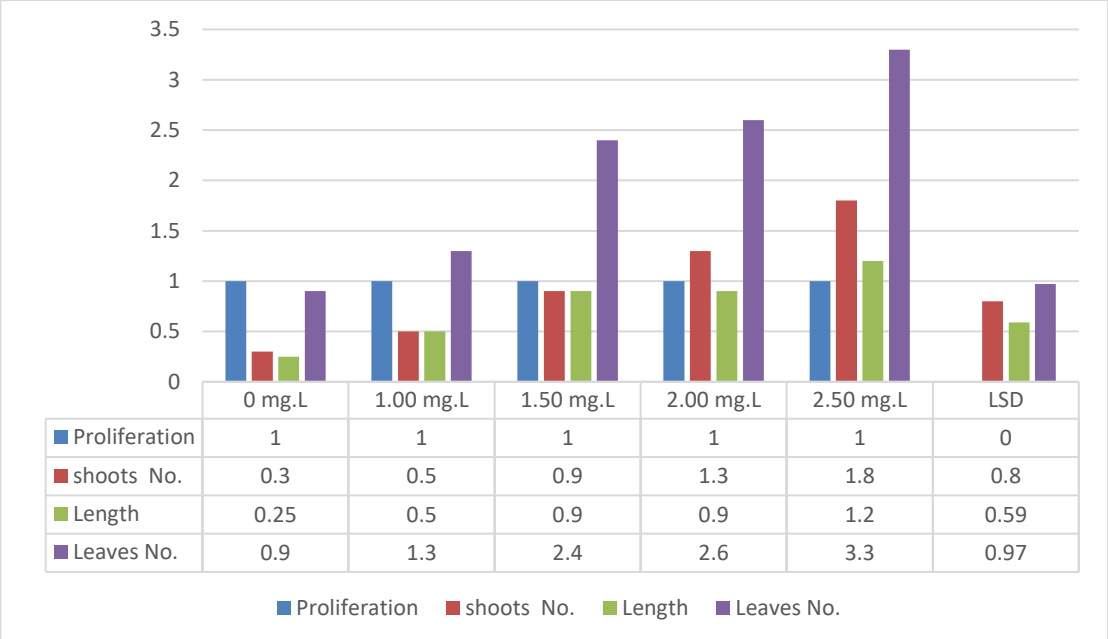
RESULTS AND DISCUSSION

Figure 1 shows that there are considerable variances in 2iP concentrations. After 4 weeks of cultivation, the 2.5 mg.L-1 treatment had the highest rate of shoots, shoots length, and leaves number (1.8, 1.2, and 3.3), compared to the control treatment, which had the lowest rate. Figure 2 depicts significant changes in 2iP concentrations. After 8 weeks of culture, the 2.5 mg.L-1 concentration had the highest rate of shoots number, shoots length, and leaves number (2.0, 1.6, and 4.3, respectively), compared to the control treatment, which had the lowest. From fig (3) it can be observed that rooting experiment shows significant response by Rooting shoots product from multiplication stage cultured on ½MS media supplemented with deferent IBA concentration whereas had 100% for (0.50, 0.75 and 1.00) mg.L^{-1} and obtained highest root number 7.5 root.shoot^{-1} and root length 3.2cm from 1.00 mg.L^{-1} of IBA

CONCLUSION

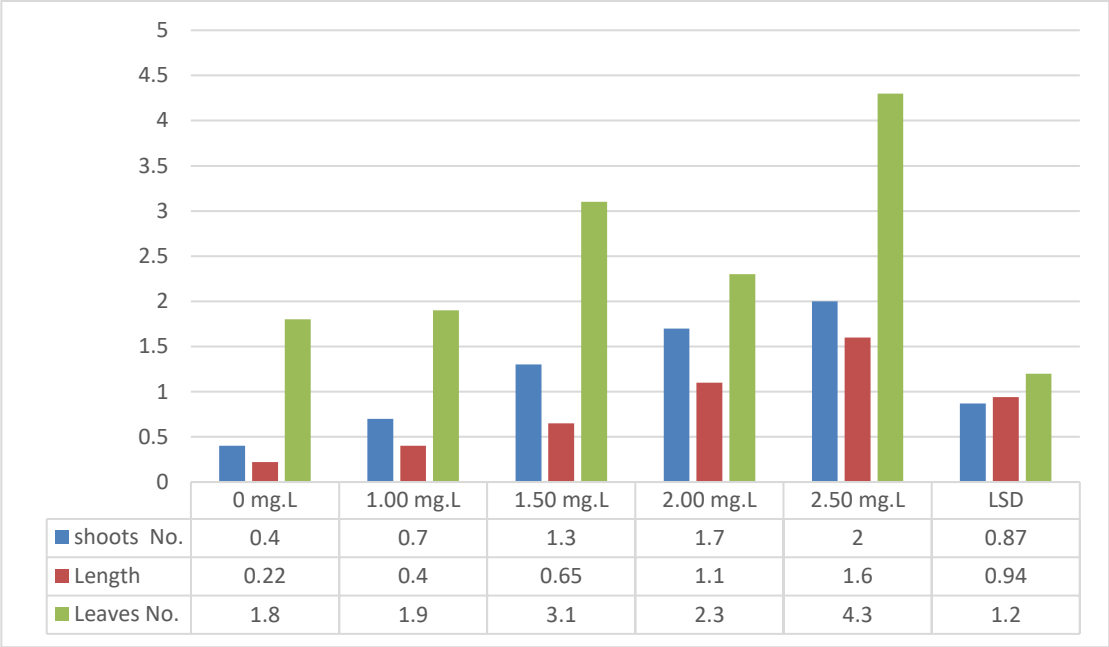
With varied concentrations of 2iP, there was a substantial change in the number of shoots, shoot lengths, and leaves number. May be due to an increase in the positive role of cytokines in apical dominance control and then growth of lateral buds in explants grown in MS medium supplemented with (2iP), and as a result of regulating hormonal balance between growth regulators in plant tissue and added growth regulators in MS media. (Fentahun et al., 2017). Also, the role of cytokines in the division and elongation of cells, which in turn is reflected in the characteristics of growth as well as its effect on building nucleic acids (Iqbal et al., 2019). This is in line with what Kadhim et al., (2019)

Fig (1): Effect of different concentrations from 2iP in the rate of shoots number, shoots length and leaves number after 4 weeks.

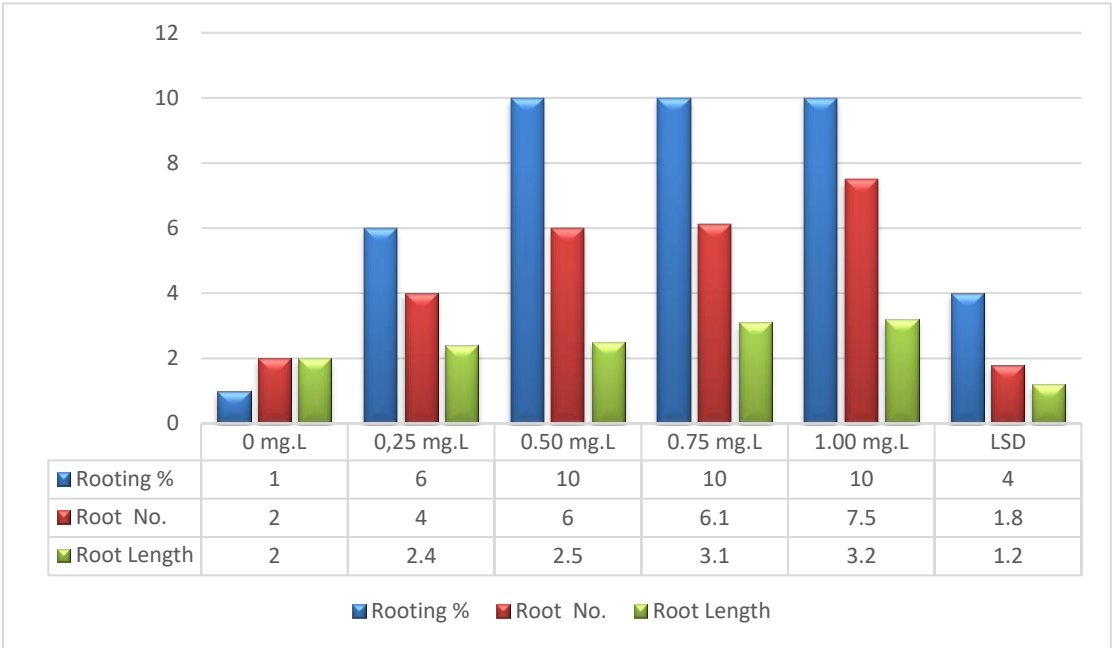


	0 mg.L	1.00 mg.L	1.50 mg.L	2.00 mg.L	2.50 mg.L	LSD
Proliferation	1	1	1	1	1	0
shoots No.	0.3	0.5	0.9	1.3	1.8	0.8
Length	0.25	0.5	0.9	0.9	1.2	0.59
Leaves No.	0.9	1.3	2.4	2.6	3.3	0.97

Fig (2): Effect of different concentrations from 2iP in the rate of shoots number, shoots length and leaves number after 8 weeks



	0 mg.L	1.00 mg.L	1.50 mg.L	2.00 mg.L	2.50 mg.L	LSD
shoots No.	0.4	0.7	1.3	1.7	2	0.87
Length	0.22	0.4	0.65	1.1	1.6	0.94
Leaves No.	1.8	1.9	3.1	2.3	4.3	1.2



	0 mg.L	0,25 mg.L	0.50 mg.L	0.75 mg.L	1.00 mg.L	LSD
Rooting %	1	6	10	10	10	4
Root No.	2	4	6	6.1	7.5	1.8
Root Length	2	2.4	2.5	3.1	3.2	1.2

Fig (3): Effect of different concentrations from IBA on rooting %, Root No. and Root Length after 6 weeks.

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