***Nigella sativa* L.**

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Nigella sativa L.

.

N-(2-hydroxyphenyl) phthalimide(A)

(10^{-8} , 10^{-6} , 10^{-4})

N-(2-carboxyphenyl) phthalimide (B)

BA NAA 2,4-D

(10^{-6})

MS

(9.77 12.657)

(75)

B A

(10^{-6})

23.33) 2,4-D

(10^{-6})

B A

(10^{-6})

(19.03

(75)

(20.53 13.72) B A

(10^{-6})

BA

.(MSt)

(16.24)

(10.8)

NAA

B

(10^{-6})

.(75)

(2.83)

(4)

B

(10^{-8})

(2.5)

(3)

A

(10^{-4})

.A

10^{-6}

:

The Role of Two Phthalimide Derivatives in the Initiation, Growth and Differentiation of *Nigella sativa* L. Callus

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ABSTRACT

The study includes evaluation for the efficiency of two of phthalimide derivatives to clarify their effects on seedling stem explants (containing nodes) of *Nigella sativa* L. to initiate callus and their effects on callus growth and differentiation.

The results referred that the addition of each of N-(2-hydroxyphenyl) phthalimide (A) and N-(2-carboxyphenyl)phthalimide (B) with concentration of (10^{-4} , 10^{-6} , 10^{-8}) molar alone or with (10^{-6}) molar each of (2,4-D, NAA, and BA) alone resulted in callus growth, remarkably the highest fresh weights of callus recorded are (12.657 and 9.77) g when 10^{-6} molar of each A or B compound was added alone after 75 days of growth alternatively. Whereas the addition of 10^{-6} molar of each A or B with 10^{-6} molar 2,4-D enhanced callus growth to reach (23.33 and 19.03)g alternatively, in comparison with the fresh weight of callus grown on MS with addition of 10^{-6} molar of BA and 10^{-6} molar of each A or B reached (13.72 and 20.53)g after 75 days of growth alternatively compared with (16.24) g that on standard medium (MSt).

The results revealed also that the addition of 10^{-6} molar of compound B with NAA increased the weight to reach 10.8 g with the enhancement of root formation from callus, and the roots formation was continued to grow after more than 75 days of culture. The addition of 10^{-8} molar of compound B enhanced root formation to reach (4) in number and 2.83 cm in length, whereas, the addition of 10^{-4} molar of compound A enhanced shoots, which reached to 3 in number and 2.5 cm in length, in addition to the enhancement of the flowerings. The result also showed that the best media to induce the growth of callus are those which contain (10^{-6}) M of compound A.

Keywords: Phthalimide derivatives, imide derivatives, plant growth regulators, *Nigella sativa*.

.(2010 ; Rafiq *et al.*, 2005)

.(Kaur and Kothari, 2004)

) (PDA)
 .(2005) (2000) (1999
 (phthalimide)
 .(Masato, 1994 ; Tanaka *et al.*, 1992)

 analgesic anti-convulsant anti-inflammatory
 .(Sharma *et al.*, 2010)
 (Jean *et al.*, 2009) *Mycobacterium tuberculosis*
 .(Fouda *et al.*, 2006)

 Basra *et al.*,1988 ;)
 .(Mahesh *et al.*,1986

 .(Fasulo *et al.*,1985) Tropane
 N-phenyl phthalimid Sulfonamide
 (Sharma *et al.*, 2010; Lima *et al.*, 2002)
 .(Maarten and Johannes,1984)

 (2012)
 .
 Paarakh, 2010 ;)
 .(Mujeeb *et al.*, 2010
 (2010 ;2002)
 .

:

N-(2-hydroxyphenyl)phthalimide :A

N-(2-carboxyphenyl)phthalimide :B

(Al-Khaffaf, 1999)

. *Nigella sativa* L.

:

%96

%6 ()

(5) (:) (2:1)

Sodium hypochlorite (NaOC)

.

.(2002)

(Arnon and Hogland, 1944) Hogland Arnon

 2 ± 20

. (8) (16)

B A

(1.5 -1)

(Murashige and Skoog, 1962) MS , (4)

2,4-dichlorophenoxy (2,4-D) B A (10^{-8} , 10^{-6} , 10^{-4}) 10^{-6} α -Naphthalene acetic acid (NAA) benzyl adenine (BA) acetic acid

.

(50)

.

2,4-D MS

(10^{-6})

.(MSt) (2010 2001)

B A MS (1- 0.5)

. 10^{-6} (NAA, BA, 2,4-D)

.....

(75-45)

MS

(MSO)

MSt

(NAA BA)

(B A)

-

(2 1)

 (10^{-6})

B A

(NAA, BA, 2,4-D)

A

-1

A

A

(2)

 (10^{-6})

50

A

(1.72)

(MSt)

 10^{-6}

.(1)

2,4-D A (10^{-6})

2,4-D A

(1)

2,4-D

 10^{-6} $(10^{-8} 10^{-4})$

A

. A

2,4-D

A

 10^{-6} (10^{-6}) 2,4-D (10^{-8})

A

2,4-D

.(A -1)

2,4-D

.(Tanimoto and Harada, 1982; Banerjee and Gupta, 1975)

BA (10⁻⁶) A (1)
 (7) BA 10⁻⁴ (0.53)
 (B-1) BA A
 . BA BA A
 BA A
 (D-1) .(C-1) BA
 (10⁻⁶) A 10⁻⁶
 .BA

BA

(Rodaway *et al.*, 1991)

10⁻⁶ NAA A
 A (0.27) (10) A
 .(E-1) NAA 10⁻⁶
 50
 .A (10⁻⁶) (10⁻⁴) (10⁻⁶) BA

Bollinger and)

pyridyl phthalimides

.(Damico,1978

:1

(A)
50 (NAA ,BA ,2,4-D) (10⁻⁶)

10 ⁻⁸					10 ⁻⁶					10 ⁻⁴					A						
	) (		) (			) (	()				) (		()								
-	-	-	1.5 8	3	+	0.3 2	1	1.72 Δ*	2	-	0.4 3	1	*2.5 Δ	3							
++	-	-	0.7 3	Δ3 Δ	+	0.2 8	2	-	-	+	-	-	0.39 ΔΔ	2		()	()	-D 2.4 MS t			
++	-	-	0.6 4	2	++	-	-	0.82	Δ*5	++	-	-	0.63	*7 Δ	+	-	-	2.67 Δ	1	BA	
+	0.6 2	2	-	-	++	0.2 7	10	0.12		+	0.3 6	6	-	-	+	-	-	-	-	NA A	
++ MSt					+	- ()					MSt					-	-	-	-	-	MS O

□
Δ
ΔΔ

•

B **-2**

B

(10^{-8} , 10^{-6} , 10^{-4})

.(F-1 2)

B

() .*Morus nigra* L.

acid phosphatase

.(Lal and Jaiswal, 1988)

α -amylase

GA₃

.(Mahesh *et al.*,1986)

2,4-D **B**

2,4-D B (2)

2,4-D 10^{-6} B 10^{-6}

(50) (2,4-D)

.(G-1)

BA **B**

BA B

(3) (10^{-6}) BA (10^{-6}) B

B (3.51)

BA 10^{-6} B (10^{-6} 10^{-4})

.(H-1 2) BA B 10^{-6} 10^{-4}

.....

:2

. 50 (NAA ,BA ,2,4-D) (10⁻⁶) (B)

10 ⁻⁸					10 ⁻⁶					10 ⁻⁴					B							
													□									
	()		()			()		()			()		()									
-	2.83	4	ΔΔ1.52	1	-	3.59	3	Δ*2.58	2	-	0.95	2	Δ*1.59	2								
+	-	-	ΔΔ0.54	1	++	-	-	ΔΔ0.234	1	+	-	-	0.352 ΔΔ	1						2.4 -D MSt		
															()		()					
															-	-	-	-				
+	-	-	Δ1.37	2	++	-	-	Δ*3.51	3	++	-	-	Δ*0.52	1	+	-	-	Δ2.67	1	BA		
+	0.21	2	ΔΔ0.32	1	++	0.23	4	ΔΔ3.25	1	+	0.43	3	ΔΔ1.95	2	+	-	-	-	-	NAA		
MSt					++ MSt					+ - ()					MSt		-	-	-	-	-	MSO
										MS					MSO							

□
Δ
ΔΔ
*

NAA B

NAA B

(10⁻⁶) (2)

NAA (I-1) (0.23) (10⁻⁶) B (4) .

B A

B A

.(Thomas, 1984)

BA, NAA,) (B A) :
(10⁻⁶) (2,4-D)

MS
(NAA BA 2,4-D) (B A) (10⁻⁸,10⁻⁶,10⁻⁴)
(.3) (75,45) 10⁻⁶

(MSt)

(2010 2002)

MS

.(MSO)

B A
75 9.77 12.657
. B A 10⁻⁶
B A .(A-2)

(MSO)

B A (10⁻⁶) 2,4-D
19.86) (3)

(23.33

$$(16.24)$$

2,4-D

.(C-2)

A

D

G

:1

.A

50

.C

.D

.E

.F

.G

.H

-1

2,4-D

B A

(Thomas, 1984)

.(Youssef *et al.*,1998)

(2,4-D)

.(Elhag *et al.*, 2004 ; Ribnicky *et al.*, 1996)

(10⁻⁶,10⁻⁴)

B A

(10⁻⁶)

BA

(MSt)

(10⁻⁶)

B

B

A

(20.53 16.353)

(10⁻⁶,10⁻⁴)

BA

B

A

.(D-2)

(Lakshmi and Reddy, 2012)

B A

BA

(10⁻⁶)

NAA

(3)

(75)

(10⁻⁶)

(10.82 ,6.787)

NAA

A

NAA

.(E-2)

(2001)

Cell cycle

.(1996) DNA

B A

NAA BA 2,4-D

A

.(2012)

B

.....

B A

()

:3

. 75 45 10^{-6} (NAA BA 2,4 - D)

B						A						المركب المدة التركيز الوزن الطري منظمات النمو القياسية		
75 يوم			45 يوم			75 يوم			45 يوم					
10^{-8} مولار	10^{-6} مولار	10^{-4} مولار	10^{-8} مولار	10^{-6} مولار	10^{-4} مولار	10^{-8} مولار	10^{-6} مولار	10^{-4} مولار	10^{-8} مولار	10^{-6} مولار	10^{-4} مولار			
8.93 0.190±	9.77 0.739±	9.16 0.447±	4.52 0.349±	6.37 0.532±	5.45 0.158±	9.52 0.432±	12.657 0.952±	10.58 0.286±	3.99 0.640±	5.69 0.531 [□] ±	6.55 [□] 0.295±			
15.14 0.943±	19.03 1.12±	15.085 0.350 ±	6.76 0.160±	10.426 0.85±	9.65 0.26±	14.548 0.34 ±	23.33 0.61±	19.86 0.66±	10.289 0.74±	10.866 0.52 ±	11.805 0.88±	75 يوم 16.24 1.231±	45 يوم 7.36 0.962±	2.4 -D MSt
10.216 0.244±	20.53 0.312±	16.353 0.971±	5.748 0.21±	13.18 0.59±	11.842 0.627±	9.686 0.634±	13.72 0.875±	13.621 0.369±	5.542 0.132±	6.415 0.198±	8.88 0.243±	6.598 0.371±	3.88 0.267±	BA
5.354 0.145±	10.82 0.410 [□] ±	9.32 0.121±	2.364 0.079±	5.72 0.118 [□] ±	4.334 0.291±	5.375 0.258±	6.787 1.03 [□] ±	4.015 0.185±	2.55 0.023±	3.947 0.048±	2.81 0.179±	4.208 0.03±	2.06 0.162±	NAA
MSt الوسط القياسي للحبة السوداء MSO الوسط MS خالي من منظمات النمو												1.365 0.012±	1.176 0.034±	MSO

□ كل قيمة تمثل 5 مكررات

□ تكوين جذور

± S. E الخطأ القياسي

- (2005)
- Lactuca*) PDA
- .12-1 (7)**16** . (*sativa* L.
- (2002)
- Nigella sativa* L.
- (1996)
- (2010)
- Nigella sativa* L.
- (PDA) (1999)
- 2789
- (2000)
- .56-36 (1)**11**
- (2012)
- (N- Substituted Phthalimides)
- .110-92 (2)**23** *Lactuca sativa*
- (2010)
- .226-209 (4)**6**
- (2001)

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