

Helianthus annuus L.

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(2018/ 9/ 17 2018/ 4 /8)

² / 50 650

Helianthus 20·15·10·5 ()

.annuus L.

)

. 60 (RNA DNA

/ / 53.411 20

/ 1.2 221.888 23.311 / 4.3 RNA DNA

60

10 35

. 20 50

50

Diode Laser Radiation Effects in Initiation and Growth of Sun Flower Plant (*Helianthus annuus L.*) Callus

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ABSTRACT

The research involved the studying of the effect of the red laser radiation at wave length 650 nm and power 50 mw/cm² using a semi-connector laser (diode laser) for different periods of times 5,10,15,20 min. in the initiation and growth of callus sunflower (*Helianthus annuus L.*). Exposing of sunflower root, stem and leaf explants to laser radiation leads to clear increase in rate of growth indicators of calli (fresh weight of calli, dihydrofolate reductase activity and the amount of protein, DNA, RNA. folate) especially after 60 days of exposure. It was found that 20 min. duration was ideal to produce maximal activity of dihydrofolate enzyme giving value of 53.411µgm/min./mg protein and an increase in the amount of protein. DNA, RNA and folate to achieve 4.3 mg/gm, 23.311, 221,888, 1.2µgm fresh weight respectively after 60 days of leaf calli growth. These changes in growth indicators reflect on differentiation of stem calli to a group of white roots with dense root

hairs after 35 days of stem explants exposure to 10 min. While leaf calli stimulated to form a number of vegetative branches after 50 days of exposure to 20 min. All shoots were rooted easily in hormone free medium. Plants continued to grow to form sunflower disks after 50 days of rooting process and growth.

Keywords: Diode laser, Folate, Dihydrofolate reductase enzyme , Callus cultures.

(Hrabina *et al.*, 2003)

(Abu-Elsaoud and Tuleukhanov, 2013; Michtchenko and Hernandez, 2010)
2015)

(Samuliene *et al.*, 2010)

(Salyaev *et al.*, 2007

(Perveen *et al.*, 2012)

Salyaev *et al.*, (2007)

1

.(2009) DNA

.(2010)

20

.(2017)

(*Helianthus annuus* L.)

Helianthus annuus L.

2:1

%96

10 (:)

/

(Arnon and Hoagland, 1944)

Arnon

°2 ± 22

1.5-1.0

2000

8

16

26

650

100

/ 1.0

(Murasighe and Skoog, 1962)

(Mohammad *et al.*, 1986)

NAA / 0.5 BA

. ° 2 ± 23

2000

8 16

30 60

Lowry *et al.*, (1951)

(DHFR)

(Mohammad *et al.*, 1989c)

(DHFR)

(Osborn and Huennckens, 1968)

(Mohammad *et al.*, 1989c)

NADPH

340

NADPH

$6.2 \times 10^3 \text{M}^{-1} \text{cm}^{-1}$

NADPH

(Mathews *et al.*, 1963)

(Cherry, 1962)

290

260

(Giles and Mayer, 1967)

DNA

DNA ³ / 10 -1

595 700

.DNA

RNA

.Calfthymus

(Batra *et al.*, 1977)

(Association of Official

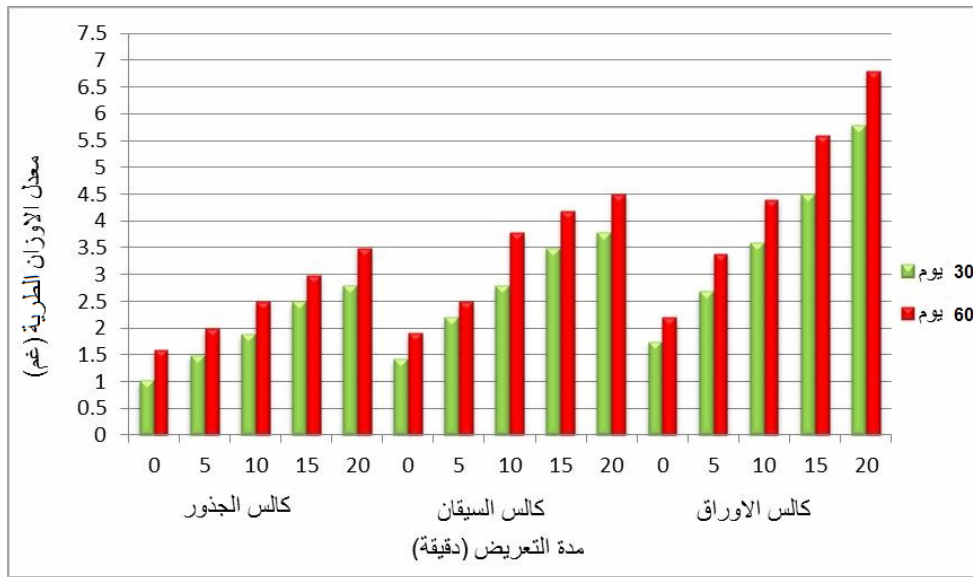
.Agricultural Chemists, 1950)

Randomized Block Complete Design (RBCD)

.(Steel and Torrie, 1980) 0.01

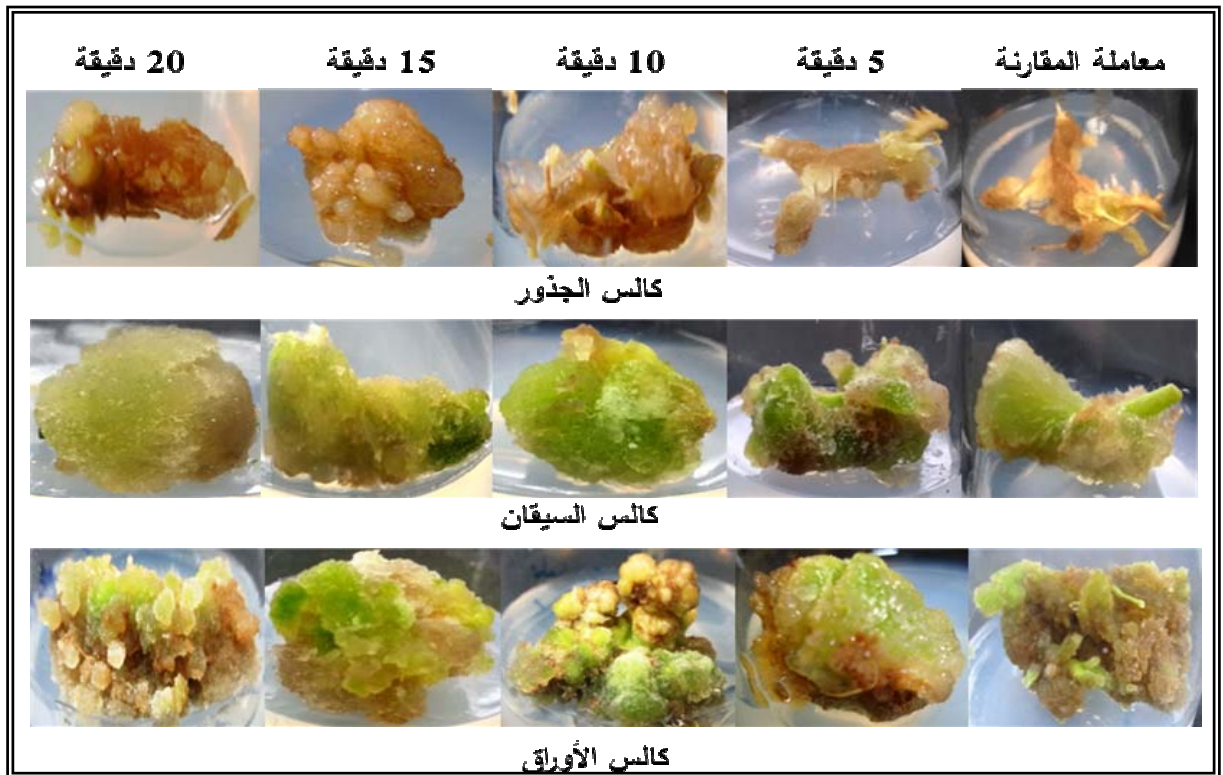
()
 / 0.5 BA / 1.0 MS
 60 30 (1) .NAA
 60 20
 4-3

.(2)



:1

60 30 *H. annuus* L.



H. annuus L.

:2

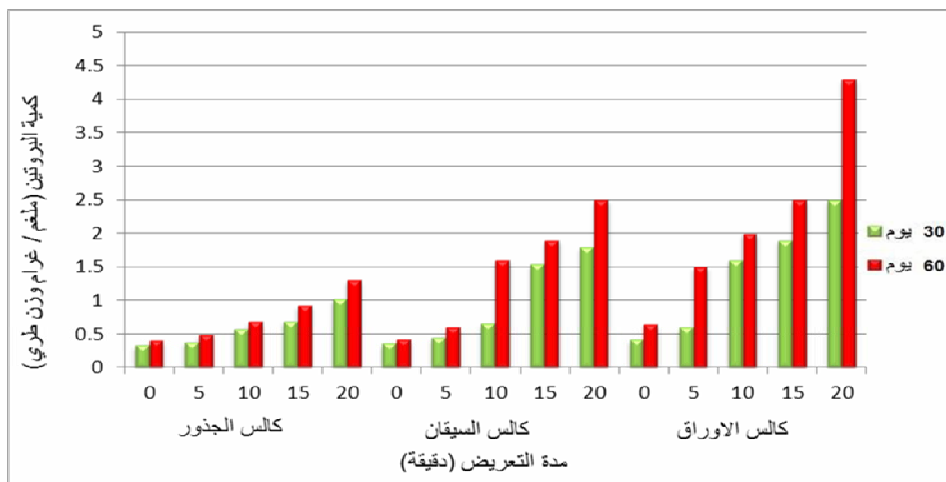
30

(3)

/ 4.3

(1)

20



H. annuus L.

:3

60 30

(DHFR)

(DHFR)

(1)

60

20

/ /

53.411

1.2

20

60

/

DHFR

:1

60 30 *H. annuus L.*

كمية الفوليت الكلية (مايكروغرام/غرام وزن طري)						الفعالية النوعية لانزيم DHFR (مايكرومول/دقيقة/ملغم بروتين)						مدة التعريض (دقيقة)
عمر الكالس (يوم)												
كالس الاوراق		كالس السيقان		كالس الجذور		كالس الاوراق		كالس السيقان		كالس الجذور		معاملة المقارنة
60	30	60	30	60	30	60	30	60	30	60	30	
h	i	h	j	h	i	g	h	g	i	h	i	معاملة المقارنة
0.501	0.454	0.381	0.304	0.322	0.283	46.411	45.011	43.411	42.211	31.411	29.220	
f	g	f	i	f	h	e	f	f	h	e	g	5
0.589	0.521	0.510	0.362	0.412	0.321	48.444	46.677	44.511	43.051	34.512	32.9 11	
e	f	e	g	d	g	c	d	d	f	d	f	10
0.602	0.584	0.602	0.480	0.492	0.394	49.921	48.721	45.821	44.510	35.315	33.411	
c	d	c	d	b	e	b	e	c	e	c	e	15
0.821	0.741	0.662	0.624	0.587	0.451	51.512	49.820	46.511	45.051	37.001	34.821	
a	b	a	b	a	c	a	b	a	b	a	b	20
1.200	0.881	0.784	0.698	0.741	0.512	53.411	51.411	48.011	47.421	38.120	37.211	

(2)

60 30 RNA DNA

23.311

60 RNA DNA

20

11.401 DNA

/

221.888

/

100.333 RNA

/

60 30 RNA DNA *H. annuus* L.

كمية RNA (مايكروغرام/غرام وزن طري)						كمية DNA (مايكروغرام/غرام وزن طري)						مدد التعريض (دقيقة)	
عمر الكالس (يوم)													
كالس الاوراق		كالس السيقان		كالس الجذور		كالس الاوراق		كالس السيقان		كالس الجذور			
60	30	60	30	60	30	60	30	60	30	60	30		
g	j	f	j	f	i	f	i	f	j	f	j	معاملة المقارنة	
100.333	47.410	97.411	42.730	79.442	27.021	11.401	5.511	10.731	5.021	9.530	3.11		
d	i	d	i	d	h	d	h	d	i	d	i		5
137.811	54.823	127.881	60.666	101.021	40.511	15.211	6.540	13.911	6.501	11.217	4.125		
c	h	c	h	c	g	c	g	c	h	c	h		10
180.011	90.418	160.112	70.621	120.411	54.311	18.812	10.991	15.942	8.000	14.011	6.815	15	
b	f	b	g	b	f	b	f	b	g	b	g	15	
194.200	101.231	168.215	90.241	143.818	79.811	20.440	11.910	17.311	10.111	16.014	8.821	20	
a	e	a	e	a	e	a	e	a	e	a	e	20	
221.888	127.411	180.416	100.999	160.574	86.981	23.311	13.418	20.110	11.411	17.241	10.011		

1.0

MS

() NAA / 0.5 BA /
60

35

MS

10

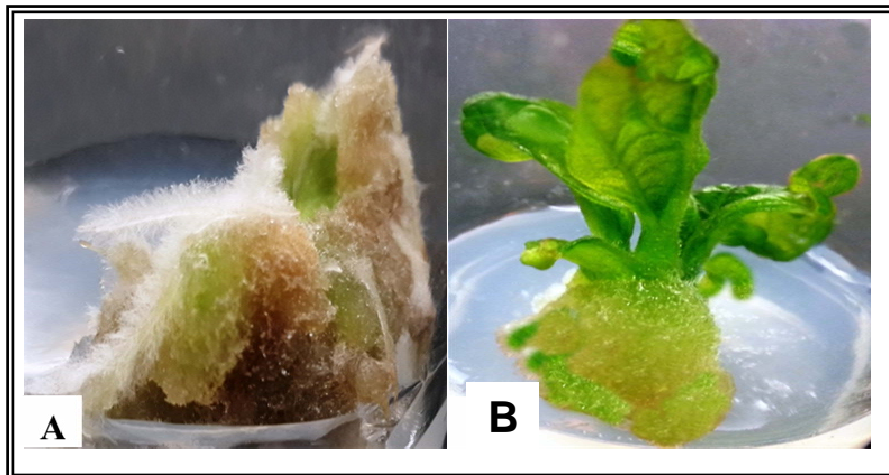
20

.(A-4)

.(B-4)

50

/ 5-4

*H. annuus*

:4

.NAA 0.5 BA / 1.0

10

35

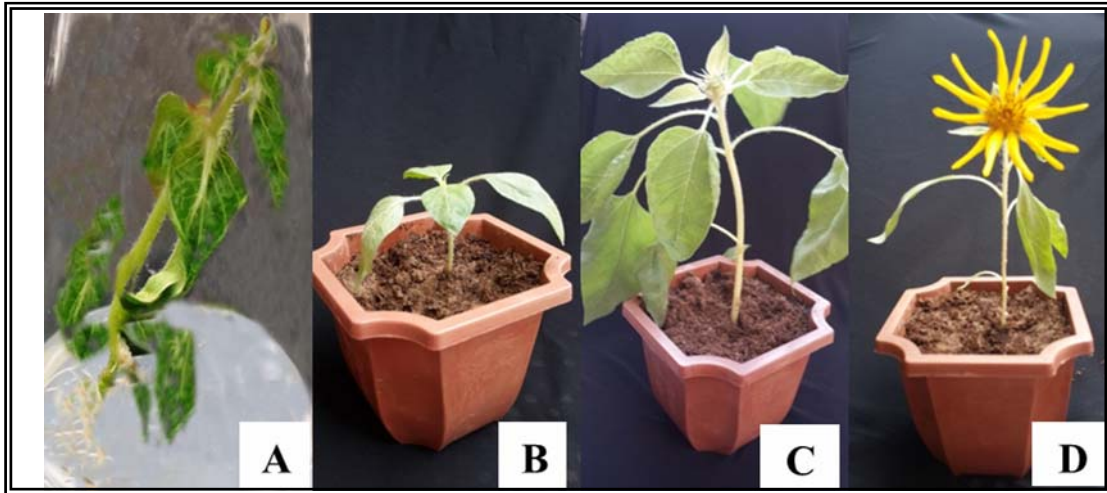
:(A)

20

50

:(B)

MS 20
 % 80 .(A-5)
 50 .(B-5)
 .(D,C -5)



H. annuus L.

:5

20

:(A)

MS

A

:(B)

50 B

:(C)

65

C

:(D)

(Callus)

(1990)

.(2010)

Dinoev, (2006) Tazawa, (1999)

DHFR

.(1990)

Induction

.....

RNA DNA
(2012b)

(Gorelova *et al.*, 2017)

(Cope and Bughee, 2013)

40 5

(Govil *et al.*, 1993)

(Bacchetta *et al.*, 2003)

(1990)

(Reinert and Bajaj, 1977)

(2009)

-

DNA

MS

20

(2011 ; Hartmann *et al.*, 2002)

(Yamazaki *et al.*, 2002)

² / 50 650

Phoenix dactylifera L.

(2010)

.66 -49 (1)9 .

- (2009)

.81-78 (2)14 .

.DNA

Allium sativum

Tamarindus indica L. (2011)
78-68 (22)2

(2012b)

Helianthus annuus L.

11-1 (3)23

(*Helianthus annuus* L.) (2015)

30-21 (2)9

Helianthus annuus L. (2017)

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(1990)

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