



## INVITROKAIINVIVO

## PINUSHALEPENSIS

,



«

»

, 2014



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,  
,



	46
	47
3.1.3	48
<b>3.2</b> :	49
<b>5 6</b>	
3.2.1	49
3.2.2	52
3.2.3	53
<b>3.3</b> :	54
<b>375</b>	<b>6</b>
3.3.1	54
3.3.2	56
3.3.3	57
<b>3.4</b>	58
<b>. INVIVOE</b>	60
<b>4.1</b>	60
4.1.1	60
4.1.2	60
<b>4.2</b>	62
4.2.1	62
4.2.2	62
4.2.3	62
4.2.4	62
4.2.5	63
	64
4.2.6	64
4.2.6	64
4.2.8	64
4.2.9	( BARS) 64
4.2.10	(TAC) 66
4.2.11	67
<b>4.3</b>	68
4.3.2	68
<b>5 :</b>	<b>,</b> 73
<b>5.1</b>	73
5.1.1	73
5.1.2	76
5.1.3	79
5.1.4	80
<b>5.2</b>	82
5.2.1	82
5.1.2	86
5.2.3	89
5.2.4	91
<b>5.3</b>	92
5.3.1	92

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	92
	94
	95
5.3.2	96
5.3.2.1	96
5.3.2.2	98
5.3.2.3	99
5.3.3	100
5.3.3.1	100
5.3.3.2	103
5.3.4	104
5.3.4.1	104
5.3.4.2	105
5.3.5	( BARS) 106
5.3.5.1	106
5.3.5.2	108
5.3.5.3	108
5.3.6	(TAC) 109
5.3.6.1	109
5.3.6.2	110
5.3.7	111
5.4	111
6 :	114
	115

---

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3.1	47
3.2	50
3.3	50
3.4	51
3.5	51
3.6	51
3.7	51
3.8	51
3.8	51
3.9	55
3.10	55
3.11	56
3.12	56
3.13	56
3.14	56
3.15	56
5.1	75
5.2	75
5.3	75
5.4	75
5.5	76
5.6	76
5.7	78
5.8	78
5.9	78-79
5.10	78-79
5.11	79
5.12	79
5.13	84
5.14	84
5.15	84
5.16	85
5.17	85
5.18	85
5.19	85
5.20	85
5.21	85
5.22	88
5.23	88
5.24	88
5.25	89
5.26	89
5.27	89
5.28	89
5.29	89
5.30	89
5.31	93
5.32	94
5.33	94
5.34	94
5.35	94



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	94
	94
	97
5.39	98
5.40	98
5.41	98
5.42	105
5.43	106
5.44	107
5.45	110



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Pinus halepensis

in vitro

5 375  
in vivo

SKH-1

(3M.E.D.),

(TBARS)

(TAC).

in vitro

, 1 g/mL

200 g/mL.

in vivo  
Pinus halepensis.

## ABSTRACT

Pinus halepensis bark extract has remarkable antioxidant properties. The activity comparison of water and methanolic bark extracts and some of their fractions seems of great importance.

In vitro tests compared the two extracts on primary murine keratinocytes at the presence of UV-R. The cancer cell lines M5 and A375 were used in order to determine the optimal dose and the toxic dose by measuring cell viability with the MTT method. For the in vivo study, female SKH-1 mice were administered three minimum erythematous doses (3M.E.D.) on their lower back, in order to cause a mild inflammation. The extracts and their fractions were formulated either as creams or gels and applied topically. Redness, transepidermal water loss and erythema area were measured every two days. Lipid peroxidation (TBARS) of the skin and total antioxidant activity (TAC) were also determined after the end of the experiment.

From the in vitro results, 1 g/mL seems to increase cell proliferation and the toxic dose probably is greater than 200 g/mL. The fractions showed a significant increase in cell viability compared to the extracts and the control group. The in vivo data proved the protective role of Pinus halepensis bark. The water extract (H) and the methanolic one (M) were the most promising results.

More studies need to be conducted to assess the best formulation and the best concentration of the extracts and their fractions.



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1 :

Pinaceae

Pinushalepesnsis

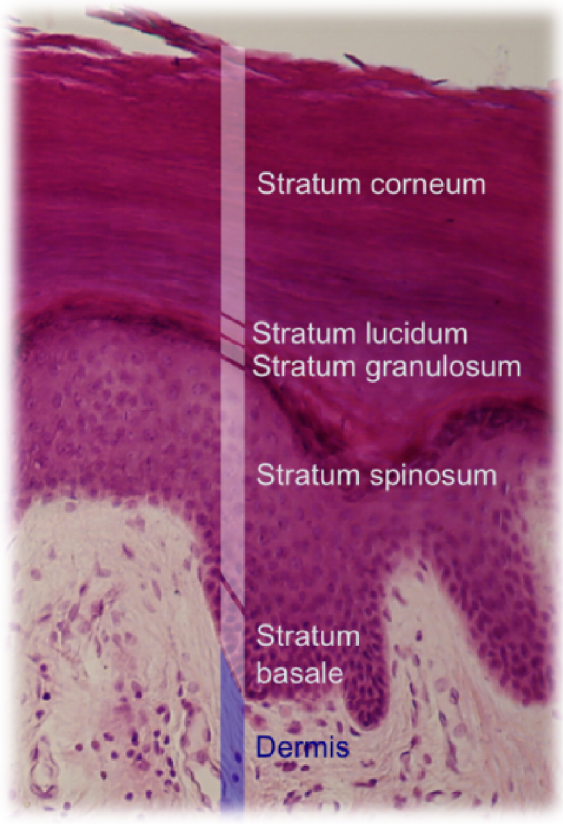
2 :

2.1

16%

2500cm<sup>2</sup>

18000cm<sup>2</sup>



2.2

2.2.1

i.

(Stratum Basale):

2.1:  
3

ii.

(Stratum Spinosum):

iii.

(StratumGranulosum):

1,2,4

iv.

(StratumLucidum):

1,2,4

v.

(StratumCorneum):

1,2

1,2

### 2.2.2

i.

28

ii.

1:5.

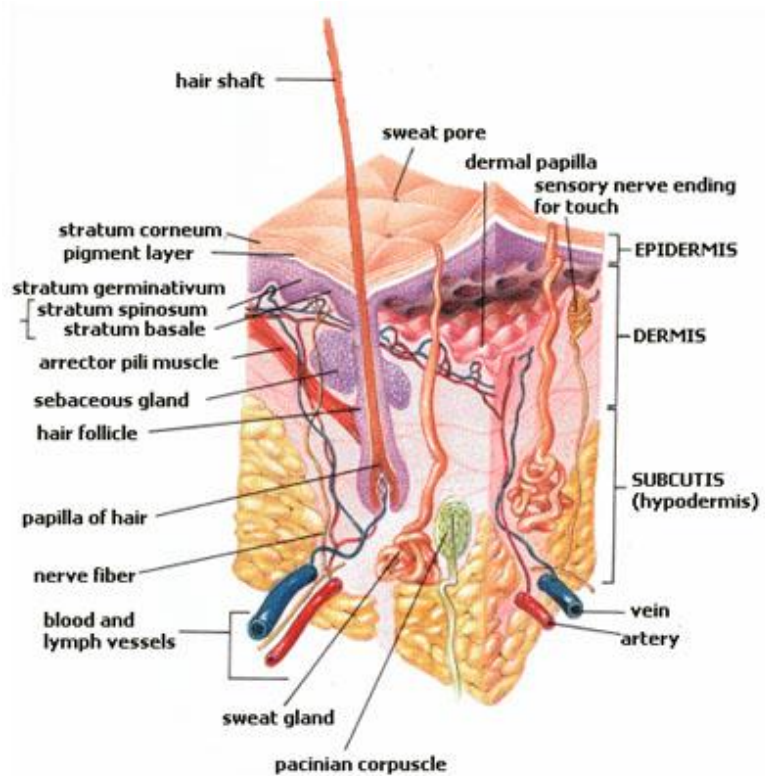
UV

iii. *Langerhans:*

iv. *Merkel:*

2.3

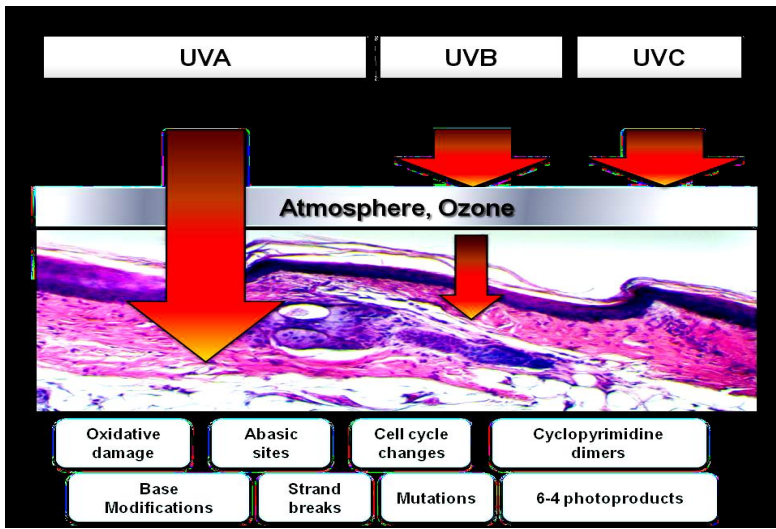
2.2:



3.1 \_\_\_\_\_

UVA (320-400nm), UVB (280-320nm) (200-400nm).  
 UVC (200-280nm), UVC  
 95% UVA, 5% UVB, UVC

UV-R,



3.1:

.11

D,

3.2 UV-R

invitro,

8

7,13,14

15,14

UVB

16

DNA

ó (6-4) ó

9,17,18

16

UVB

19

20

UV-  
12

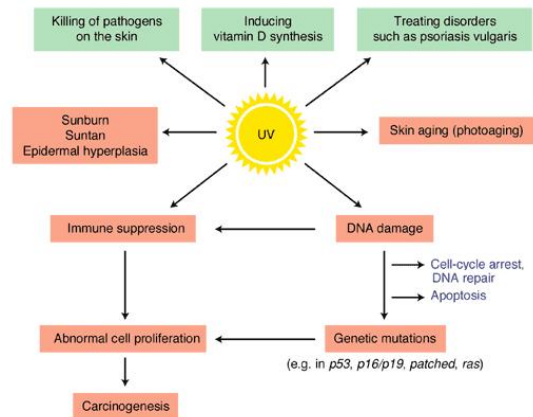
DNA,

UVA

UVB

8,21,9

3.2:  
UV-R<sup>22</sup>

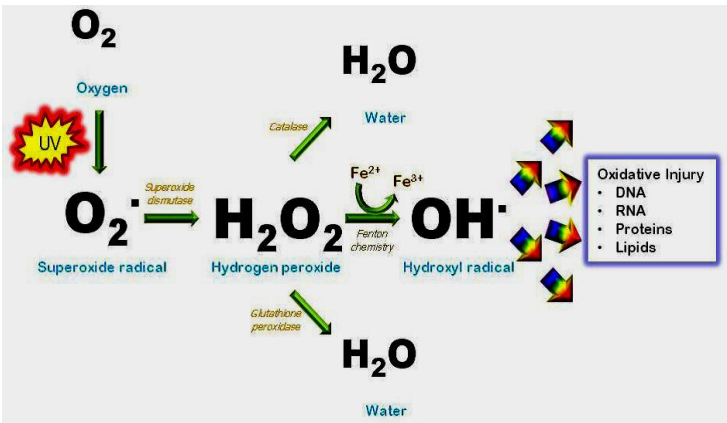






ROS, UV-R, 33,18  
 33,34  
 ROS, DNA, 33,35  
 30  
 33,36  
 ROS (s),  
 (-2, -9),

18




3.4:

11

UVA.<sup>15,21</sup>

DNA ( ROS, )



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UVA.<sup>9</sup>

UVB

.<sup>16,20</sup>

.<sup>16</sup> ROS

.<sup>16,9</sup>

ROS

UVB.

TNF- $\alpha$ ,

2

2(COX-2).

.<sup>33</sup>

ROS

DNA

.<sup>16,12</sup>

UVB

.<sup>16,30</sup>

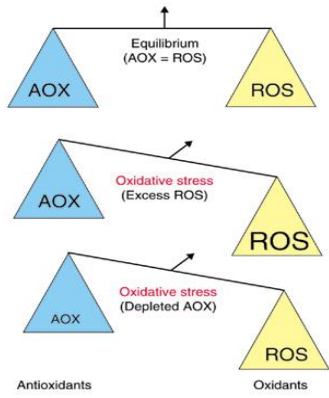
UVA,UVB

UVC

ROS

DNA.<sup>9,12,23</sup>

4.1



4.1:

40

4.2 (ReactiveOxygenSpecies - R.O.S.)

R.O.S.

34

R.O.S.,

39,38

(R.S.S.)<sup>41</sup>

(R.O.S.),

(R.N.S.),

(R.C.I.S.)

R.O.S.

3, 2 2).<sup>35,42</sup>

(<sup>1</sup> 2,

« »

1. :
2. :
3. :
4. ,

39

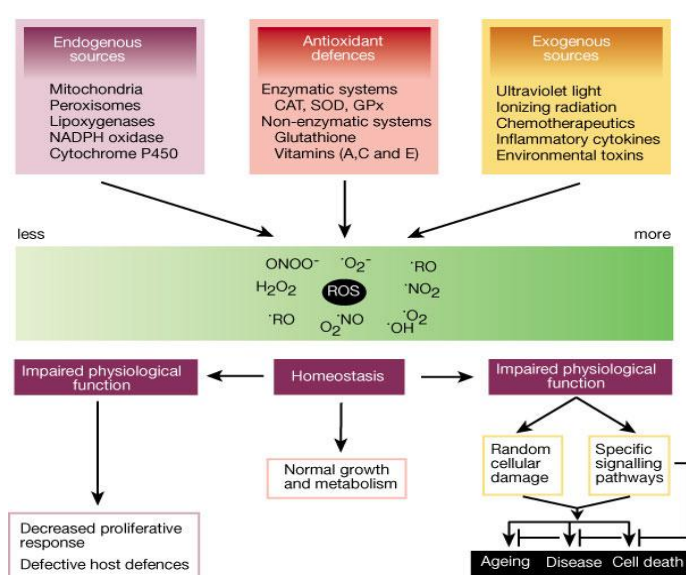
R.O.S.

39

38,39

2-3%

R.O.S.,  
39



4.2:  
R.O.S.

43

( UV ),  
34  
80-90%  
P450.  
R.O.S.  
39  
R.O.S.  
(\* 2), (\* 2)  
(\* ).  
38,44 (HOCl)  
(ROO\*), (\* )  
45

	$O_2^{-*}$	$NADPH + 2O_2^{-*} \rightarrow NADP^+ + 2O_2^{-*} + H^+$ $2O_2^{-*} + H^+ \rightarrow O_2 + H_2O_2$
	$H_2O_2$	$+ H_2O + O_2 \rightarrow +$ $H_2O_2$ $+ H_2O + O_2 \rightarrow +$ $H_2O_2$
	$^*OH$	$Fe^{2+} + H_2O_2 \rightarrow Fe^{3+} + OH^- + ^*OH$
	HOCl	$H_2O_2 + Cl^- \rightarrow HOCl + H_2O$
	ROO*	$R^* + O_2 \rightarrow ROO^*$
	HOO*	$O_2^- + H_2O \rightarrow HOO^* + OH^-$

3.1: 45

4.3

46

DNA

R.O.S.

39

DNA.<sup>12,39</sup>

4.4

R.O.S.

35

<b>R.O.S.</b>
( <b>Alzheimer, Parkinson</b> )

4.2:

39

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n), « » (promotion) « » ,

34

DNA, R.O.S. , ,

R.O.S.

34

R.O.S.

12,14

38

R.O.S.

39

47

48

R.O.S.

34

49





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.50

,

.51

.52

R.O.S.,

,

.53

4.5

R.O.S.

R.O.S.

.34

R.O.S.

.54

.39,54

R.O.S.

.39,54,55

.55

.41

R.O.S.

.56



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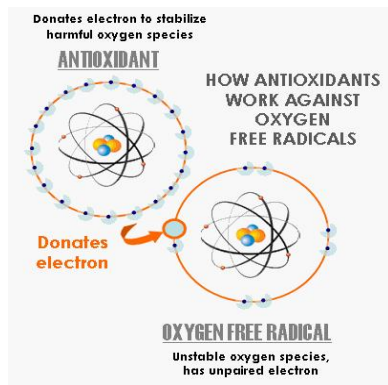
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5 :

5.1

,  
.  
39

R.O.S.



5.1: 57

,  
42

1. :  
R.O.S.

,  
58,59

2. :

,  
59

3. :

,  
59

,  
R.O.S.<sup>59</sup>

60

61

62

5.2

38

	SOD	$M^{(n+1)}\text{-SOD} + O_2^- \rightarrow M^{n+}\text{-SOD} + O_2$ $M^{n+}\text{-SOD} + O_2^- + 2H^+ \rightarrow M^{(n+1)}\text{-SOD} + H_2O_2$
	CAT	$2H_2O_2 \rightarrow O_2 + H_2O$ $H_2O_2 + Fe(III)\text{-E} \rightarrow H_2O + O=\text{Fe(IV)\text{-E}^+}$ $H_2O_2 + O=\text{Fe(IV)\text{-E}^+} \rightarrow H_2O + Fe(III)\text{-E} + O_2$
	GPX	$2GSH + H_2O_2 \rightarrow GSSG + 2H_2O$ $2GSH + ROOH \rightarrow GSSG + ROH + H_2O$

5.1:

45

4.1,  
SOD, CAT GPX. SOD  
( 2 )

( 2 2).<sup>39,42</sup>

SOD, CuZn-SOD (SOD1),  
, Mn-SOD (SOD2),

CAT

SOD1.<sup>36,63</sup>

<sup>39,42,11</sup>  
<sup>39</sup>  
2 2.

GPX

2 2,

CAT,

5.3

---

(C),  
(CoQ10), . . .<sup>38,58</sup>

(GSH),

Q10

( , , )

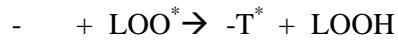
( , , ).

<sup>64</sup>

Golgi,

<sup>65</sup>

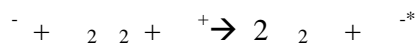
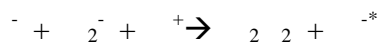
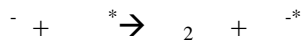
GSH.<sup>39,42</sup>



<sup>64</sup>

<sup>60</sup>

<sup>46,66</sup>



GSH NADPH.<sup>46</sup>  
60

(GSH)

11

36,41

R.O.S.

GPXs

2 2

36

GSH

11,39

C.<sup>36,41</sup>

51

67

Q10,

Alzheimer,

12,62

UV

60

( . . . . )

51,62

ó	
_____	



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		LDL
		LDL

5.2:

ó

LDL  
.58

## 5.4

,

.16

,

,

27

,

,

.68

,

.69

,

.70

,

Langerhans.<sup>71</sup>

, invivo

-

UVB



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process.

27

UVA UVB

C.<sup>62,27</sup>

69

27

33

16

64

60

67

S.<sup>28</sup>

67

28





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use period has ended.  
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64

62

F-

LDL.<sup>64</sup>

C

44

R.O.S.

66

73

74

«

»

74

49

Pinushalepensis.

Pinaceae

Rhone

75

76

Pinus

75,77,78

ThesaurusMedicamum (1479)

68,79

C.

68

79

68

Pinuspinaster

Pycnogenol<sup>®</sup>,

62,80,86

68

( , . . ),

62,80,68

Pycnogenol<sup>®</sup>

68

invivo

UV

62,80,68

68

P. halepensis,

R.O.S.

75

81

82,83

84

Staphylococcus aureus

Bacillus cereus.<sup>85</sup>

26

16

, 4

3

85

, P. halepensis

Pinus,

86

: P. pinea < P. brutia < P. halepensis < P. radiata < P. attenuata < P. nigra.<sup>80</sup>

5.6

Pinus,

41,28

87

4.000

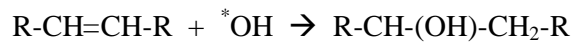
2

3

41,88

89

2 2,



ROS, RNS RCIS.

Fe Cu,

Fenton Haber-

Weiss.<sup>41,49,90,91</sup>

89

SOD,

CAT.<sup>91</sup>

89

89

DNA<sup>8,33</sup>

(COX) (LPO),  
NF-kB.<sup>89,91</sup>

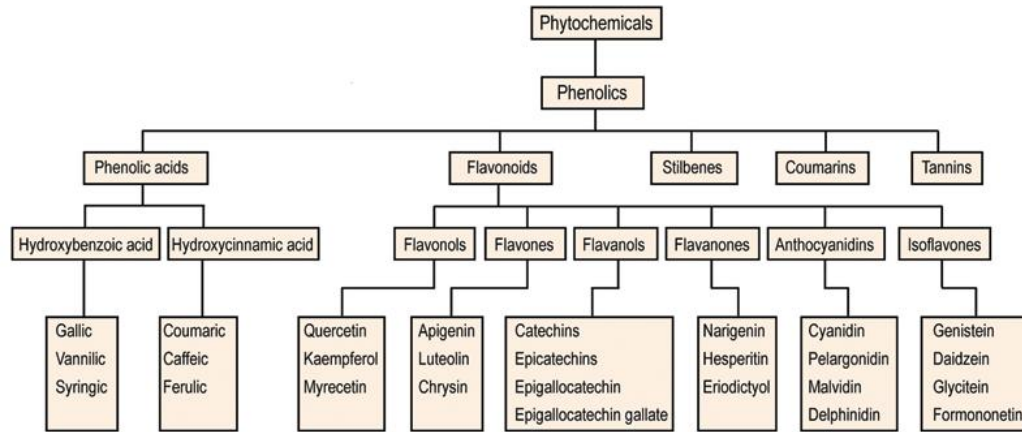
91

NMDA<sup>92,93</sup>

91,92

91

92



5.2:

94



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# .INVITRO

1 :

Pinushalepensis

invitro

invivo

\_\_\_\_\_ : SKH-1 5  
375 .

\_\_\_\_\_ :  
Gibco® (Keratinocytes-SFM 0,09mM Calcium,  
SFM without Calcium, Gibco®) 1% Antibiotic-Antimycotic, Gibco®  
(Keratinocytes-

\_\_\_\_\_ : RPMI (Sigma-  
Aldrich®), 10% Foetal Bovine Serum-FBS (Gibco®) 1% Antibiotic-  
Antimycotic, (Gibco®).

\_\_\_\_\_ K : 25cm<sup>2</sup>  
96 (96 cellwellplates, Costar®).

Garamycin® (80mg/vial, MSD)

: 70:30

Phosphate Buffer Saline-PBS pH 7,4 (Gibco®)

Dispase® (Gibco®)-

Trypsin-EDTA, (Gibco®)-

Foetal Bovine Serum-FBS (Gibco®)

Trypsin-EDTA

Thiazolyl Blue Tetrazolium Bromide (Sigma-Aldrich®),

Triton<sup>1</sup> X-100 (Sigma-Aldrich®),

(Sigma-Aldrich®),

HCl 37%,

DMSO (Sigma-Aldrich®),

(4 C) o

, PBS,

le, (-20 C)

INCO 2 Memmert  
37 C CO<sub>2</sub> 5%.

Axover 25 ZEISS

Hettich RotoSilenta III

Fluostar BMG

## 2.2

### 2.2.1

- i. : 1000mL  
175 L Garamycin  
7 g/mL.
- ii. *Dispase*:  
45mg Dispase  
50mL.  
Dispase 1U/mL. 0,22 m (Millipore).  
1:5 1:10  
Dispase 0,2U/mL 0,1U/mL
- iii. *Trypsin-EDTA*: 3ml Trypsin-EDTA  
9ml
- iv. : 25mg  
5ml PBS
- v. *Triton-X*: 3ml Triton-X  
300 I HCl 37%  
30ml
- vi. *Pinushalepensis*:

/	




2.1:

5mg  
1ml  
0,5ml  
0,5mlDMSO( 1).

- a) 200 g/ml: 1  
10 l.
- b) 100 g/ml: 1  
400 l
- c) 200 l, ( 2) 10 l.  
50 g/ml: 2  
5 l.
- d) 10 g/ml: 1  
250 l,
- e) 5ml ( 3) 10 l  
5 g/ml: 3  
5 l
- f) 1 g/ml: 3  
500 l,
- g) 5ml( 4) 10 l  
0,5 g/ml: 5 l
- h) 4. 0,1 g/ml: 100 l  
4 1ml 10 l

vii.

- a) DMSO (TD):  
200 IDMSO 200 l  
10 l

250 l,  
5ml

2.2.2

SKH-1

, 5-7 0-48h 10 ,  
, . , ( , ) , :

2.2:

1	Cetavlon
2	: 70:30
3	: 70:30
4	
5	: 70:30
6	: 70:30
7	
8	
9	
10	
11	7mL Dispase 0,2U/mL

1-4 , 5-11 .  
( ) 1, ,  
, 2-7 ( )  
) 7, 8. ,  
9, ,  
11, 10

Dispase 0,2U/mL 30min  
7mL Dispase 0,2U/ml 30min Vortex.  
5mL Dispase 0,1U/mL 2min  
Vortex.  
700 LFBS. 15mL 5mL Dispase 0,1U/mL  
2min Vortex. 35mL.  
8-10  
2 35mL,  
1000rpm 8min.  
2  
2-3min 1000rpm. 7,5mL.  
100 L  
100 L  
4mL

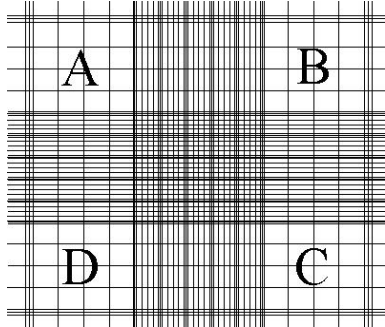
2.2.3

300 l Trtysin-EDTA  
5min.  
2mlFBS  
10min 1000rpm.

2.2.4

2.2.2 2.2.3

edPoly-OpticGmbH<sup>®</sup>Hemacytometer (Germany).



2.1: Hemacytometer.<sup>95</sup>

$10^4$

mL

250 L.

5% CO<sub>2</sub>.

37 C

2.2.5

70-80%.

2.2.1

2.2.6

24

50 IPBS

XenonOriel 68820

UVA

UVB

PBS

250 l

2.2.7

MTT

NAD(P)H

(ThiazolylBlueTetrazoliumBromide),

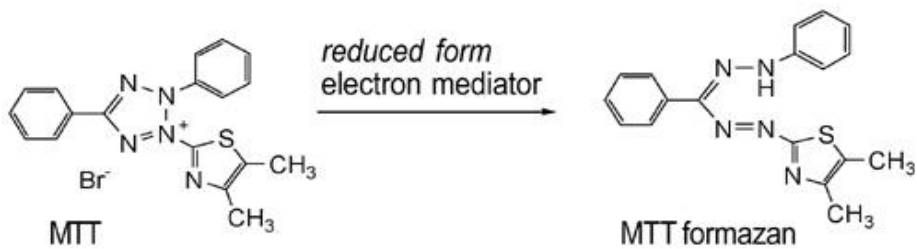
100 l

10 l

2-3

200 l

Triton-X,



2.2:

.96

**3.1 Pinushalepensis** : **UV**  
**6**

**3.1.1** \_\_\_\_\_

i. \_\_\_\_\_ :

5 SKH-1

2.2.2.

mL. 152.500 Hemacytometer (15,25x10<sup>4</sup>)  
29.000 ,  
190 L 60 L  
250 L.  
37 C 5% CO<sub>2</sub>

ii. \_\_\_\_\_ :  
\_\_\_\_\_

200 L  
250 L

80%,  
Pinushalepensis, 1 g/ml  
0,1 g/ml, 1 g/ml, 10 g/ml

	1	2	3	4	5	8	9	10	11	12
<b>A</b>	C	1	0,1 M	1 M	10 M	UV	1 +UV	0,1 M+UV	1 M+UV	10 +UV
<b>B</b>	C	1	0,1 M	1 M	10 M	UV	1 +UV	0,1 M+UV	1 M+UV	10 M+UV
<b>C</b>	C	1	0,1 M	1 M	10 M	UV	1 +UV	0,1+UV	1 M+UV	10 +UV
<b>D</b>	C	1	0,1 M	1 M	10 M	UV	1 +UV	0,1 +UV	1 M+UV	10 M+UV

3.1: Pinushalepensis

: C= (Control group)

= Pinus halepensis

M= Pinus halepensis

halepensis UV

+UV= Pinushalepensis UV

iii. \_\_\_\_\_ : \_\_\_\_\_ UVlight \_\_\_\_\_

2.2.6 2.2.7.

800W. UVA 1.450mW/cm<sup>2</sup>,  
2,9mJ/cm<sup>2</sup> (1.450mW/cm<sup>2</sup>x 2sec), UVB 1.270mW/cm<sup>2</sup>  
2,6mJ/cm<sup>2</sup> (1.270mW/cm<sup>2</sup>x 2sec).

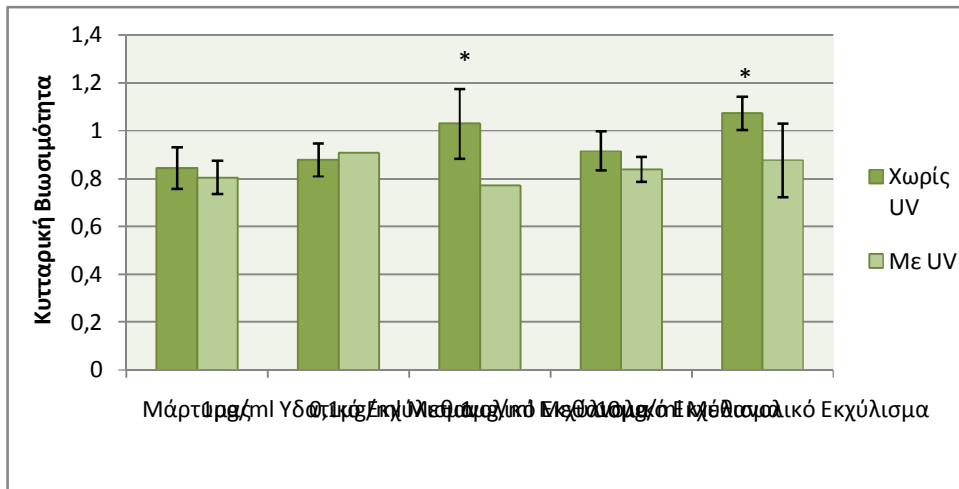
2, (gainadjustment 020).

3.2:

Pinushalepensis UV

	C	UV	1	1 +UV	0,1M	0,1M+UV	1M	1M+UV	10M	10 M+UV
1	0,9189	0,7148	0,8453	0,9141	1,1183	0,7437	0,9931	0,7795	1,1763	0,6961
2	0,8106	0,7882	0,9583	0,9017	1,1696	0,729	0,9741	0,8517	1,0437	1,0553
3	0,9126	0,8456	0,9104	0,934	0,9839	0,889	0,8226	0,9046	1,0262	0,931
4	0,7375	0,8729	0,8016	0,88	0,8453	0,7278	0,8723	0,8194	1,0447	0,822
M.O.	0,8449	0,8054	0,8789	0,9075	1,0293	0,7724	0,9155	0,8388	1,0727	0,8761
T.A.	0,08712	0,06994	0,06928	0,02262	0,14551	0,07809	0,08155	0,05288	0,06957	0,15325

MTT



3.1:

3.2.2

(OneWayAnova, Post-Hoc:LSD) ó

<0,05

	P
- 0.1 g/ml	0.008
- 10 g/ml	0.001
UV - 0.1 g/ml M	0.002
UV - 10 g/ml	0.000
1 g/ml -0.1 g/ml	0,026
1 g/ml -10 g/ml	0,005
1 g/ml +UV-0.1 g/ml +UV	0.044
1 g/ml +UV-10 g/ml	0.015
0.1 g/ml -0.1 g/ml +UV	0.000
0.1 g/ml -1 g/ml +UV	0.006
0.1 g/ml -10 g/ml +UV	0.024
0.1 g/ml +UV-1 g/ml	0.034
0.1 g/ml +UV-10 g/ml	0.000
1 g/ml -10 g/ml	0.021
1 g/ml +UV-10 g/ml	0.001
10 g/ml -10 g/ml +UV	0.005
3.3: P	

3.1.3

UV,

1 g/ml

0,1 g/ml

0,1 g/ml

UV.

UV,

10 g/ml



3.2.1 \_\_\_\_\_

i. \_\_\_\_\_ : \_\_\_\_\_ 96

2.2.3. \_\_\_\_\_ 126.100 (12,61x10<sup>4</sup>)  
mL. \_\_\_\_\_ 5.000  
, 40 L \_\_\_\_\_ 210 L

37 C 5% CO<sub>2</sub>

ii. \_\_\_\_\_ *P. halepensis*

5 g/ml 10 g/ml. \_\_\_\_\_ 0,5 g/ml, 1 g/ml,  
:

	1	2	3	4	5	6	7	8	9	10	11	12
	0,5	1	5	10	0,5 B	1 B	5 B	10 B	0,5	1	5	10
	0,5	1	5	10	0,5 B	1 B	5 B	10 B	0,5	1	5	10
<b>C</b>	0,5	1	5	10	0,5 B	1 B	5 B	10 B	0,5	1	5	10
<b>D</b>	C	C	C									
<b>E</b>	0,5M	1M	5M	10M	0,5MB	1MB	5MB	10MB	0,5M	1M	5M	10M
<b>F</b>	0,5M	1M	5M	10M	0,5MB	1MB	5MB	10MB	0,5M	1M	5M	10M
<b>G</b>	0,5M	1M	5M	10M	0,5MB	1MB	5MB	10MB	0,5M	1M	5M	10M
<b>H</b>	CD	CD	CD									

3.4:

96

C=

CD= DMSO

iii. \_\_\_\_\_

3.5,

(gainadjustment 035).

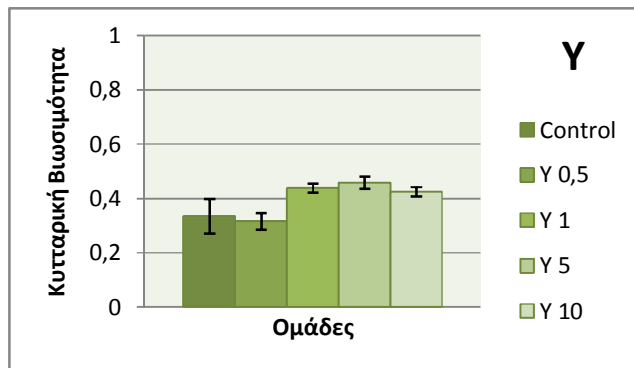
	C	0,5	1	5	10	0,5 B	1 B	5 B	10 B
<b>1</b>	0,2901	0,2955	0,4551	0,4703	0,4379	0,3788	1,0036	0,7022	0,7382

	0,4344	0,4063	0,3411	0,8495	0,9281	0,8295
	0,4733	0,4337	0,7487	0,8549	0,9176	0,8897
	0,4593	0,4259	0,4895	0,9027	0,8493	0,8191
<b>T.A.</b>	0,06456	0,03012	0,01668	0,02165	0,01716	0,2252

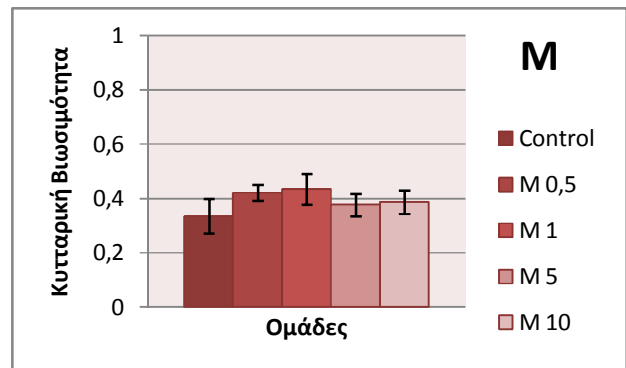
	0,5	1	5	10	0,5M	1M	5M	10M
<b>1</b>	0,9068	0,8145	0,5498	0,5265	0,4031	0,3889	0,5837	0,8965
<b>2</b>	0,9372	0,846	0,6861	0,504	0,5524	0,253	0,5406	0,7281
<b>3</b>	0,92	0,8457	0,6274	0,6161	0,4851	0,3966	0,4613	0,8145
<b>. .</b>	0,9213	0,8354	0,6211	0,5489	0,4802	0,3462	0,5285	0,8123
<b>T.A.</b>	0,01524	0,01810	0,06836	0,05930	0,07477	0,08078	0,06209	0,1191

	CD	0,5M	1M	5M	10M	0,5MB	1MB	5MB	10MB
<b>1</b>	0,4497	0,3955	0,4948	0,3919	0,359	0,7018	0,7946	0,813	0,6388
<b>2</b>	0,3483	0,454	0,4257	0,3313	0,3658	0,5863	0,9014	0,869	0,603
<b>3</b>	0,4812	0,4162	0,3825	0,4089	0,4366	0,4725	0,7906	0,9459	0,5007
<b>. .</b>	0,4264	0,4219	0,4343	0,3774	0,3871	0,5871	0,8289	0,8760	0,5808
<b>T.A.</b>	0,06944	0,02966	0,05665	0,04079	0,04297	0,1621	0,06285	0,06672	0,07167

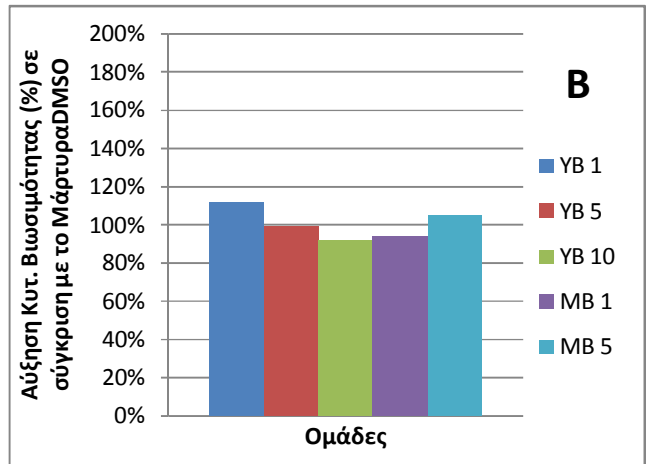
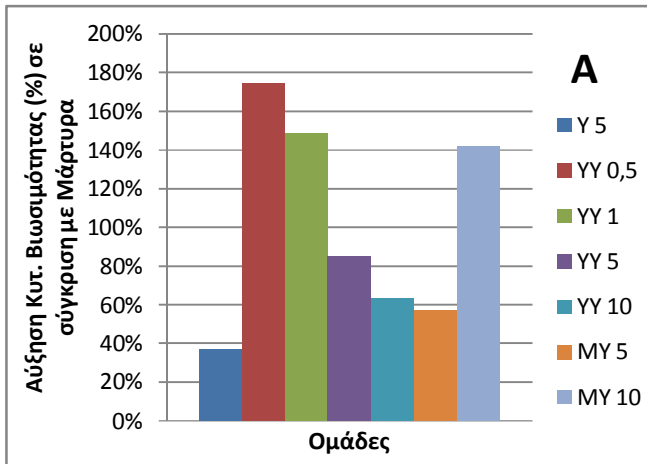
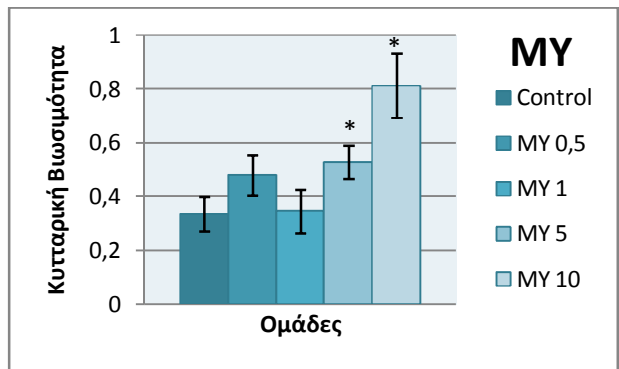
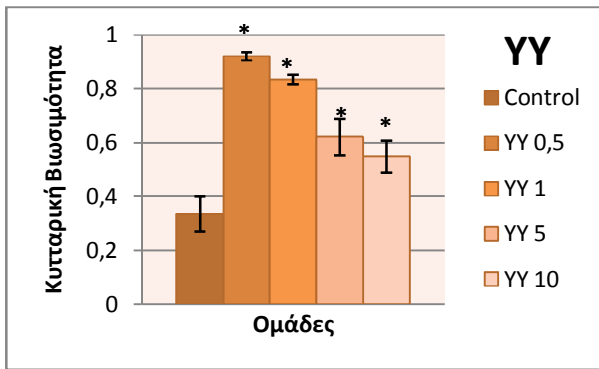
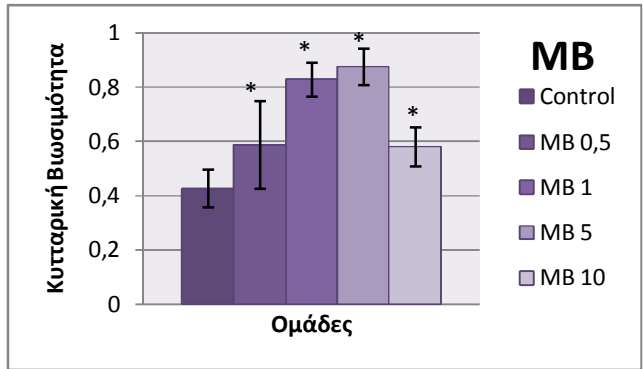
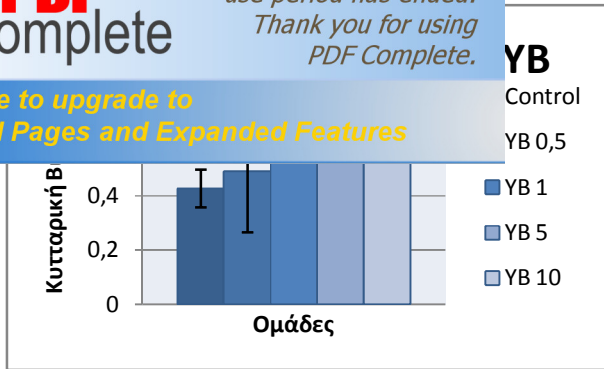
3.5:



3.2 3.3:



, Y



3.8 3.8 :

( )

DMSO (B).

0%.

P

(OneWayAnova, PostHoc: LSD) -

<0,05

	P		P
CD ó 1 g/ml YB	0.000	CDó 0,5 g/ml MB	0.007
CDó 5 g/ml YB	0.000	CD ó 1 g/ml MB	0.000
CD ó 10 g/ml YB	0.000	CDó 5 g/ml MB	0.000
C ó 0,5 g/ml YY	0.000	CD ó 10 g/ml MB	0.009
C ó 1 g/ml YY	0.000	C ó 0,5 g/ml MY	0.014
C ó 5 g/ml YY	0.000	C ó 5 g/ml MY	0.002
C ó 10 g/ml YY	0.004	C ó 10 g/ml MY	0.000
0,5 g/ml Y ó 0,5 g/ml YB	0.024	0,5 g/ml M ó 0,5 g/ml MB	0.006
0,5 g/ml Y ó 1 g/ml YB	0.000	0,5 g/ml M ó 1 g/ml MB	0.000
0,5 g/ml Y ó 5 g/ml YB	0.000	0,5 g/ml M ó 5 g/ml MB	0.000
0,5 g/ml Y ó 10 g/ml YB	0.000	0,5 g/ml M ó 10 g/ml MB	0.008
0,5 g/ml Y ó 0,5 g/ml YY	0.000	0,5 g/ml M ó 10 g/ml MH	0.000
0,5 g/ml Y ó 1 g/ml YY	0.000	1 g/ml M ó 0,5 g/ml MB	0.010
0,5 g/ml Y ó 5 g/ml YY	0.000	1 g/ml M ó 1 g/ml MB	0.000
0,5 g/ml Y ó 10 g/ml YY	0.003	1 g/ml M ó 5 g/ml MB	0.000
1 g/ml Y ó 1 g/ml YB	0.000	1 g/ml M ó 10 g/ml MB	0.013
1 g/ml Y ó 5 g/ml YB	0.000	1 g/ml M ó 10 g/ml MY	0.000
1 g/ml Y ó 10 g/ml YB	0.000	5 g/ml M ó 0,5 g/ml MB	0.001
1 g/ml Y ó 0,5 g/ml YY	0.000	5 g/ml M ó 1 g/ml MB	0.000
1 g/ml Y ó 1 g/ml YY	0.000	5 g/ml M ó 5 g/ml MB	0.000
1 g/ml Y ó 5 g/ml YY	0.013	5 g/ml M ó 10 g/ml MB	0.001
5 g/ml Y ó 1 g/ml YB	0.000	5 g/ml M ó 5 g/ml MY	0.011
5 g/ml Y ó 5 g/ml YB	0.000	5 g/ml M ó 10 g/ml MY	0.000
5 g/ml Y ó 10 g/ml YB	0.000	10 g/ml M ó 0,5 g/ml MB	0.001
5 g/ml Y ó 0,5 g/ml YY	0.000	10 g/ml M ó 1 g/ml MB	0.000
5 g/ml Y ó 1 g/ml YY	0.000	10 g/ml M ó 5 g/ml MB	0.000
5 g/ml Y ó 5 g/ml YY	0.025	10 g/ml M ó 10 g/ml MB	0.002
10 g/ml Y ó 1 g/ml YB	0.000	10 g/ml M ó 5 g/ml MY	0.016
10 g/ml Y ó 5 g/ml YB	0.000	10 g/ml M ó 10 g/ml MY	0.000
10 g/ml Y ó 10 g/ml YB	0.000	0,5 g/ml MB ó 1 g/ml MB	0.000
10 g/ml Y ó 0,5 g/ml YY	0.000	0,5 g/ml MB ó 5 g/ml MB	0.000
10 g/ml Y ó 1 g/ml YY	0.000	0,5 g/ml MB ó 1 g/ml MY	0.000
10 g/ml Y ó 5 g/ml YY	0.008	0,5 g/ml MB ó 10 g/ml MY	0.000
0,5 g/ml YB ó 1 g/ml YB	0.000	1 g/ml MB ó 10 g/ml MB	0.000
0,5 g/ml YB ó 5 g/ml YB	0.000	1 g/ml MB ó 0,5 g/ml MY	0.000
0,5 g/ml YB ó 10 g/ml YB	0.000	1 g/ml MB ó 1 g/ml MY	0.000
0,5 g/ml YB ó 0,5 g/ml YY	0.000	5 g/ml MB ó 5 g/ml MY	0.000

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	0.000	10 g/ml MB ó 1 g/ml MY	0.000
	0.000	10 g/ml MB ó 10 g/ml MY	0.000
	0.000	0,5 g/mlMY ó 1 g/mlMY	0.022
5 g/ml YB ó 5 g/ml YY	0.002	0,5 g/mlMY ó 10 g/mlMY	0.000
5 g/ml YB ó 10 g/ml YY	0.000	1 g/mlMY ó 5 g/mlMY	0.003
10 g/ml YB ó 5 g/ml YY	0.007	1 g/mlMY ó 10 g/mlMY	0.000
10 g/ml YB ó 10 g/ml YY	0.000	5 g/mlMY ó 10 g/mlMY	0.000
0,5 g/mlYY ó 5 g/mlYY	0.000	0,5 g/ml YB ó 1 g/ml MB	0.002
0,5 g/mlYY ó 10 g/mlYY	0.000	0,5 g/ml YB ó 5 g/ml MB	0.001
1 g/mlYY ó 5 g/mlYY	0.004	1 g/ml YB ó 0,5 g/ml MB	0.004
1 g/mlYY ó 10 g/mlYY	0.000	1 g/ml YB ó 10 g/ml MB	0.004
0,5 g/ml Y ó 0,5 g/ml M	0.004	5 g/ml YB ó 0,5 g/ml MB	0.013
0,5 g/ml Y ó 1 g/ml M	0.001	5 g/ml YB ó 10 g/ml MB	0.012
0,5 g/ml Y ó 10 g/ml M	0.045	10 g/ml YB ó 0,5 g/ml MB	0.026
1 g/ml Y ó 5 g/ml M	0.042	10 g/ml YB ó 10 g/ml MB	0.023
5 g/ml Y ó 5 g/ml M	0.010	5 g/ml YY ó 0,5 g/ml MY	0.015
5 g/ml Y ó 10 g/ml M	0.020	5 g/ml YY ó 1 g/ml MY	0.000
0,5 g/mlYY ó 0,5 g/mlMY	0.000	5 g/ml YY ó 10 g/ml MY	0.002
0,5 g/mlYY ó 1 g/mlMY	0.000	10 g/ml YY ó 1 g/ml MY	0.001
0,5 g/mlYY ó 5 g/mlMY	0.000	10 g/ml YY ó 10 g/ml MY	0.000
1 g/mlYY ó 0,5 g/mlMY	0.000	1 g/ml YY ó 5 g/ml MY	0.000
1 g/mlYY ó 1 g/mlMY	0.000		

3.6: P

3.2.3 \_\_\_\_\_

, Y  
1 g/ml.  
0,5 g/ml,  
, Y  
10 g/ml

3.3.1 \_\_\_\_\_

ii. \_\_\_\_\_ : \_\_\_\_\_ 96

2.2.3. 263.700 (26,37x10<sup>4</sup>)  
mL. 10.000  
, 40 L 210 L

37 C 5% CO<sub>2</sub>

iii. \_\_\_\_\_ P. halepensis

100 g/ml 200 g/ml. 50 g/ml,  
:

	1	2	3	4	5	6	7	8	9	10	11	12
	50	100	200	50	100	200	50	100	200			
	50	100	200	50	100	200	50	100	200			
<b>C</b>	50	100	200	50	100	200	50	100	200			
<b>D</b>	C	C	C									
<b>E</b>	50	100	200	50	100	200	50	100	200			
<b>F</b>	50	100	200	50	100	200	50	100	200			
<b>G</b>	50	100	200	50	100	200	50	100	200			
<b>H</b>	TD	TD	TD									

3.7: 96

C=

TD= DMSO

iv. \_\_\_\_\_

3.8, (gainadjustment 035).

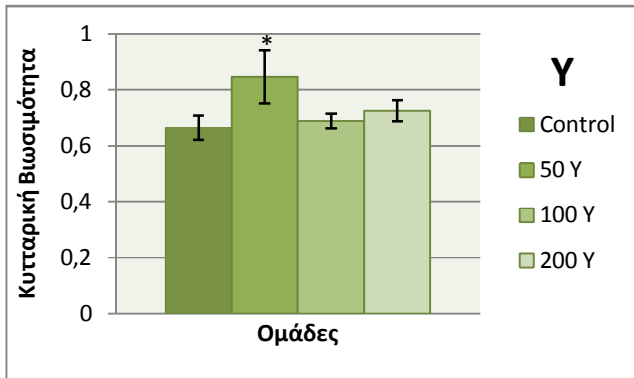
	C	50	100	200	50 B	100 B	200 B
<b>1</b>	0,6256	0,7462	0,6662	0,7299	0,6396	0,4717	0,4599

			0,6829	0,6859	0,5908	0,4915	0,452
			0,7177	0,7602	0,558	0,5389	0,4838
· ·	0,664867	0,846867	0,688933	0,725333	0,596133	0,5007	0,465233
<b>T.A.</b>	0,043297	0,094824	0,026275	0,03736	0,041061	0,034532	0,016557

	50	100	200	50M	100M	200M
<b>1</b>	0,8337	0,8301	0,7774	0,702	0,6563	0,6386
<b>2</b>	0,7526	0,7242	0,7338	0,6676	0,5832	0,5405
<b>3</b>	0,645	0,8799	0,8229	0,6553	0,5767	0,5769
· ·	0,743767	0,8114	0,778033	0,674967	0,6054	0,585333
<b>T.A.</b>	0,09466	0,079517	0,044553	0,024206	0,0442	0,049591

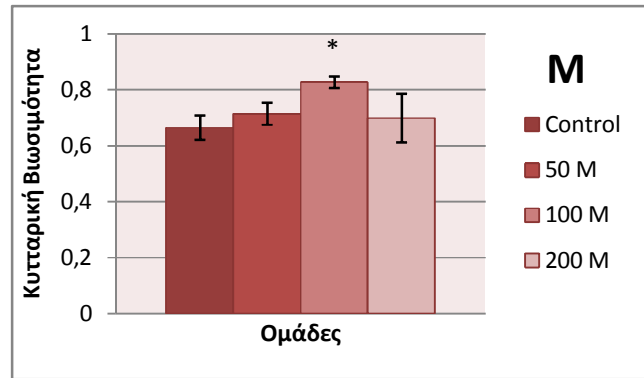
	D	50M	100M	200M	50MB	100MB	200MB
<b>1</b>	0,2654	0,7541	0,8484	0,7931	0,6439	0,5851	0,7492
<b>2</b>	0,2571	0,7141	0,8264	0,6207	0,729	0,6174	0,7739
<b>3</b>	0,2485	0,675	0,8077	0,6842	0,775	0,5899	0,7725
· ·	0,257	0,7144	0,8275	0,699333	0,715967	0,597467	0,7652
<b>T.A.</b>	0,00845	0,039551	0,020372	0,087191	0,066515	0,017429	0,013874

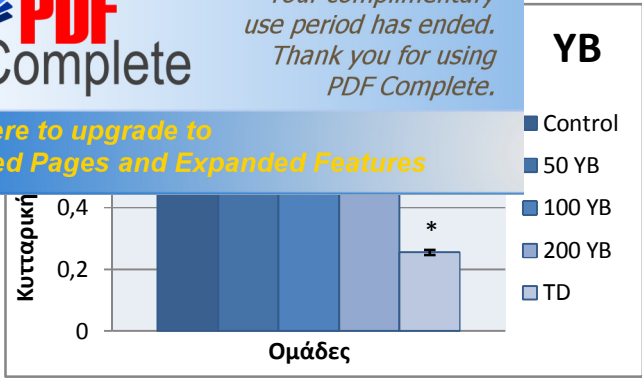
3.8:



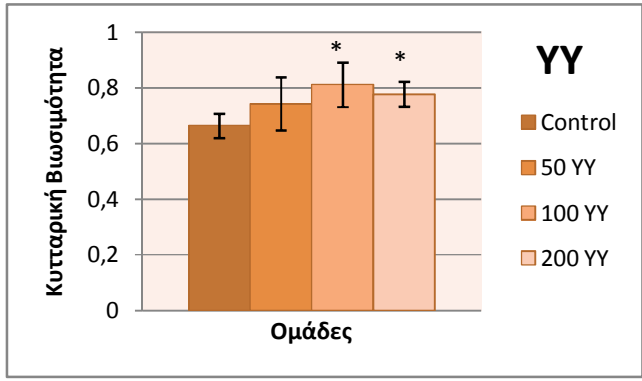
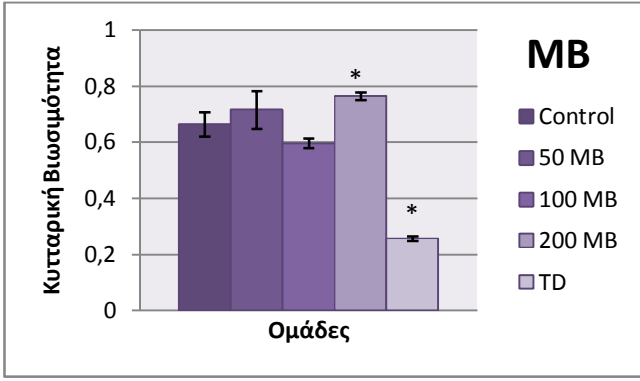
3.9

3.10:

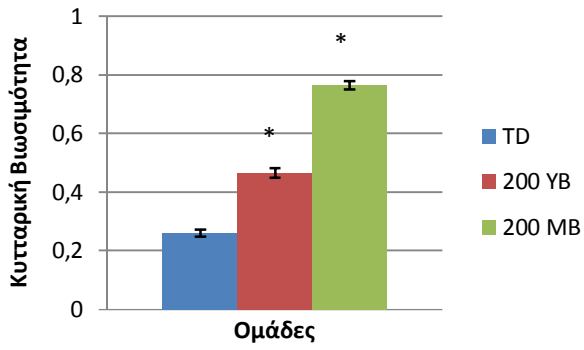
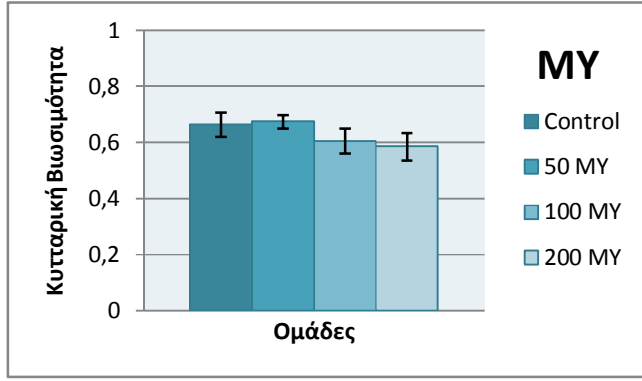




3.11 3.12:



3.13 3.14:



3.15:

DMSO (TD).

3.3.2

P

<0,05

(OneWayAnova, PostHoc: LSD) -



	P		P
	0.001	Có 100 g/ml M	0.000
Có 100 g/ml B	0.001	C ó 200 g/ml MB	0.011
Có 200 g/ml B	0.000	C ó 200 g/ml M	0.038
Có 100 g/ml	0.004	TCó 200 g/ml MB	0.000
Có 200 g/ml	0.020	50 g/ml M - 100 g/ml M	0.005
TCó 200 g/ml B	0.000	50 g/ml M - 100 g/ml MB	0.004
C - TC	0.000	50 g/ml M - 100 g/ml M	0.006
50 g/ml - 100 g/ml	0.002	50 g/ml M - 200 g/ml M	0.002
50 g/ml - 200 g/ml	0.013	100 g/ml M - 200 g/ml M	0.002
50 g/ml - 50 g/ml B	0.000	100 g/ml M - 50 g/ml MB	0.005
50 g/ml - 100 g/ml B	0.000	100 g/ml M - 100 g/ml MB	0.000
50 g/ml - 200 g/ml B	0.000	100 g/ml M - 50 g/ml M	0.000
50 g/ml - 50 g/ml	0.032	100 g/ml M - 100 g/ml M	0.000
100 g/ml - 100 g/ml B	0.000	100 g/ml M - 200 g/ml M	0.000
100 g/ml - 200 g/ml B	0.000	200 g/ml M - 100 g/ml MB	0.010
100 g/ml - 100 g/ml	0.012	200 g/ml M - 100 g/ml M	0.016
200 g/ml - 50 g/ml B	0.009	200 g/ml M - 200 g/ml M	0.005
200 g/ml - 100 g/ml B	0.000	50 g/ml MB - 100 g/ml MB	0.003
200 g/ml - 200 g/ml B	0.000	50 g/ml MB - 100 g/ml M	0.006
50 g/ml B - 100 g/ml B	0.046	50 g/ml MB - 200 g/ml M	0.002
50 g/ml B - 200 g/ml B	0.008	100 g/ml MB - 200 g/ml MB	0.000
50 g/ml B - 50 g/ml	0.003	100 g/ml MB - 50 g/ml M	0.043
50 g/ml B - 100 g/ml	0.000	200 g/ml MB - 50 g/ml M	0.020
50 g/ml B - 200 g/ml	0.001	200 g/ml MB - 100 g/ml M	0.000
100 g/ml B - 50 g/ml	0.000	200 g/ml MB - 200 g/ml M	0.000
100 g/ml B - 100 g/ml	0.000	50 g/ml M - 200 g/ml M	0.021
100 g/ml B - 200 g/ml	0.000	50 g/ml - 50 g/mlM	0.017
200 g/ml B - 50 g/ml	0.000	50 g/ml - 200 g/mlM	0.010
200 g/ml B - 100 g/ml	0.000	100 g/ml - 100 g/mlM	0.014
200 g/ml B - 200 g/ml	0.000	50 g/ml B - 50 g/ml MB	0.002
200 g/ml B - 50 g/mlMB	0.000	50 g/ml B - 200 g/ml MB	0.000
200 g/ml B - 100 g/mlMB	0.001	100 g/ml B - 50 g/ml MB	0.000
200 g/ml B - 200 g/mlMB	0.000	100 g/ml B - 100 g/ml MB	0.007
50 g/ml - 100 g/mlM	0.017	100 g/ml B - 200 g/ml MB	0.000
50 g/ml - 200 g/mlM	0.008	200 g/ml - 100 g/ml M	0.005
100 g/ml - 50 g/mlM	0.018	200 g/ml - 200 g/ml M	0.002
100 g/ml - 100 g/mlM	0.001	100 g/ml - 200 g/ml M	0.001
100 g/ml - 200 g/mlM	0.001		

3.9:

### 3.3.3

100 g/ml

200 g/ml

DMSO

(200 g/ml DMSO, 200 g/ml )

3.15).

### 3.4

invitro

UV

10,18,25,97

( 3.1),

2,6mJ/cm<sup>2</sup>

UVB,  
2,5mJ/cm<sup>2</sup>

1000J/cm<sup>2</sup>,

20,97

halepensis.

P.

0,8

Lambert-Beer.

0,1 g/ml

1 g/ml

( 5 375).

98

P. halepensis( 3.2)

( 3.3).

3.3,

P. halepensis.

P. sibirica.

600 g/ml

800 g/ml,

3.3

200 g/ml.<sup>77</sup>

99

UV

formation),

TNF- ,

(R.O.S.

(IL-1 , IL-6)

( ),

2 (COX-2).<sup>20,99, 100</sup>

# VIVOE

4 :

## 4.1

### 4.1.1

invivo  
SKH-1,

30% ( EL 25 BIO 07).

22 C 25 C

### 4.1.2

Pinushalepensis

invivo

2.2.1.

#### 4.1.2.1

5mg/mL.  
(50:50)

	Eucerin (E)	10g	-
	Y 1%	9,900g	100 L
	Y 3%	9,700g	300 L
	Y 5%	9,500g	500 L
	YY 1%	9,900g	100 L
	YY 3%	9,700g	300 L
	YY 5%	9,500g	500 L
	1%	9,900g	100 L
	3%	9,700g	300 L
	5%	9,500g	500 L
	Y 1%	9,900g	100 L
	Y 3%	9,700g	300 L

9,500g	500 L
--------	-------

4.1.2.2

(YY, Y)  
5mg/mL.  
:DMSO  
(4% CMC  
50:50.  
)

DMSO  
DMSO  
5%.  
1%,

			CMC	DMSO	
1	Gel (G)	9,600g	400mg	-	-
2	Gel DMSO (D)	9,350g	400mg	250 L	-
	Y 1%	9,500 g	400mg	-	100 L
	Y 5%	9,100g	400mg	-	500 L
	Y 1%	9,300g	400mg	200 L	100 L
	Y 5%	9,100g	400mg	-	500 L
	YY 1%	9,500g	400mg	-	100 L
	YY 5%	9,100g	400mg	-	500 L
	1%	9,500g	400mg	-	100 L
	5%	9,100g	400mg	-	500 L
	MB 1%	9,300g	400mg	200 L	100 L
	MB 5%	9,100g	400mg	-	500 L
	Y 1%	9,500g	400mg	-	100 L
	Y 5%	9,100g	400mg	-	500 L

4.2: ø

4.1.2.3

5mg/mL.  
(Y , )  
:DMSO 50:50.  
(50:50)

	Eucerin (E)	10g	-
	1%	9,900g	100 L
	1%	9,900g	100 L
	1%	9,900g	100 L

4.3:

## 4.2

### 4.2.1

SKH-1  
120mJ/cm<sup>2</sup>UVA.  
68820

UV  
(M.E.D.).  
110mJ/cm<sup>2</sup>

UVB  
XenonOriel

18sec

### 4.2.2

40-50mg.

4 C

### 4.2.3

16

2cmx

2cm.

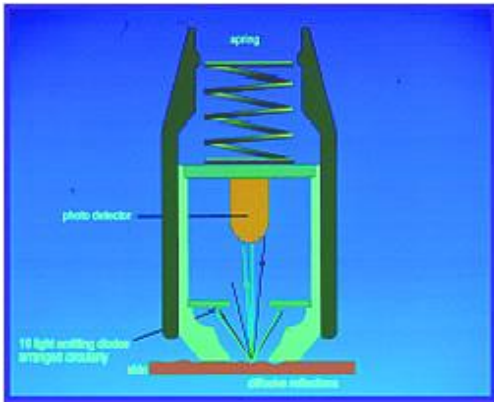
20-60mg.

-25 C.

### 4.2.4

18(Courage ó Khazaka, Germany).

MEXAMETER<sup>®</sup>MX

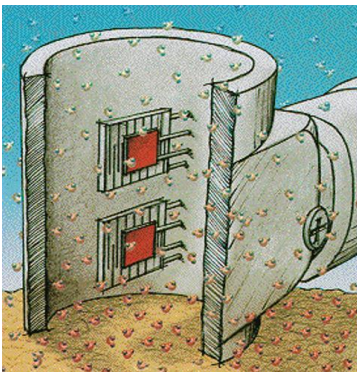


4.1: MEXAMETER<sup>®</sup>MX 18<sup>101</sup>

( 0 )

4.2.5

TEWAMETER<sup>®</sup>TM 240 (Courage- Khazaka, Germany).



g/h/m<sup>2</sup>.

4.2:

TEWAMETER<sup>®</sup>TM 240<sup>102</sup>

( 0)

4.2.6

SWMEDIFAspherical,

NikonD5100  
NikonNikkorAF-SMicro 60 mmf/2.8 GED,  
30 cm

4.2.6

AdobePhotoshopCS6.

4.2.8

- Kontes<sup>®</sup> Dounce tissue grinder, capacity 7mL, 20-56 m (USA)
- Phosphate Buffer Saline, PBS pH 7,4 (Gibco<sup>®</sup>, USA)
- BHT (Sigma<sup>®</sup>, USA)
- (Sigma<sup>®</sup>, USA)
- 

1. -20 C 24
2. 5
3. 600 LPBS 10 L
4. BHT 5%
5. -20 C. 6
6. 5 5.000rpm.
7. -20 C.

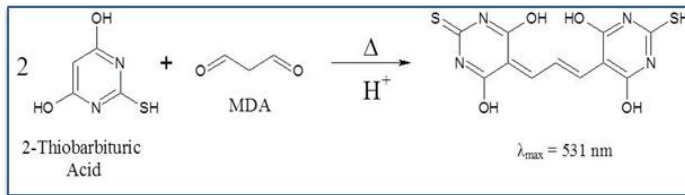
4.2.9 ( BARS)



(malondialdehyde, MDA),

(thiobarbituric acid, TBA). H

(Thiobarbituric Acid Reactive Substances, TBARS)



4.3:

2-

103

- Sodium Dodecyl Sulfate, SDS (Sigma<sup>®</sup>, USA)
- Thiobarbituric Acid, TBA (Sigma<sup>®</sup>, USA)
- MDA 4,18 (Merck<sup>®</sup>)
- Phosphate Buffer Saline, PBS pH 7,4 (Gibco<sup>®</sup>, USA)

Shimadzu Spectrophotometer UV-120-02, Japan

MDA,

MDA

	100 L	MDA	9,9mLPBS
1	100 L	1	9,9mLPBS
2	100 L	2	9,9mLPBS
3	500 L	3	
	500 L	3	500 LPBS
C	100 L	3	900 LPBS
D	100 L	2	900 LPBS

70 L	2	930 LPBS
50 L	3	950 LPBS
500 LPBS		

4.4:

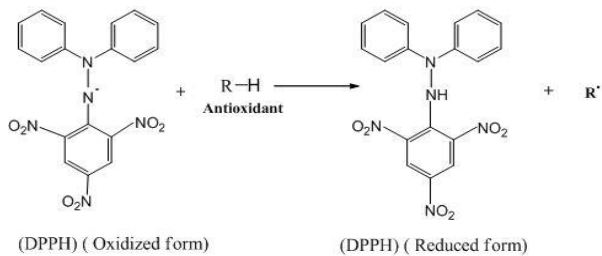
,B, C, D,E, F

1. 125 l ( 4.2.8)  
125 ISDS 10%
2. 10  
37 C.
3. 312 l 5,2mg/ml 10%
4. 90 C 60
- 5.

400-600nm. 532nm  
574nm.

4.2.10 (TAC)

(TAC)



4.4:

104

TAC  
DPPH (1,1-diphenyl-2-picrylhydrazyl).

(DPPH•)  
(1,1-diphenyl-2-picrylhydrazine)

520 nm.

PBS pH 7,4 (Gibco<sup>®</sup>, USA)

- DPPH
- (Sigma<sup>®</sup>, USA)
- 10mM

:

0,02gDPPH 5mL  
100  
10mM.

500 IPBS 500 IDPPH 0,1mM.  
500 IPBS, 495 IDPPH 0,1mM 5 l 10mM.

500 IPBS, 480 IDPPH 0,1mM 20 l  
( 4.2.8).

60

3 13.000rpm

520nm.

:

i) % Abs =  $\frac{(Abs_{\text{sample}} - Abs_{\text{blank}})}{Abs_{\text{standard}}} \times 100$

ii) mol DPPH / mL =  $[(\% Abs / 100) \times 50] / 1000$

) 100

) 50 DPPH

50 mol/L

) 50

50- (1000 L / 20 L

= 50).

) 1000 L mL

#### 4.2.11

Shapiroó Wilk,

IBMSPSSStatisticsViewer.  
0,05.

4.3

invivo

- 

- 

4.3.2

4.3.2.1

3

2.1.2.1.

(C)
Eucerin (E)
1%
3%
5%
1%
3%
5%
1%
3%
5%
1%
3%
5%

4.5:

7

( 0),

7

16

0	1	2	3	4	5

6	7	8	9	10	11

12	13	14	15	6

4.6:

3

2.1.2.2.

:

(C)
Gel (G)
Gel DMSO (D)
1%
5%
1%
5%
1%
5%
1%
5%
MB 1%
MB 5%
1%
5%

4.7:

,

7

( 0),

7

,

,

,

, 16

0	1	2	3	4	5

		<b>8</b>	<b>9</b>	<b>10</b>	<b>11</b>

<b>12</b>	<b>13</b>	<b>14</b>	<b>15</b>	<b>6</b>

4.8:

4.3.2.3

7

2.1.2.3.

:

(C)
Eucerin (E)
1%
1%
1%

4.9:

,

7

( 0),

7

, 16

,

2.2.3.

0	1	2	3	4	5

6	7	8	9	10	11

12	13	14	15	6

4.10:



## 5.1

### 5.1.1

( . . )  
0 ( . = . . / . . 0  
\*100).

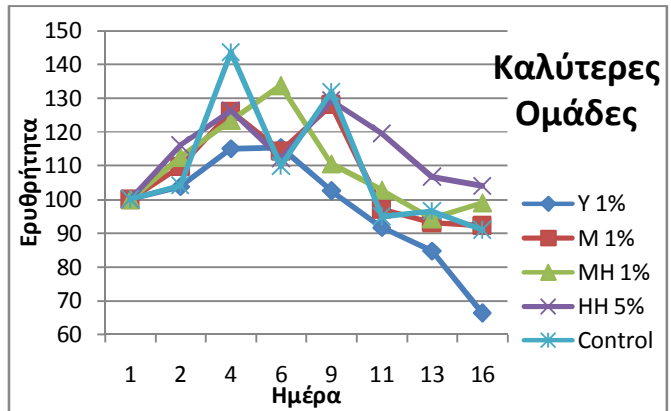
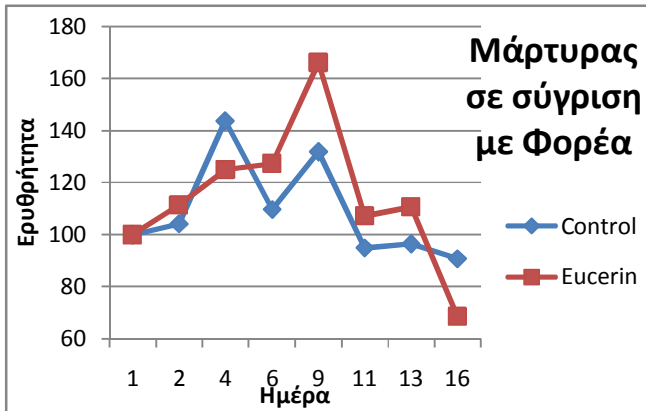
		0	2	4	6	9	11	13	16
C	1	244	285	374	360	543	258	319	270
	2	236	226	337	227	213	243	200	226
	3	301	303	411	271	274	241	235	214
	M.O.	<b>260,3333</b>	<b>271,3333</b>	<b>374</b>	<b>286</b>	<b>343,3333</b>	<b>247,3333</b>	<b>251,3333</b>	<b>236,6667</b>
	.	100	104,2254	143,662	109,8592	131,8822	95,0064	96,54289	90,90909
	1	231	259	321	371	267	254	250	24
	2	270	291	328	291	553	240	260	255
	3	277	317	324	329	473	340	352	255
	M.O.	<b>259,3333</b>	<b>289</b>	<b>324,3333</b>	<b>330,3333</b>	<b>431</b>	<b>278</b>	<b>287,3333</b>	<b>178</b>
	.	100	111,4396	125,0643	127,3779	166,1954	107,1979	110,7969	68,63753
1%	1	314	291	303	379	309	250	241	57
	2	270	328	340	360	307	300	260	256
	3	288	287	360	268	278	250	238	266
	M.O.	<b>290,6667</b>	<b>302</b>	<b>334,3333</b>	<b>335,6667</b>	<b>298</b>	<b>266,6667</b>	<b>246,3333</b>	<b>193</b>
	.	100	103,8991	115,0229	115,4817	102,5229	91,74312	84,74771	66,39908
3%	1	289	296	370	316	568	330	270	247
	2	330	317	361	388	325	263	278	284
	3	239	294	330	240	270	247	268	273
	M.O.	<b>286</b>	<b>302,3333</b>	<b>353,6667</b>	<b>314,6667</b>	<b>387,6667</b>	<b>280</b>	<b>272</b>	<b>268</b>
	.	100	105,711	123,6597	110,0233	135,5478	97,9021	95,1049	93,70629
5%	1	274	279	309	358	340	283	253	253
	2	258	272	365	368	290	280	283	273
	3	261	259	400	400	373	305	262	286
	M.O.	<b>264,3333</b>	<b>270</b>	<b>358</b>	<b>375,3333</b>	<b>334,3333</b>	<b>289,3333</b>	<b>266</b>	<b>270,6667</b>
	.	100	102,1438	135,4351	141,9924	126,4817	109,4578	100,6305	102,396

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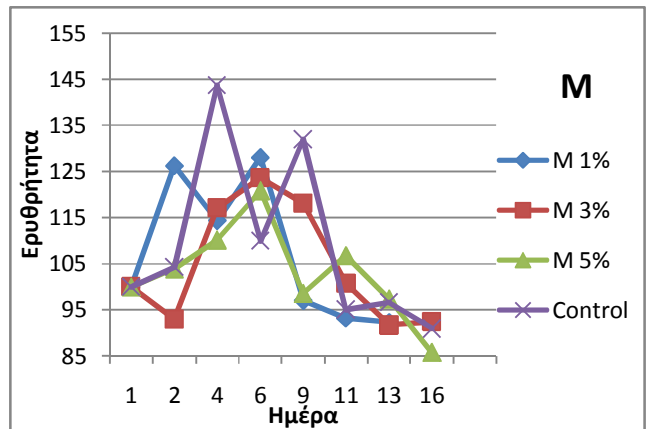
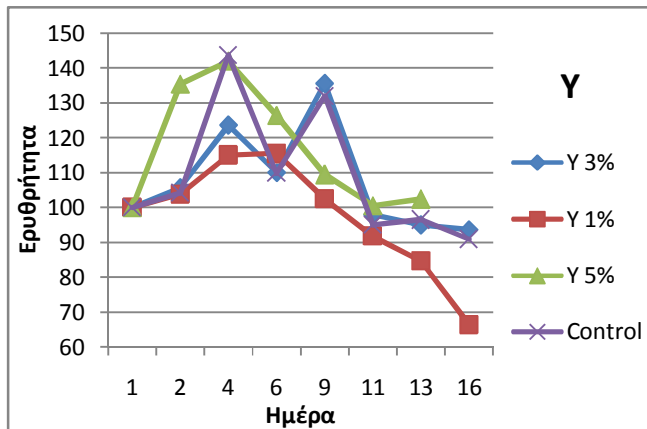
		52	352	278	255	261	226	255	
		34	411	348	470	290	256	263	
	5	247	289	261	230	247	269	246	
	<b>M.O.</b>	<b>270</b>	<b>275</b>	<b>341,3333</b>	<b>285,3333</b>	<b>324</b>	<b>273,3333</b>	<b>247,3333</b>	<b>254,6667</b>
		100	101,8519	126,4198	105,679	120	101,2346	91,60494	94,32099
3%	1	279	291	366	283	226	260	237	225
	2	275	288	359	384	274	310	273	277
	3	274	244	341	321	251	270	259	247
	<b>M.O.</b>	<b>276</b>	<b>274,3333</b>	<b>355,3333</b>	<b>329,3333</b>	<b>250,3333</b>	<b>280</b>	<b>256,3333</b>	<b>249,6667</b>
		100	291	128,744	119,3237	90,70048	101,4493	92,8744	90,45894
5%	1	265	273	312	302	367	324	256	232
	2	254	283	317	278	324	276	252	270
	3	238	323	327	270	288	305	300	286
	<b>M.O.</b>	<b>252,3333</b>	<b>293</b>	<b>318,6667</b>	<b>283,3333</b>	<b>326,3333</b>	<b>301,6667</b>	<b>269,3333</b>	<b>262,6667</b>
		100	116,1162	126,288	112,2853	129,3263	119,5509	106,7371	104,0951
1%	1	245	258	357	355	470	255	233	239
	2	259	303	362	283	275	245	270	253
	3	299	320	294	280	283	279	245	249
	<b>M.O.</b>	<b>267,6667</b>	<b>293,6667</b>	<b>337,6667</b>	<b>306</b>	<b>342,6667</b>	<b>259,6667</b>	<b>249,3333</b>	<b>247</b>
		100	109,7136	126,1519	114,3213	128,0199	97,01121	93,15068	92,27895
3%	1	270	240	305	287	456	233	252	215
	2	260	244	314	388	222	274	253	252
	3	251	242	295	290	244	280	211	255
	<b>M.O.</b>	<b>260,3333</b>	<b>242</b>	<b>304,6667</b>	<b>321,6667</b>	<b>307,3333</b>	<b>262,3333</b>	<b>238,6667</b>	<b>240,6667</b>
		100	92,95775	117,0294	123,5595	118,0538	100,7682	91,67734	92,44558
5%	1	230	261	250	274	243	235	230	204
	2	265	285	319	270	274	290	310	242
	3	276	255	280	387	243	298	211	215
	<b>M.O.</b>	<b>257</b>	<b>267</b>	<b>283</b>	<b>310,3333</b>	<b>253,3333</b>	<b>274,3333</b>	<b>250,3333</b>	<b>220,3333</b>
		100	103,8911	110,1167	120,7523	98,57328	106,7445	97,40597	85,73281
1%	1	305	328	340	351	280	274	270	279
	2	255	278	302	401	338	300	277	265
	3	264	322	375	350	293	273	230	272
	<b>M.O.</b>	<b>274,6667</b>	<b>309,3333</b>	<b>339</b>	<b>367,3333</b>	<b>303,6667</b>	<b>282,3333</b>	<b>259</b>	<b>272</b>
		100	112,6214	123,4223	133,7379	110,5583	102,7913	94,29612	99,02913
3%	1	248	294	265	340	304	270	251	262
	2	247	269	317	309	249	250	252	208

		100	113,4986	121,7631	143,1129	111,2948	109,2287	103,4435	94,6281
5%	1	264	262	355	260	252	232	222	239
	2	262	311	298	412	340	420	248	271
	3	252	327	376	339	465	300	262	263
	M.O.	259,3333	300	343	337	352,3333	317,3333	244	257,6667
		100	115,6812	132,2622	129,9486	135,8612	122,365	94,0874	99,35733

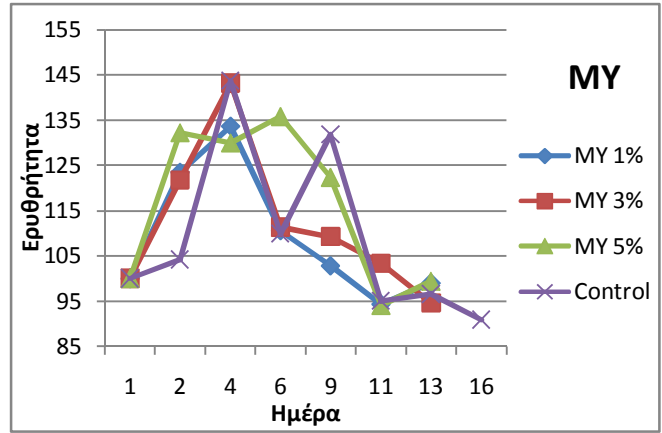
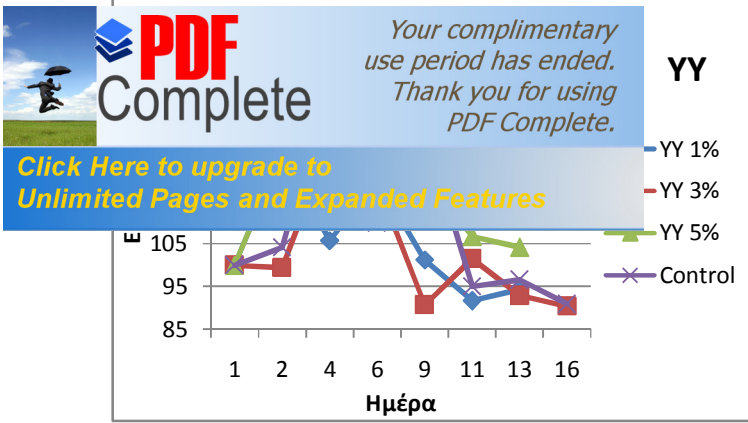
5.1:



5.1 5.2:



5.3 5.4:



5.1.2

( . . )  
 0 ( . = . . / . . 0  
 \*100).

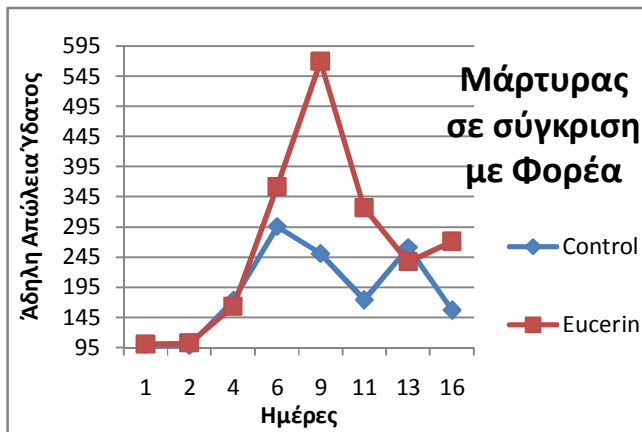
		0	2	4	6	9	11	13	16
<b>C</b>	1	12,4	12	29,7	38,5	40,6	34,4	63,5	22,2
	2	9,8	9,8	13,1	24,8	19,4	11,9	11,6	15,1
	3	13,1	12,8	18	40,9	27,9	14,8	16,8	17,8
	<b>M.O.</b>	<b>11,76667</b>	<b>11,53333</b>	<b>20,26667</b>	<b>34,73333</b>	<b>29,3</b>	<b>20,36667</b>	<b>30,63333</b>	<b>18,36667</b>
		100	97,96	172,22	295,07	250,43	173,07	260,24	156,07
	1	12,4	12,1	17,5	38,9	17,7	14,5	16	18,3
	2	9,5	11,8	17,5	52,3	84,5	31,2	18,1	18,2
	3	9,2	7,7	15,6	21,3	74,8	55,8	39,4	47,7
	<b>M.O.</b>	<b>10,36667</b>	<b>10,53333</b>	<b>16,86667</b>	<b>37,5</b>	<b>59</b>	<b>33,83333</b>	<b>24,5</b>	<b>28,06667</b>
		100	101,54	162,68	361,62	568,95	326,23	236,26	270,68
<b>1%</b>	1	15,1	13	24,4	36,8	26,3	13,3	16,2	16,5
	2	10,8	11,2	28,9	31,3	24,9	16,6	20,2	10,2
	3	12,6	10,4	16,4	28,3	19	14,9	19,5	17,5
	<b>M.O.</b>	<b>12,83333</b>	<b>11,53333</b>	<b>23,23333</b>	<b>32,13333</b>	<b>23,4</b>	<b>14,93333</b>	<b>18,63333</b>	<b>14,73333</b>
		100	89,87	181,06	250,42	182,39	116,38	145,21	114,81
<b>3%</b>	1	11	19,4	40,1	51,9	58	42,7	48,9	24,2
	2	11,4	13,7	37,4	24,2	51	14,9	16,5	20,6
	3	11,8	20,2	17,7	30,8	25,1	19,6	21	16,5
	<b>M.O.</b>	<b>11,4</b>	<b>17,76667</b>	<b>31,73333</b>	<b>35,63333</b>	<b>44,7</b>	<b>25,73333</b>	<b>28,8</b>	<b>20,43333</b>
		100	155,88	278,33	312,54	392,11	225,7	252,63	179,21
<b>5%</b>	1	10,6	12,7	20,4	51,5	39,5	20,9	21,5	17,8
	2	7,5	13,9	22,9	38,8	38,5	18,8	19,9	20,2

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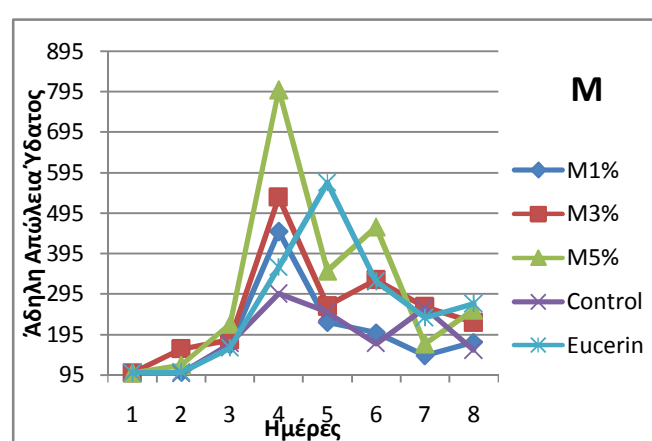
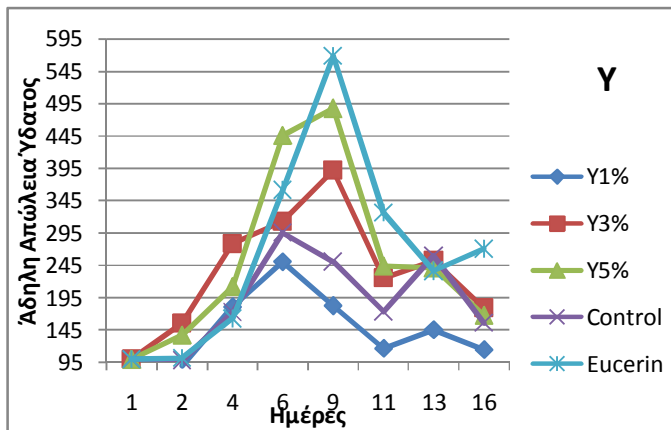
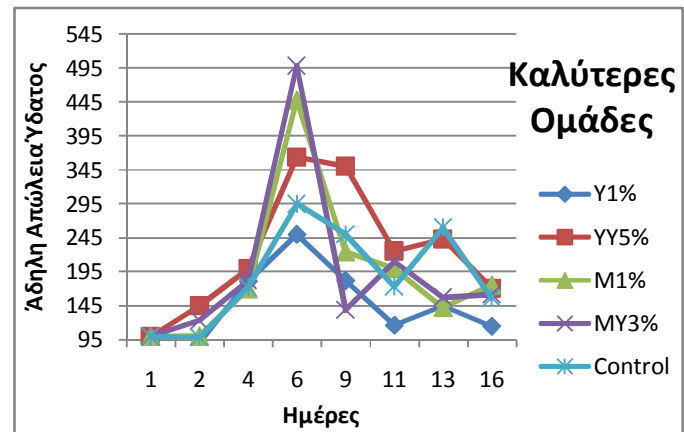
				20,8	44,5	69,2	34,1	31,4	12,8
				<b>21,36667</b>	<b>44,93333</b>	<b>49,06667</b>	<b>24,6</b>	<b>24,26667</b>	<b>16,93333</b>
		100	137,34	212,21	446,18	487,29	244,29	241,01	168,12
1%	1	11,7	17,9	18	57,9	31,3	15,6	15,9	10,6
	2	8,3	9,3	56,4	85,1	54,4	41	27	18,9
	3	9,4	11,3	27,7	21,9	45,8	21,8	14,8	17,6
	M.O.	<b>9,8</b>	<b>12,83333</b>	<b>34,03333</b>	<b>54,96667</b>	<b>43,83333</b>	<b>26,13333</b>	<b>19,23333</b>	<b>15,7</b>
		100	130,92	347,24	560,92	447,24	266,63	196,22	160,2
3%	1	8,8	10,3	17	35,8	17,5	13	16,1	10,2
	2	13,5	14,8	41,4	66,3	75,2	59,7	38	16,5
	3	10,1	11,8	14,9	51,2	16,1	29,5	14,4	15,2
	M.O.	<b>10,8</b>	<b>12,3</b>	<b>24,43333</b>	<b>51,1</b>	<b>36,26667</b>	<b>34,06667</b>	<b>22,83333</b>	<b>13,96667</b>
		100	113,89	226,2	473,15	335,83	315,46	211,39	129,35
5%	1	5,9	12,1	23,8	39,7	50,7	23,5	35,2	20,7
	2	11,5	13,6	12,6	40,8	40	29,2	20,2	19,2
	3	14,6	20,7	27,6	36	21,5	19,6	22,5	14,6
	M.O.	<b>10,66667</b>	<b>15,46667</b>	<b>21,33333</b>	<b>38,83333</b>	<b>37,4</b>	<b>24,1</b>	<b>25,96667</b>	<b>18,16667</b>
		100	144,99	199,9	363,91	350,52	225,87	243,39	170,29
1%	1	6,8	7,2	13,6	20,7	12	10,3	11,7	11,7
	2	6,6	7,3	16,1	52,9	26	20,3	11,5	19
	3	12,8	11,9	14,8	43,8	20,8	21,7	14,1	15,4
	M.O.	<b>8,733333</b>	<b>8,8</b>	<b>14,83333</b>	<b>39,13333</b>	<b>19,6</b>	<b>17,43333</b>	<b>12,43333</b>	<b>15,36667</b>
		100	100,8	169,87	448,22	224,51	199,66	142,38	176,06
3%	1	7,4	10,1	10,3	38,8	24,4	16,6	19,8	15
	2	7,8	15,3	12,6	48,3	16,6	44,4	23,9	21,2
	3	8,8	12,9	20,5	41,1	22,7	18,3	19,5	17,7
	M.O.	<b>8</b>	<b>12,76667</b>	<b>14,46667</b>	<b>42,73333</b>	<b>21,23333</b>	<b>26,43333</b>	<b>21,06667</b>	<b>17,96667</b>
		100	159,63	180,88	534,13	265,38	330,38	263,38	224,63
5%	1	7,2	11,6	12,2	39,2	19,2	18,8	14,1	17,4
	2	6,6	7,4	12,5	62	14,3	52,4	7,4	19,9
	3	7,1	6	21,4	66	40,1	25,2	14,4	16
	M.O.	<b>6,966667</b>	<b>8,333333</b>	<b>15,36667</b>	<b>55,73333</b>	<b>24,53333</b>	<b>32,13333</b>	<b>11,96667</b>	<b>17,76667</b>
		100	119,5	220,51	799,57	351,94	460,98	171,74	254,95
1%	1	7,5	11,4	16,2	72,6	35,8	17,3	23,6	11
	2	9,1	15,9	23,8	31,2	63,4	57,2	29,3	21,9
	3	5,4	9,7	17,4	57,8	23,1	37,9	23,6	17,1
	M.O.	<b>7,333333</b>	<b>12,33333</b>	<b>19,13333</b>	<b>53,86667</b>	<b>40,76667</b>	<b>37,46667</b>	<b>25,5</b>	<b>16,66667</b>

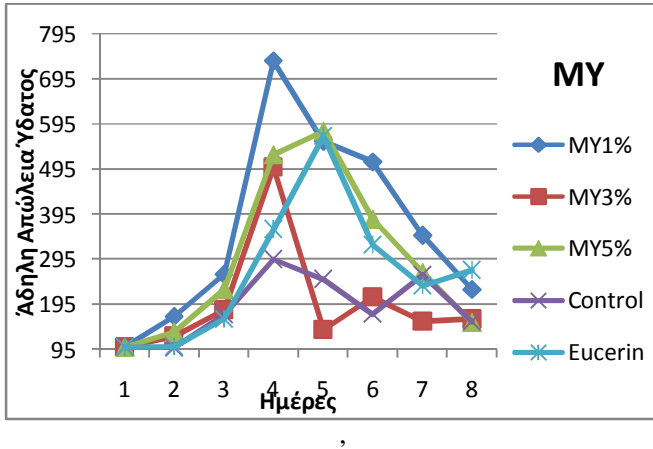
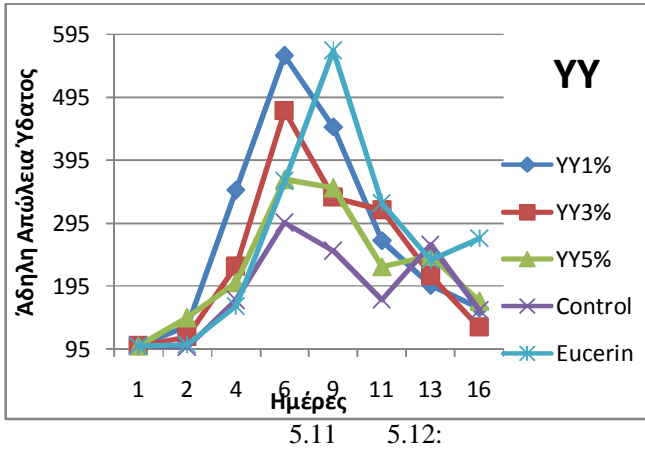
				260,98	734,92	556,21	511,19	347,89	227,42
	2	9,9	9,3	25,2	53	12,3	27,1	18,5	13,3
	3	7,6	12,3	10,4	34,7	11,5	11,7	12,6	15,1
	M.O.	8,633333	10,63333	15,73333	43,03333	12	18,16667	13,56667	13,96667
		100	123,17	182,27	498,61	139,05	210,54	157,24	161,88
5%	1	8,2	13,7	13,2	21,6	17,9	17,8	18,5	13,9
	2	9,9	12,7	19,7	56,1	49,7	46	34,5	12,8
	3	9,8	10,6	30,6	69,2	93,9	43,3	20,9	16,5
	M.O.	9,3	12,33333	21,16667	48,96667	53,83333	35,7	24,63333	14,4
		100	132,58	227,63	526,56	578,82	383,87	264,84	154,84

5.2:



5.7 5.8:



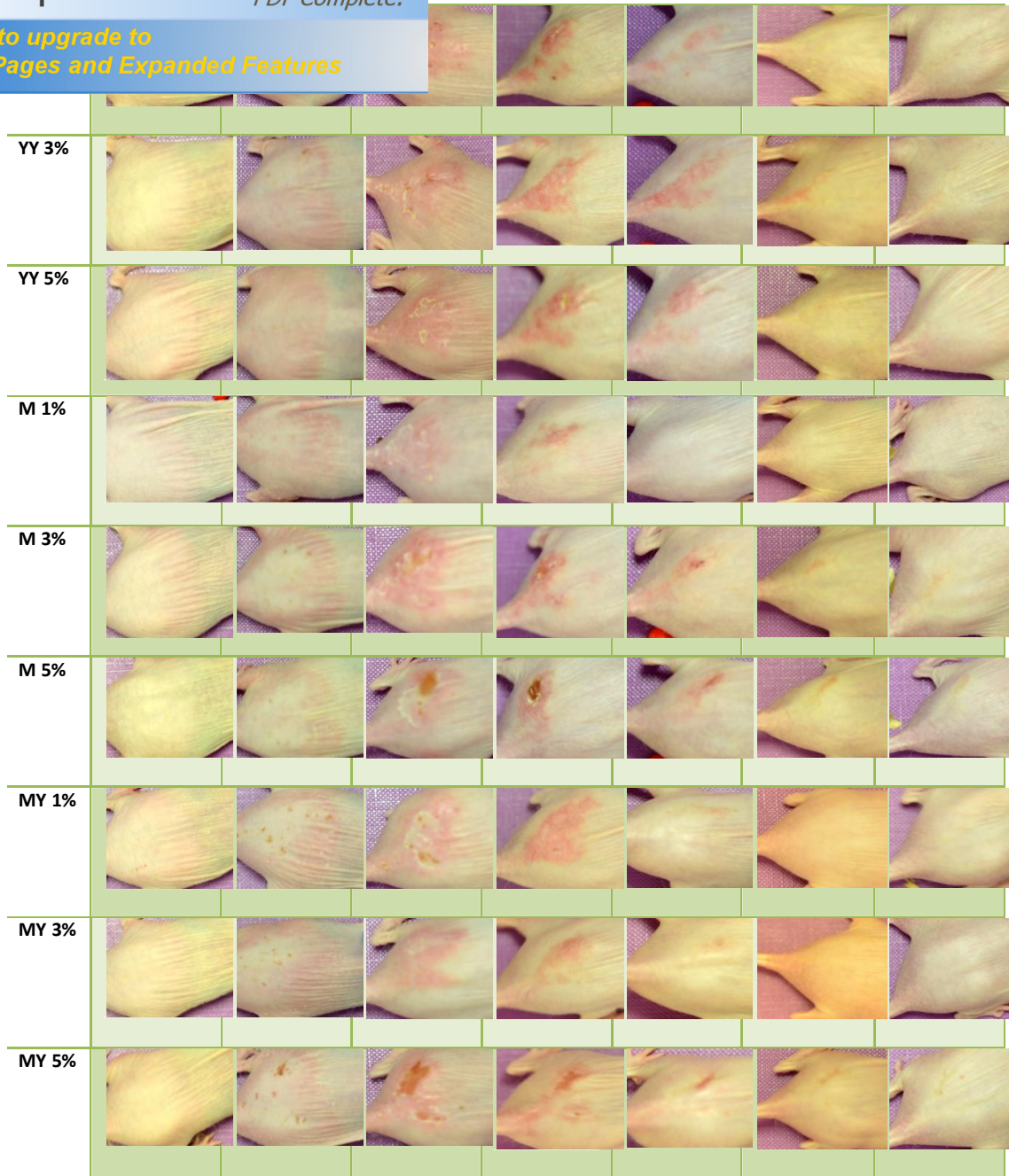


5.1.3

3

	ΗΜΕΡΕΣ						
ΟΜΑΔ ΕΣ	2	4	6	9	11	13	16
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Y 1%							
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5.3:

5.1.4





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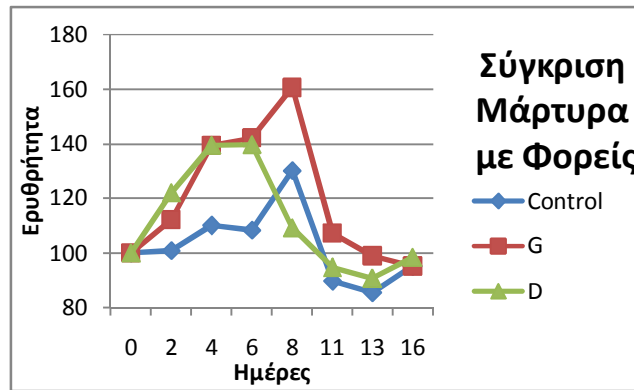
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		0	2	4	6	8	11	13	16
<b>C</b>	1	290	290	342	302	229	255	258	264
	2	287	270	286	286	549	250	227	276
	3	280	304	315	340	338	264	247	276
	<b>M.O.</b>	<b>285,6667</b>	<b>288</b>	<b>314,3333</b>	<b>309,3333</b>	<b>372</b>	<b>256,3333</b>	<b>244</b>	<b>272</b>
		100	100,8	110,03	108,28	130,2217	89,73162	85,41424	95,21587
<b>G</b>	1	276	285	334	456	400	267	241	224
	2	240	299	332	352	259	268	249	240
	3	250	275	402	280	570	287	268	265
	<b>M.O.</b>	<b>255,3333</b>	<b>286,3333</b>	<b>356</b>	<b>362,6667</b>	<b>409,6667</b>	<b>274</b>	<b>252,6667</b>	<b>243</b>
		100	112,14	139,42	142,04	160,4439	107,3107	98,95561	95,16971
<b>D</b>	1	290	387	324	385	302	259	251	272
	2	242	284	420	362	300	249	237	258
	3	268	305	371	370	272	249	238	258
	<b>M.O.</b>	<b>266,6667</b>	<b>325,3333</b>	<b>371,6667</b>	<b>372,3333</b>	<b>291,3333</b>	<b>252,3333</b>	<b>242</b>	<b>262,6667</b>
		100	122	139,37	139,62	109,25	94,625	90,75	98,5
<b>1%</b>	1	268	285	360	304	380	237	225	222
	2	256	279	311	340	492	293	252	258
	3	283	274	280	299	329	288	279	273
	<b>M.O.</b>	<b>269</b>	<b>279,3333</b>	<b>317</b>	<b>314,3333</b>	<b>400,3333</b>	<b>272,6667</b>	<b>252</b>	<b>251</b>
		100	103,84	117,8	116,85	148,8228	101,3631	93,6803	93,30855
<b>5%</b>	1	278	289	306	287	450	294	220	260
	2	214	260	393	322	271	247	212	218
	3	281	260	376	363	394	273	276	253
	<b>M.O.</b>	<b>257,6667</b>	<b>269,6667</b>	<b>358,3333</b>	<b>324</b>	<b>371,6667</b>	<b>271,3333</b>	<b>236</b>	<b>243,6667</b>
		100	104,66	139,06	125,74	144,2432	105,304	91,5912	94,56662
<b>B 1%</b>	1	266	310	325	313	268	275	232	266
	2	272	302	405	390	358	255	268	304
	3	245	273	295	305	328	232	252	249
	<b>M.O.</b>	<b>261</b>	<b>295</b>	<b>341,6667</b>	<b>336</b>	<b>318</b>	<b>254</b>	<b>250,6667</b>	<b>273</b>

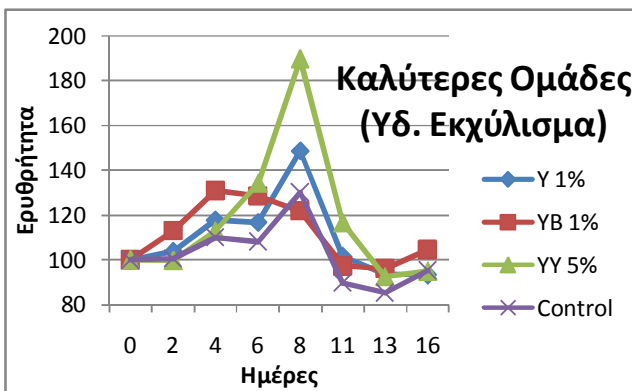
				130,91	128,74	121,8391	97,31801	96,04087	104,5977
				333	287	387	272	278	285
	2	289	360	362	380	329	288	281	273
	3	300	324	354	387	442	236	263	244
	<b>M.O.</b>	<b>279,6667</b>	<b>329,6667</b>	<b>349,6667</b>	<b>351,3333</b>	<b>386</b>	<b>265,3333</b>	<b>274</b>	<b>267,3333</b>
		100	117,88	125,03	125,62	138,0215	94,87485	97,97378	95,58999
<b>1%</b>	1	258	277	323	460	465	222	238	250
	2	256	270	330	460	480	279	273	253
	3	250	319	332	421	446	264	263	246
	<b>M.O.</b>	<b>254,6667</b>	<b>288,6667</b>	<b>328,3333</b>	<b>447</b>	<b>463,6667</b>	<b>255</b>	<b>258</b>	<b>249,6667</b>
		100	113,35	128,92	175,52	182,0681	100,1309	101,3089	98,03665
<b>5%</b>	1	288	299	335	308	395	250	266	266
	2	290	282	340	385	620	280	261	286
	3	270	266	283	446	595	459	259	253
	<b>M.O.</b>	<b>282,6667</b>	<b>282,3333</b>	<b>319,3333</b>	<b>379,6667</b>	<b>536,6667</b>	<b>329,6667</b>	<b>262</b>	<b>268,3333</b>
		100	99,88	112,97	134,31	189,8585	116,6274	92,68868	94,92925
<b>1%</b>	1	295	280	323	367	321	273	255	218
	2	205	254	365	527	578	263	225	214
	3	226	283	284	284	278	244	252	241
	<b>M.O.</b>	<b>242</b>	<b>272,3333</b>	<b>324</b>	<b>392,6667</b>	<b>392,3333</b>	<b>260</b>	<b>244</b>	<b>224,3333</b>
		100	112,53	133,8	162,26	162,1212	107,438	100,8264	92,69972
<b>5%</b>	1	250	247	290	295	308	268	252	251
	2	247	310	292	370	248	250	232	271
	3	249	266	302	369	252	268	246	269
	<b>M.O.</b>	<b>248,6667</b>	<b>274,3333</b>	<b>294,6667</b>	<b>344,6667</b>	<b>269,3333</b>	<b>262</b>	<b>243,3333</b>	<b>263,6667</b>
		100	110,32	118,5	138,61	108,311	105,3619	97,85523	106,0322
<b>B 1%</b>	1	269	285	274	384	496	340	259	257
	2	262	279	340	338	523	257	250	260
	3	242	255	329	390	355	274	259	280
	<b>M.O.</b>	<b>257,6667</b>	<b>273</b>	<b>314,3333</b>	<b>370,6667</b>	<b>458</b>	<b>290,3333</b>	<b>256</b>	<b>265,6667</b>
		100	105,95	122	143,85	177,749	112,6779	99,35317	103,1048
<b>B5%</b>	1	241	278	332	387	455	265	277	250
	2	260	268	316	445	414	251	267	252
	3	220	304	321	268	490	300	253	279
	<b>M.O.</b>	<b>240,3333</b>	<b>283,3333</b>	<b>323</b>	<b>366,6667</b>	<b>453</b>	<b>272</b>	<b>265,6667</b>	<b>260,3333</b>
		100	117,89	134,4	152,57	188,4882	113,1761	110,5409	108,3218
<b>1%</b>	1	276	300	336	290	396	254	259	269

		343	460	624	263	255	259		
		265	406	280	228	263	251		
	<b>M.O.</b>	<b>261,3333</b>	<b>276</b>	<b>314,6667</b>	<b>385,3333</b>	<b>433,3333</b>	<b>248,3333</b>	<b>259</b>	<b>259,6667</b>
		100	105,61	120,41	147,45	165,8163	95,02551	99,10714	99,36224
<b>M 5%</b>	1	241	279	300	372	430	271	244	278
	2	279	285	280	341	476	289	285	258
	3	250	274	323	455	628	272	238	240
	<b>M.O.</b>	<b>256,6667</b>	<b>279,3333</b>	<b>301</b>	<b>389,3333</b>	<b>511,3333</b>	<b>277,3333</b>	<b>255,6667</b>	<b>258,6667</b>
		100	108,83	117,27	151,68	199,2208	108,0519	99,61039	100,7792

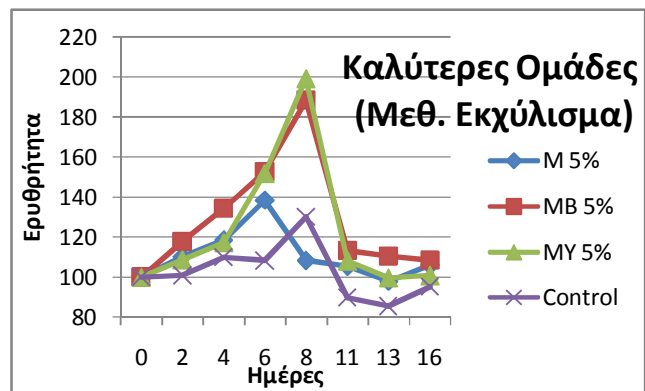
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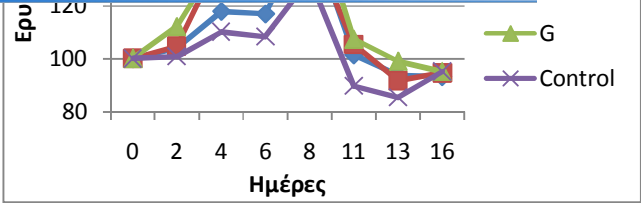


5.14 5.15:

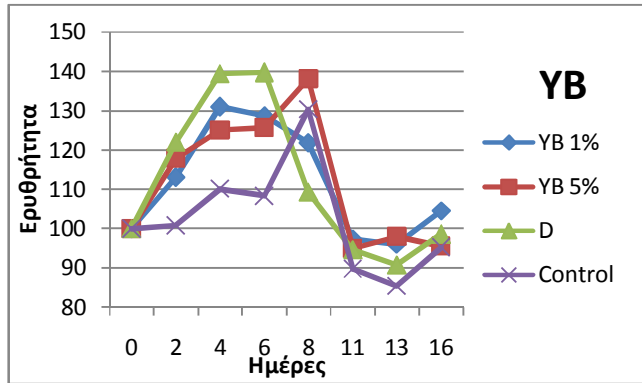
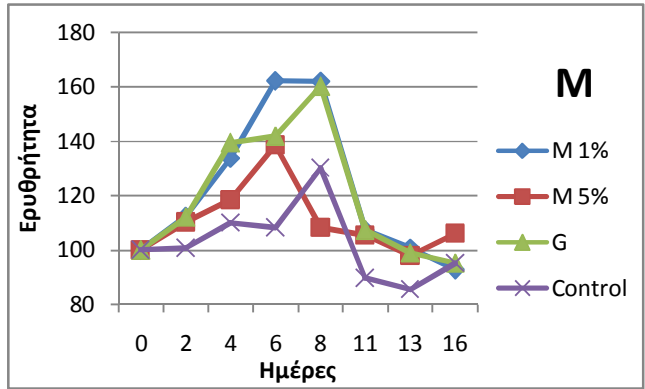


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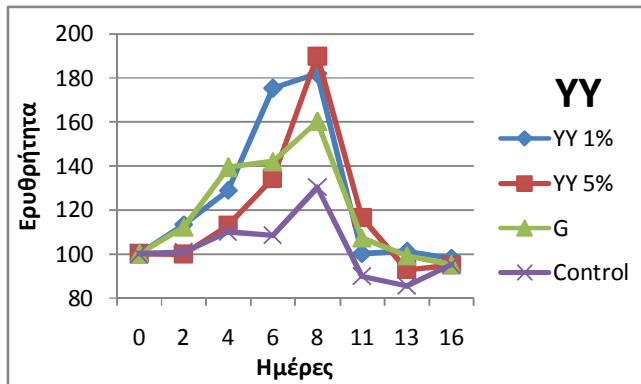
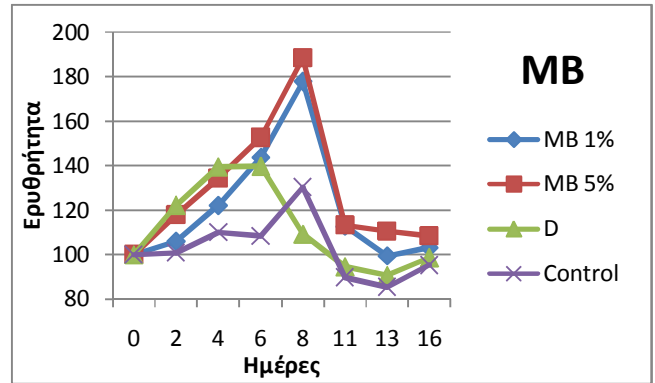
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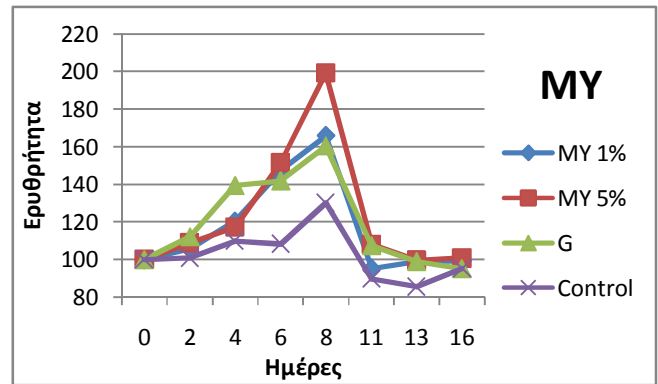
5.16 5.17:



5.18 5.19:



5.20 5.21:



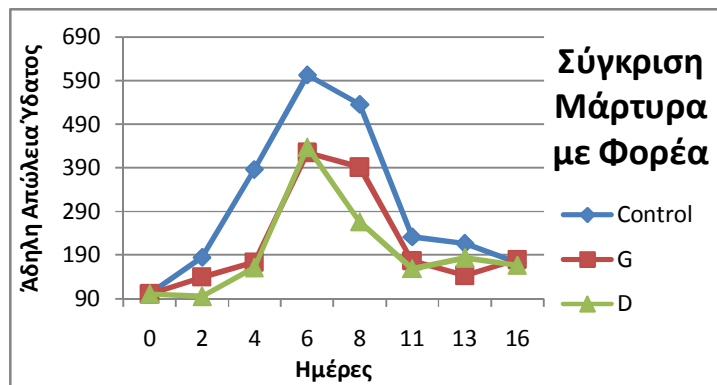
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		0	2	4	6	8	11	13	16
<b>C</b>	1	6,8	15	37,2	27,5	22,1	19,5	16,6	12,5
	2	6,3	9,5	23,2	50,2	39,8	12,8	13,2	16,1
	3	6,8	12,3	16,5	42,3	44,5	13,8	13,4	5,8
	<b>M.O.</b>	<b>6,633333</b>	<b>12,26667</b>	<b>25,63333</b>	<b>40</b>	<b>35,46667</b>	<b>15,36667</b>	<b>14,4</b>	<b>11,46667</b>
		100	185,07	386,58	603,32	534,99	231,83	217,19	173
<b>G</b>	1	8,2	11,3	16,6	36,9	27,4	13	12,8	12,2
	2	8,4	9,8	12,7	36,1	25,9	15,7	8,8	15,2
	3	8,8	14,2	14,8	35	46,1	16,2	14,7	18,1
	<b>M.O.</b>	<b>8,466667</b>	<b>11,76667</b>	<b>14,7</b>	<b>36</b>	<b>33,13333</b>	<b>14,96667</b>	<b>12,1</b>	<b>15,16667</b>
		100	138,96	173,55	425,03	391,15	176,74	142,86	179,1
<b>D</b>	1	10,8	6,3	14,2	37,8	22,8	16,8	15,3	13,1
	2	8,9	7,8	11	31,3	22,2	10,8	19,7	12,9
	3	7,5	11,6	18,7	50	27,5	15,7	14,9	19,5
	<b>M.O.</b>	<b>9,066667</b>	<b>8,566667</b>	<b>14,63333</b>	<b>39,7</b>	<b>24,16667</b>	<b>14,43333</b>	<b>16,63333</b>	<b>15,16667</b>
		100	94,49	161,3	437,71	266,48	159,1	183,35	167,25
<b>1%</b>	1	7,5	15,6	24,6	38,5	42,8	33,5	15,3	15,6
	2	10,3	12,8	13,7	57,4	39,5	17,1	21	17,1
	3	8,7	17,9	23,1	40,7	39,6	25,7	22,9	15,6
	<b>M.O.</b>	<b>8,833333</b>	<b>15,43333</b>	<b>20,46667</b>	<b>45,53333</b>	<b>40,63333</b>	<b>25,43333</b>	<b>19,73333</b>	<b>16,1</b>
		100	174,75	231,82	515,63	460,14	288	223,44	182,33
<b>5%</b>	1	8,3	8,1	15,7	58,2	54,1	20,3	18,3	15,9
	2	7	14	18,3	45,2	31,5	17	12,6	15,7
	3	9,6	14,3	25,6	63,5	56	39,2	13,9	17,8
	<b>M.O.</b>	<b>8,3</b>	<b>12,13333</b>	<b>19,86667</b>	<b>55,63333</b>	<b>47,2</b>	<b>25,5</b>	<b>14,93333</b>	<b>16,46667</b>
		100	146,14	239,4	670,24	568,67	307,23	179,88	198,43
<b>B 1%</b>	1	8,7	13,9	14,5	42,8	19	18,8	17,8	18,8
	2	9,8	16,8	29,8	58,9	16,6	11,6	19,5	12,8
	3	9,4	15,6	11,2	41,4	21,8	12,8	17,9	17,8
	<b>M.O.</b>	<b>9,3</b>	<b>15,43333</b>	<b>18,5</b>	<b>47,7</b>	<b>19,13333</b>	<b>14,4</b>	<b>18,4</b>	<b>16,46667</b>
		100	165,9	198,92	512,9	205,7	173,49	197,85	177,1

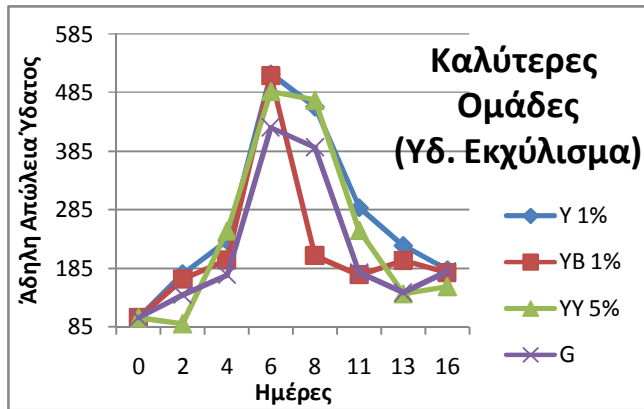
	3	12,2	39,5	43,8	16,3	15,3	12,3		
	4	16,2	40,5	58,8	22,1	12,7	14,4		
	5	10	16,2	15,9	64,7	31,8	19,8	10,5	17,7
	<b>M.O.</b>	<b>8,533333</b>	<b>13,96667</b>	<b>14,76667</b>	<b>48,23333</b>	<b>44,8</b>	<b>19,4</b>	<b>12,83333</b>	<b>14,8</b>
	.	100	163,77	173,04	565,42	525,21	227,43	150,41	173,5
<b>1%</b>	1	5,6	9,3	10,5	60,2	57,4	17,8	10,5	14,7
	2	8,1	15	13,8	65,9	42,8	16	15,3	9,2
	3	3,5	14,3	11,2	54,7	53,2	26,3	15,5	15
	<b>M.O.</b>	<b>5,733333</b>	<b>12,86667</b>	<b>11,83333</b>	<b>60,26667</b>	<b>51,13333</b>	<b>20,03333</b>	<b>13,76667</b>	<b>12,96667</b>
	.	100	224,61	206,46	1051,83	892,32	349,56	238,57	226,35
<b>5%</b>	1	10,1	14,2	27,3	29,3	41,9	13,7	15,1	16,4
	2	8,6	12,5	17,5	54,2	47,8	31,2	11,2	15,2
	3	12,6	1,3	32,8	68,7	57,8	33	17,8	16,6
	<b>M.O.</b>	<b>10,43333</b>	<b>9,333333</b>	<b>25,86667</b>	<b>50,73333</b>	<b>49,16667</b>	<b>25,96667</b>	<b>14,7</b>	<b>16,06667</b>
	.	100	89,45	248,03	486,1	471,43	248,99	140,94	154,07
<b>1%</b>	1	6,5	8,9	11,5	41,8	14,2	16,4	14,6	7,4
	2	6,2	10,4	10,8	78,2	56,6	53,4	22,7	17
	3	7,7	11	10,8	46,2	18,4	10,2	14,9	12,7
	<b>M.O.</b>	<b>6,8</b>	<b>10,1</b>	<b>11,03333</b>	<b>55,4</b>	<b>29,73333</b>	<b>26,66667</b>	<b>17,4</b>	<b>12,36667</b>
	.	100	148,52	162,21	814,71	437,72	392,21	255,88	181,91
<b>5%</b>	1	8,8	10,8	17,1	45,6	45,4	15,9	16,6	20,5
	2	5,6	7,5	11,3	32,5	14,2	12,1	5,7	15,5
	3	6,5	8,8	10,5	46,3	17,6	22,8	20	18,6
	<b>M.O.</b>	<b>6,966667</b>	<b>9,033333</b>	<b>12,96667</b>	<b>41,46667</b>	<b>25,73333</b>	<b>16,93333</b>	<b>14,1</b>	<b>18,2</b>
	.	100	129,56	186,08	594,98	369,15	242,9	202,3	261,12
<b>B 1%</b>	1	6,7	10,1	17,1	45,8	63,1	41,4	23,8	14,1
	2	9,8	11,1	11,3	65,2	57,9	29,3	17,6	19,9
	3	7,5	8,7	10,5	52,4	44,9	14,2	14,1	13,3
	<b>M.O.</b>	<b>8</b>	<b>9,966667</b>	<b>12,96667</b>	<b>54,46667</b>	<b>55,3</b>	<b>28,3</b>	<b>18,5</b>	<b>15,76667</b>
	.	100	124,62	162,13	680,88	691,25	353,75	231,25	197,13
<b>B5%</b>	1	9,2	10,3	20,4	74,5	33,8	18,6	12,8	21,5
	2	7,2	12,9	18,8	40,2	24,6	18,6	15,7	11,5
	3	9,2	17	30,5	67,9	66	37,2	22	16,7
	<b>M.O.</b>	<b>8,533333</b>	<b>13,4</b>	<b>23,23333</b>	<b>60,86667</b>	<b>41,46667</b>	<b>24,8</b>	<b>16,83333</b>	<b>16,56667</b>
	.	100	157,09	272,33	713,6	486,17	290,74	197,3	194,26
<b>1%</b>	1	7,4	9,8	19,9	45,4	32,3	18	16,3	18,1
	2	8,3	12,3	30,1	75,7	41,8	21,8	27,5	15

		100	134,23	268,85	691,03	388,46	245,26	248,33	199,62
M 5%	1	6,2	16,1	30,5	51,5	30,3	17,9	11,4	20,6
	2	9,4	13,8	16,9	54,4	38,1	16,8	12,7	12,3
	3	10,6	13,4	68,4	58,3	65,2	18,3	17,2	15,6
	M.O.	8,733333	14,43333	38,6	54,73333	44,53333	17,66667	13,76667	16,16667
		100	165,86	442,15	626,92	510,08	202,41	157,73	185,22

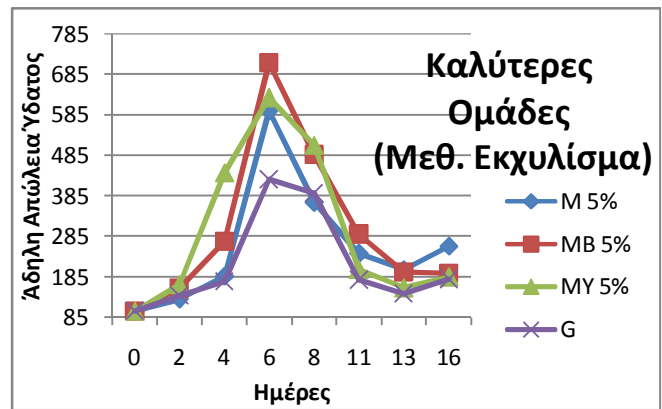
5.5:



5.22:



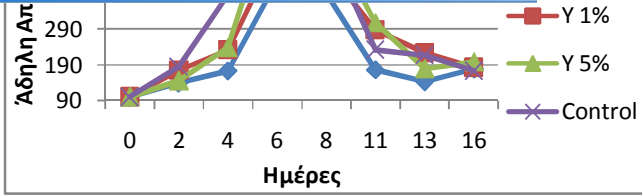
5.23 5.24:



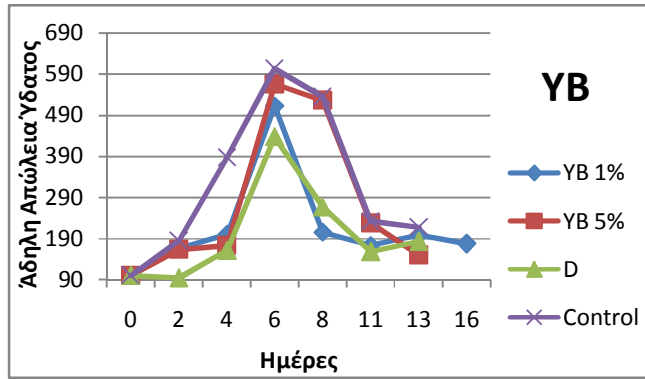
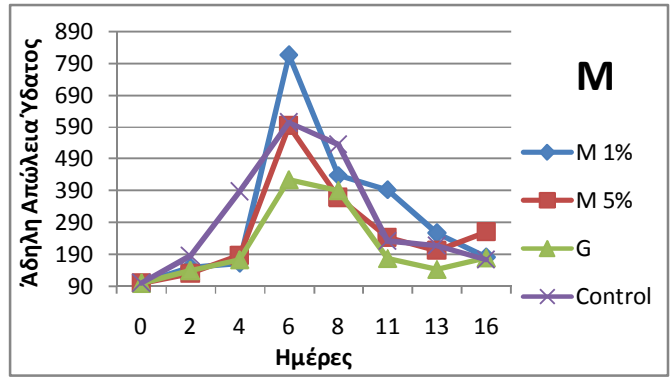
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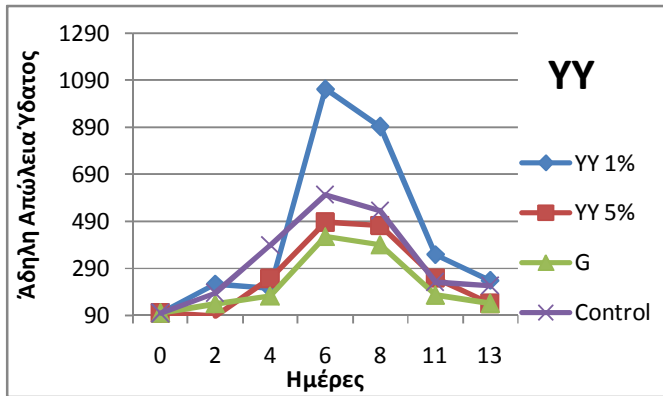
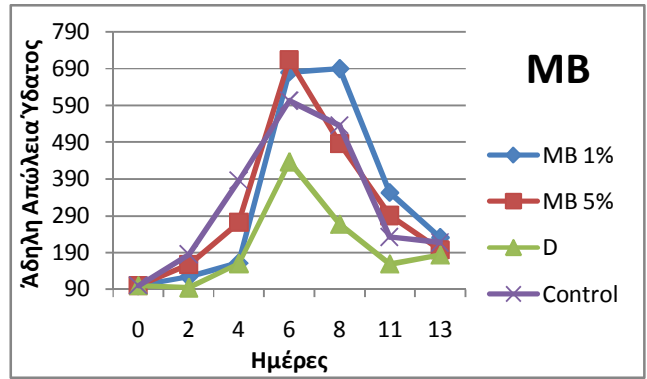




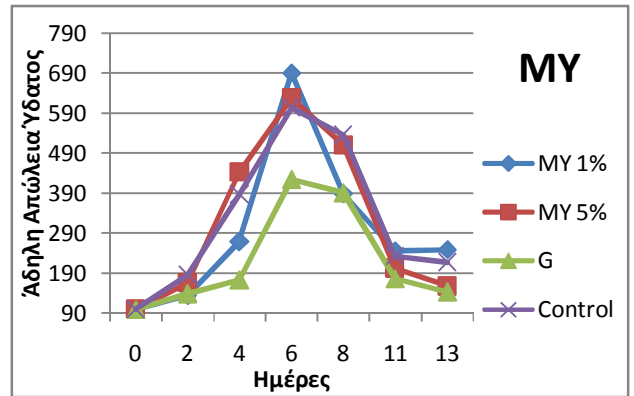
5.25 5.26:



5.27 5.28:



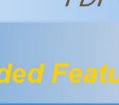
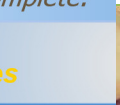









































































5.29 5.30:



5.2.3

	ΗΜΕΡΕΣ				
ΟΜΑΔΕΣ	2	4	6	9	11

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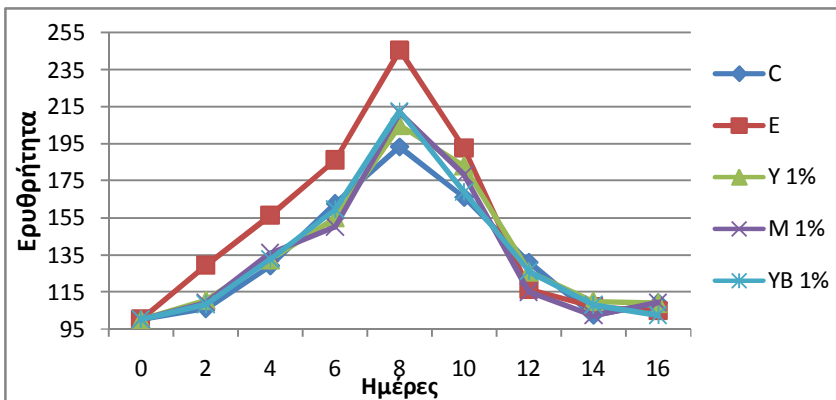
5.3.1.1

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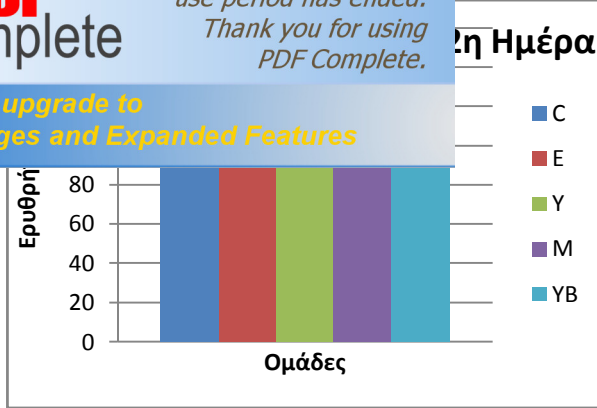
		0	2	4	6	8	10	12	14	16
C	1	214	241	238	381	457	334	335	213	224
	2	248	274	329	371	523	487	310	217	304
	3	238	245	311	483	524	467	288	273	270
	4	273	251	349	355	373	250	282	288	262
	5	234	247	320	488	537	434	330	251	259
	6	270	279	316	344	465	472	405	287	279
	7	249	286	366	358	424	404	300	239	286
	. .	<b>246,57</b>	<b>260,43</b>	<b>318,43</b>	<b>397,14</b>	<b>471,86</b>	<b>406,86</b>	<b>321,43</b>	<b>252,57</b>	<b>269,14</b>
	. .	<b>20,61</b>	<b>18,56</b>	<b>40,50</b>	<b>61,51</b>	<b>60,43</b>	<b>86,55</b>	<b>41,84</b>	<b>31,29</b>	<b>25,13</b>
	.	100	105,96	129,02	162,91	193,32	166,11	131,05	102,40	109,36
	. . .	0	7,71	11,98	33,66	34,00	36,39	18,83	8,86	8,77
	1	219	326	393	355	618	507	272	242	236
	2	219	315	381	527	580	451	304	248	205
	3	259	297	370	500	565	436	270	269	257
	4	242	299	299	420	650	468	284	228	248
	5	264	284	344	491	544	392	251	255	233
	6	217	266	353	372	580	470	258	234	284
	7	210	304	382	369	442	388	245	256	232
	. .	<b>232,86</b>	<b>298,71</b>	<b>360,29</b>	<b>433,43</b>	<b>568,43</b>	<b>444,57</b>	<b>269,14</b>	<b>247,43</b>	<b>242,14</b>
	. .	<b>21,97</b>	<b>19,70</b>	<b>31,99</b>	<b>71,60</b>	<b>65,79</b>	<b>43,15</b>	<b>20,33</b>	<b>14,05</b>	<b>24,53</b>
	.	100	129,41	156,39	186,07	245,37	192,72	116,46	106,88	104,67
	. . .	0	16,31	24,06	26,07	32,30	28,47	13,98	9,62	13,88
Y 1%	1	274	274	308	408	512	369	244	282	273
	2	254	258	357	474	604	542	355	284	295
	3	238	314	389	322	481	360	255	271	291
	4	234	257	248	334	431	465	317	245	217
	5	252	264	363	391	606	573	439	246	276

		325	395	430	431	257	296	270		
		306	375	508	436	320	285	269		
	..	<b>248,71</b>	<b>273,86</b>	<b>328,00</b>	<b>385,57</b>	<b>510,29</b>	<b>453,71</b>	<b>312,43</b>	<b>272,71</b>	<b>270,14</b>
	..	<b>15,04</b>	<b>21,70</b>	<b>46,69</b>	<b>50,42</b>	<b>72,50</b>	<b>80,56</b>	<b>69,48</b>	<b>19,96</b>	<b>25,56</b>
	.	100	110,62	132,23	154,98	204,92	182,98	125,85	109,91	108,76
	...	0	13,04	20,41	17,75	24,31	33,34	27,56	9,66	10,43
1%	1	276	273	359	360	393	382	293	260	232
	2	236	247	314	404	496	407	285	280	272
	3	232	271	368	330	570	470	335	234	280
	4	230	271	311	327	464	374	268	213	249
	5	249	291	332	379	568	492	283	254	295
	6	238	269	327	414	519	391	270	250	276
	7	258	251	320	356	609	540	231	261	263
	..	<b>245,57</b>	<b>267,57</b>	<b>333,00</b>	<b>367,14</b>	<b>517,00</b>	<b>436,57</b>	<b>280,71</b>	<b>250,29</b>	<b>266,71</b>
	..	<b>16,67</b>	<b>14,73</b>	<b>22,18</b>	<b>33,82</b>	<b>73,60</b>	<b>64,20</b>	<b>31,28</b>	<b>21,45</b>	<b>20,91</b>
	.	100	109,34	135,96	150,03	211,75	178,18	114,93	102,08	109,23
	...	0	8,89	10,87	16,71	34,07	25,79	16,48	8,54	12,82
	Y 1%	1	252	284	332	428	404	380	250	290
2		265	227	336	390	542	386	269	260	239
3		244	274	339	355	536	320	250	271	241
4		255	246	324	475	640	640	448	251	290
5		233	273	289	377	549	404	329	280	218
6		244	283	324	351	510	408	271	266	264
7		233	274	343	377	484	381	352	240	289
..		<b>246,57</b>	<b>265,86</b>	<b>326,71</b>	<b>393,29</b>	<b>523,57</b>	<b>417,00</b>	<b>309,86</b>	<b>265,43</b>	<b>251,71</b>
..		<b>11,70</b>	<b>21,26</b>	<b>18,11</b>	<b>44,12</b>	<b>71,58</b>	<b>102,48</b>	<b>72,54</b>	<b>16,99</b>	<b>29,90</b>
.		100	108,27	132,65	159,46	212,55	168,96	126,03	107,84	102,31
...		0	12,33	8,08	15,42	28,54	38,91	30,06	8,39	13,46

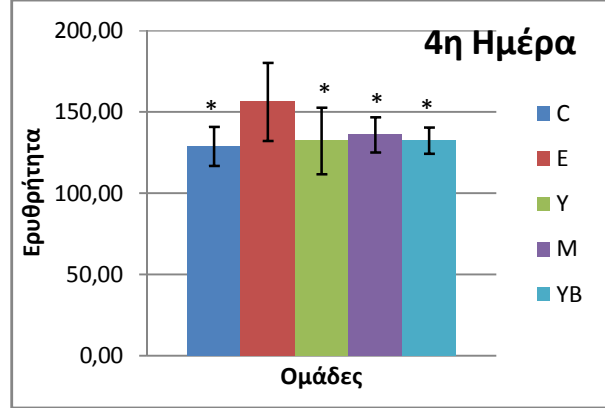
5.7:



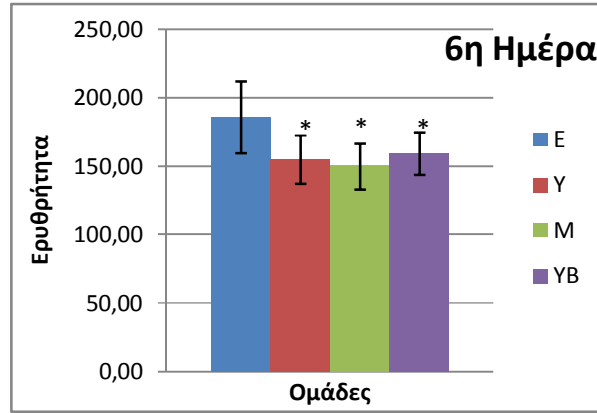
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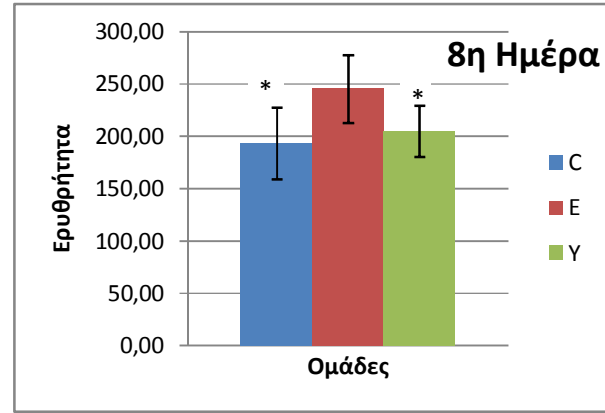
5.32 5.33:  
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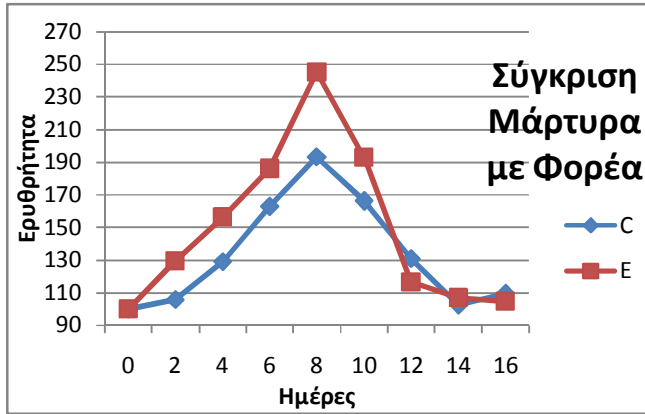
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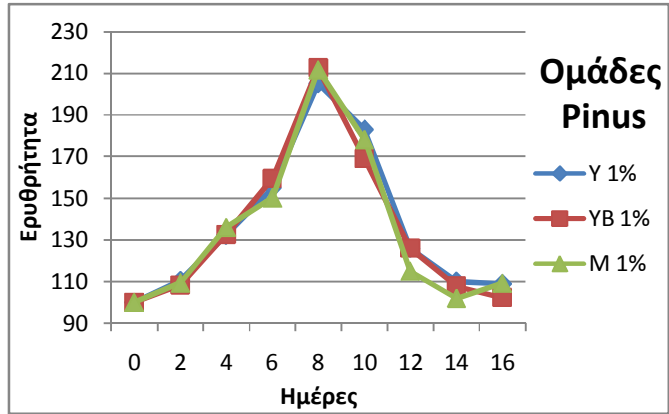
5.34 5.35:  
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5.36 5.37:



5.3.1.2

(OneWayAnova, Post-Hoc:LSD) ó

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<b>2</b>	C ó E	0.001
	E ó 1%	0.007
	E ó M 1%	0.004
	E ó B 1%	0.003
<b>4</b>	C ó E	0.004
	E ó 1%	0.009
	E ó M 1%	0.026
	E ó B 1%	0.010
<b>6</b>	E ó 1%	0.017
	E ó M 1%	0.006
	E ó B 1%	0.039
<b>8</b>	C ó E	0.004
	E ó 1%	0.020

5.8:

5.3.1.3

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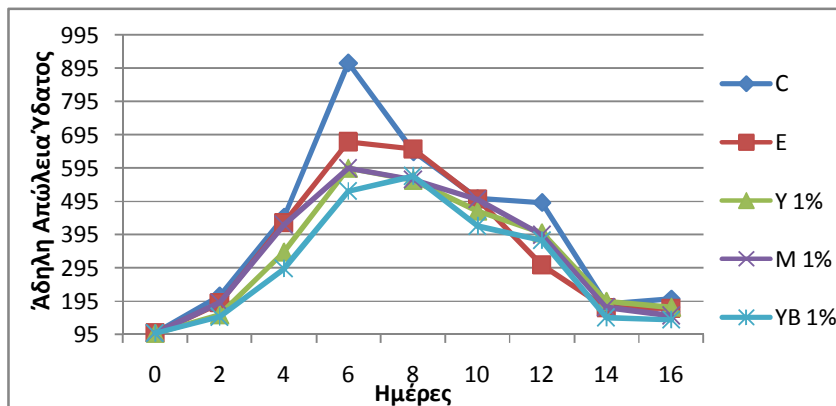
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		0	2	4	6	8	10	12	14	16
<b>C</b>	1	5,2	13,8	40,5	57,6	47	30,2	32,6	14,1	15
	2	5,8	18,5	23,3	64,2	41,3	42	35,3	13,2	14,8
	3	8,4	18,5	35,3	80,1	60	41,1	30,1	14,7	14,7
	4	10,4	13,9	24,1	57,1	33	19,2	21,9	17,8	16,9
	5	6,8	13,6	34,7	71,8	60,1	47,9	46,2	13,2	13,6
	6	7,9	14,2	45,6	83	45,8	43,4	48,4	10,3	12,6
	7	9	14,7	19,9	49,3	36,6	26,3	30,6	12,3	15,4
	. .	<b>7,64</b>	<b>15,31</b>	<b>31,91</b>	<b>66,16</b>	<b>46,26</b>	<b>35,73</b>	<b>35,01</b>	<b>13,66</b>	<b>14,71</b>
	. .	<b>1,83</b>	<b>2,20</b>	<b>9,66</b>	<b>12,60</b>	<b>10,61</b>	<b>10,55</b>	<b>9,36</b>	<b>2,31</b>	<b>1,36</b>
	.	100	211,62	448,74	910,21	645,39	503,54	490,93	186,58	201,68
	. . .	0	63,31	196,30	252,42	224,27	201,51	183,32	49,85	50,59
	1	8,8	17,2	27,5	60,1	77,3	51,5	27,9	16,3	17,4
	2	10,8	14,4	48,4	70	62,9	55	32,3	17,7	20
	3	13,2	41,4	27,3	73,6	57,6	41,4	30,4	17	15,2
	4	8,6	11	27,5	66,4	55,8	38,1	33,1	21,2	18,4
	5	11,3	17,6	59,2	77,9	63,2	55,5	28,1	14,8	19,4
	6	10	23,3	69,2	71,6	78,6	47,5	23,3	18,3	16,3
	7	8,1	14	40,9	52,3	54,2	56,7	33,5	15	13,8
	. .	<b>10,11</b>	<b>19,84</b>	<b>42,86</b>	<b>67,41</b>	<b>64,23</b>	<b>49,39</b>	<b>29,80</b>	<b>17,19</b>	<b>17,21</b>
	. .	<b>1,80</b>	<b>10,25</b>	<b>16,88</b>	<b>8,71</b>	<b>9,96</b>	<b>7,32</b>	<b>3,65</b>	<b>2,20</b>	<b>2,26</b>
	.	100	190,27	429,72	673,12	651,49	502,47	303,79	174,80	173,87
	. . .	0	65,44	162,88	66,74	146,89	119,71	73,35	39,97	31,32
<b>1%</b>	1	9,5	15,7	38,4	46,7	51,6	46	20,8	14,4	13,2
	2	11,2	11	30,9	64,4	50,3	46,1	43	17,2	15,2
	3	8,8	18,1	45,6	39	44,8	38,8	27,2	19	10,8
	4	8,3	15,7	27,5	77,8	55,5	45,6	45,5	17,4	19,4
	5	9,4	14,3	23,4	37,6	50	34,3	38,4	17,4	19,6
	6	9,5	10,7	27,6	64,8	45,1	35,9	30	17,2	16,8

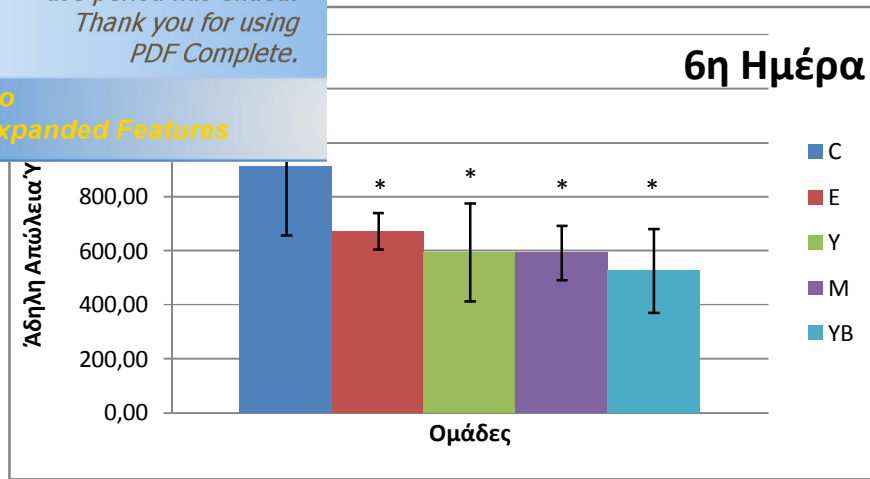


			26,6	50,3	57,4	50,1	49,3	21	17,5	
			<b>31,43</b>	<b>54,37</b>	<b>50,67</b>	<b>42,40</b>	<b>36,31</b>	<b>17,66</b>	<b>16,07</b>	
		<b>1,07</b>	<b>2,73</b>	<b>7,83</b>	<b>15,01</b>	<b>4,75</b>	<b>6,01</b>	<b>10,53</b>	<b>2,01</b>	<b>3,24</b>
		100	154,47	343,68	595,13	557,61	466,16	401,22	194,67	176,86
		0	38,46	91,94	181,98	102,27	97,59	141,78	39,92	45,26
1%	1	8,4	13,9	80,2	40,4	43	40,5	40,8	13,4	13,2
	2	9,6	17,2	48,2	59,4	61,7	51,9	48	16,2	12,4
	3	8,8	37,2	38,8	57,1	61	71,7	52,9	16	16,3
	4	10	12,9	16,9	68,1	67,8	38,8	28,8	19,7	13,1
	5	13,9	16	22,7	63,6	53,9	55,6	24,7	15,9	15,4
	6	7,5	11,5	19,5	54	24,2	34	31,3	19,3	13,8
	7	7,8	13,6	37,2	42,7	53,3	33,3	22,3	12,1	12,6
		<b>9,43</b>	<b>17,47</b>	<b>37,64</b>	<b>55,04</b>	<b>52,13</b>	<b>46,54</b>	<b>35,54</b>	<b>16,09</b>	<b>13,83</b>
		<b>2,17</b>	<b>8,90</b>	<b>22,01</b>	<b>10,29</b>	<b>14,63</b>	<b>13,98</b>	<b>11,84</b>	<b>2,79</b>	<b>1,48</b>
		100	191,31	423,86	593,51	559,94	500,83	393,68	176,28	151,27
		0	104,71	274,10	100,52	153,85	147,82	148,78	44,06	28,58
1%	1	10,4	12,5	18,5	77,2	56,1	46,4	19,1	10,3	14,1
	2	7,2	10,5	29,5	31,2	49,7	32,9	25,3	11,7	14,4
	3	7,4	13	21,9	53,8	57,8	32,5	32,3	11,5	14,4
	4	11	15,3	48,8	44,8	63,1	49,7	55,9	16,3	10,2
	5	10,5	16,9	26,8	35,7	49,8	40,6	32,3	12,5	12,3
	6	11	14,9	26	59,1	45,3	30,3	34	19,7	12,2
	7	8,8	13,9	20,2	43,8	46,6	42,7	47,9	13,6	10,9
		<b>9,47</b>	<b>13,86</b>	<b>27,39</b>	<b>49,37</b>	<b>52,63</b>	<b>39,30</b>	<b>35,26</b>	<b>13,66</b>	<b>12,64</b>
		<b>1,66</b>	<b>2,09</b>	<b>10,21</b>	<b>15,59</b>	<b>6,52</b>	<b>7,53</b>	<b>12,68</b>	<b>3,28</b>	<b>1,71</b>
		100	147,88	292,62	526,42	571,44	420,21	377,25	145,40	139,26
		0	18,47	98,52	155,67	126,34	70,34	126,63	27,27	41,75

5.9:



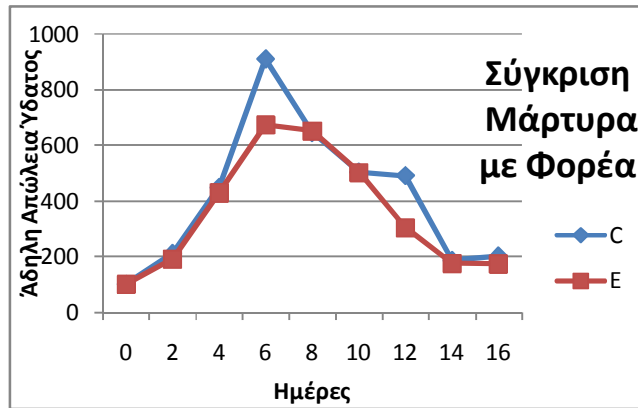
5.38:



5.39:

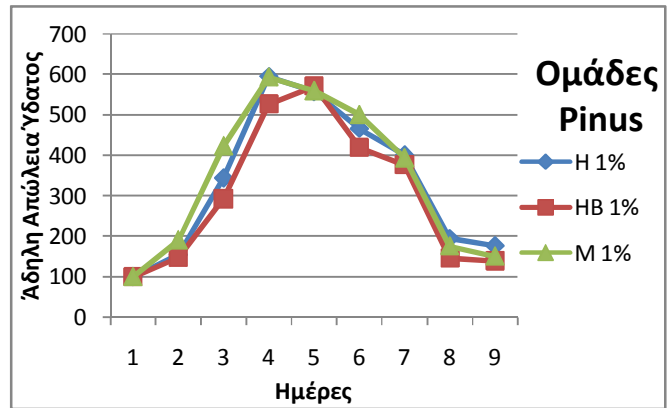
(C)

6



5.40

5.41:



5.3.2.2

P

(OneWayAnova, Post-Hoc:LSD) δ

<0,05

<b>6</b>	C δ E	0.011
	C δ 1%	0.001
	C δ M 1%	0.001
	C δ B 1%	0.000

5.10:

(C)

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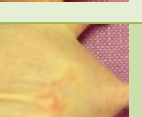





















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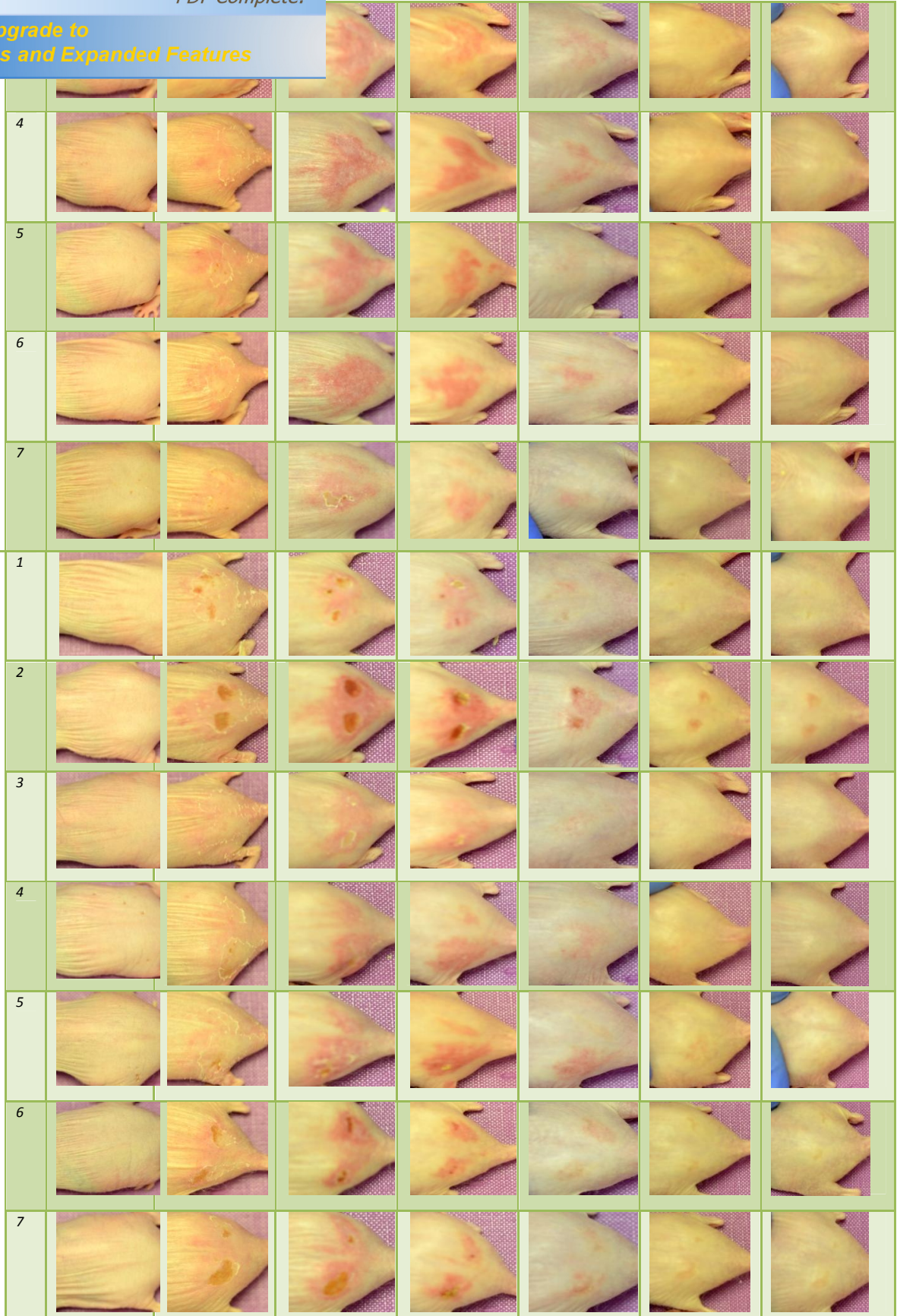
( )

(C).

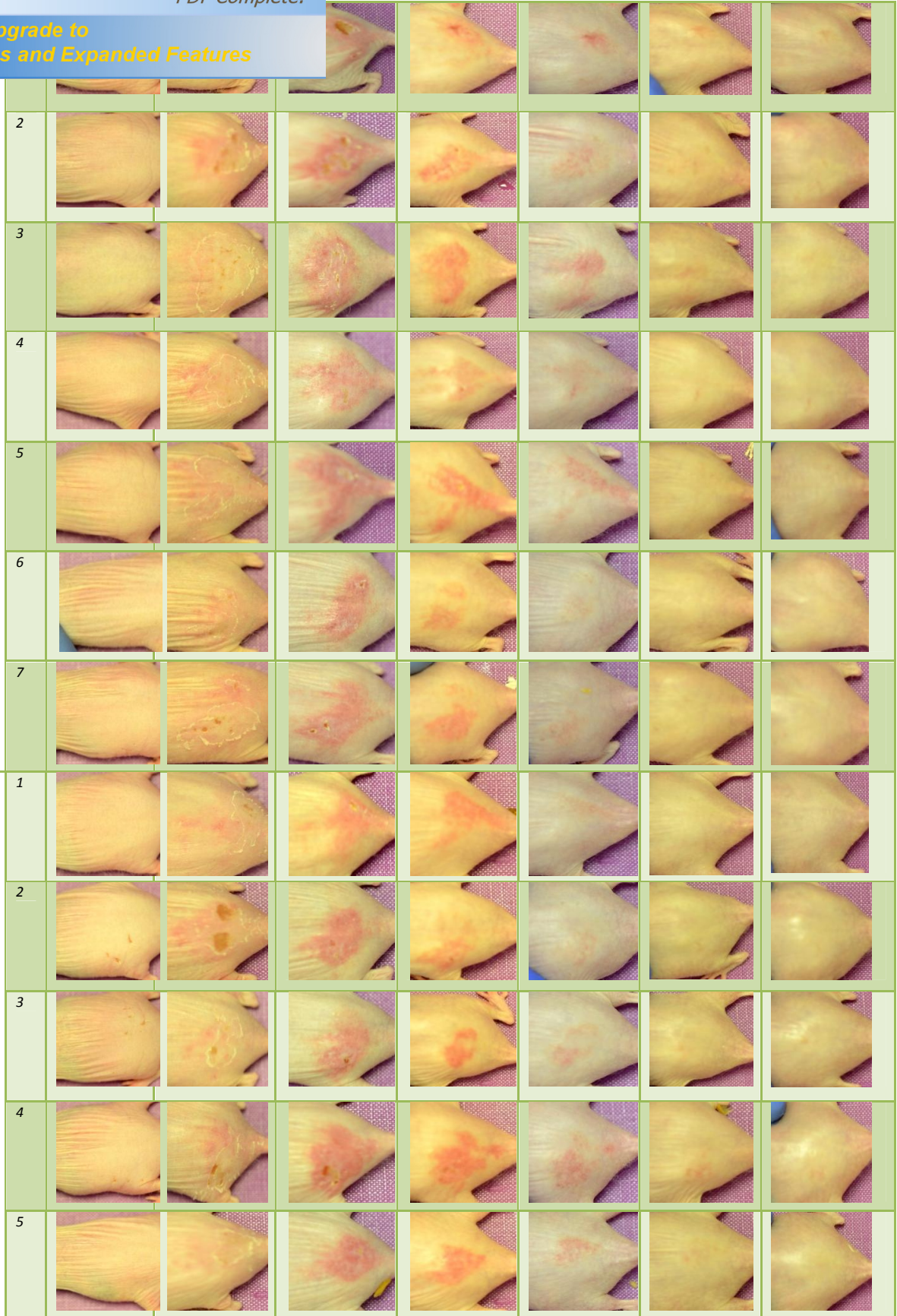
		ΗΜΕΡΕΣ						
ΟΜΑΔΕΣ		2	4	6	8	10	12	14
C	1							
	2							
	3							
	4							
	5							
	6							
	7							
E	1							
	2							



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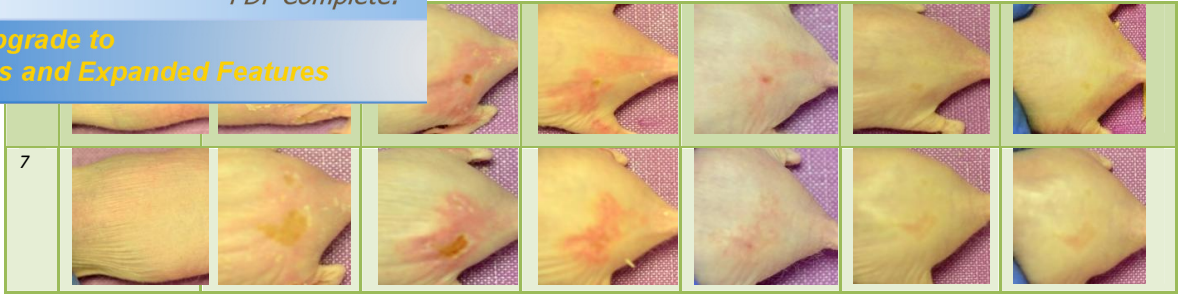


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5.11:

5.3.3.2

(C).

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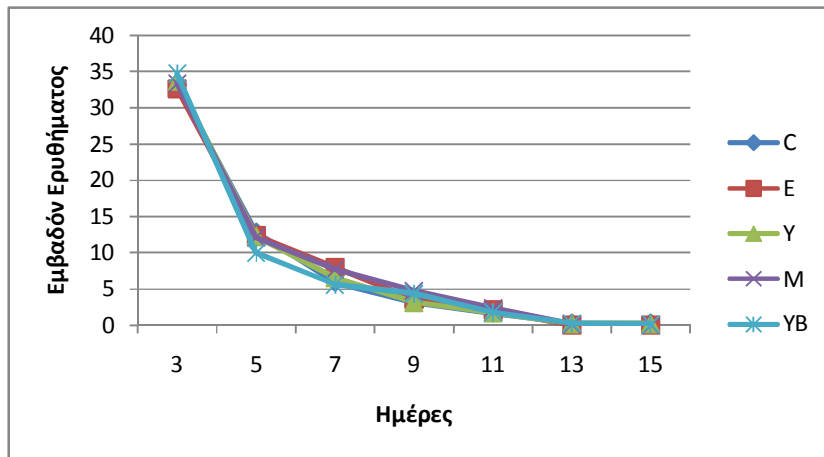
		2	4	6	8	10	12	14
<b>C</b>	1	38,27168	17,1293	3,746914	4,064063	1,507266	0,329922	0,250313
	2	34,5075	19,06664	7,340977	5,90625	1,49707	0,27207	0,323438
	3	34,8075	13,64258	10,57492	1,810117	1,845938	0	0
	4	31,55313	10,29168	4,806914	2,001563	0	0	0
	5	28,91227	11,28258	4,859063	2,466406	3,72375	0,33375	0,3025
	6	28,81875	9,550625	4,565039	2,793516	1,523086	1,343164	0,826172
	7	35,23	9,071992	5,535	2,800313	1,422539	0	0
	..	<b>33,15726</b>	<b>12,8622</b>	<b>5,918404</b>	<b>3,120318</b>	<b>1,645664</b>	<b>0,325558</b>	<b>0,243203</b>
	..	<b>3,521739</b>	<b>3,910396</b>	<b>2,336609</b>	<b>1,429284</b>	<b>1,093374</b>	<b>0,475471</b>	<b>0,296451</b>
		1	32,90066	12,0368	5,969531	4,401445	3,748047	0
2		33,64227	12,0793	8,177734	3,627656	2,402578	0	0
3		31,13086	11,47184	7,314375	4,027148	3,609375	0	0
4		36,04609	13,6325	10,93266	2,779766	1,665625	0	0
5		29,33266	14,47875	8,979609	1,986328	0	0	0
6		32,47313	12,81465	8,051094	4,5675	2,446875	0	0
7		33,075	10,27852	6,365625	3,691953	0,685352	0	0
..		<b>32,65724</b>	<b>12,39891</b>	<b>7,970089</b>	<b>3,583114</b>	<b>2,079693</b>	<b>0</b>	<b>0</b>
..		<b>2,085864</b>	<b>1,390991</b>	<b>1,675913</b>	<b>0,916949</b>	<b>1,402567</b>	<b>0</b>	<b>0</b>
<b>1%</b>		1	34,50539	11,68547	4,90625	2,1375	0,354375	0,031719
	2	34,1434	13,58438	9,920586	5,133906	2,87918	0,544688	0,597188
	3	35,41789	12,41594	5,483984	3,638672	0,707383	0	0
	4	32,09219	13,24	6,294922	3,681875	2,14418	0	0
	5	30,80547	13,85434	5,977148	3,608438	2,645977	0,604688	0,36457
	6	35,11406	10,40156	7,042773	1,989688	1,870664	0,126875	0,131836
	7	33,61359	10,63895	6,253125	2,055508	1,390117	0,353828	0,373438
	..	<b>33,67028</b>	<b>12,26009</b>	<b>6,554113</b>	<b>3,177941</b>	<b>1,713125</b>	<b>0,2374</b>	<b>0,213092</b>
	..	<b>1,671358</b>	<b>1,395964</b>	<b>1,62907</b>	<b>1,171301</b>	<b>0,948909</b>	<b>0,261444</b>	<b>0,234212</b>
	<b>1%</b>	1	35,37586	9,356406	5,248359	2,687813	0,676992	0,34043
2		31,49137	10,75531	6,63	4,695234	3,293086	0,031797	0,029063
3		32,88828	14,42391	9,090664	7,897266	3,942891	0,347344	0,05332



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	648	10,07813	4,1875	4,68457	0,031719	0,014063
	141	10,54617	4,417656	1,604883	0	0
6	33,76957	8,251367	5,398828	2,558359	1,146836	0
7	37,29844	15,69867	6,603906	6,716953	1,091797	0
..	<b>33,40785</b>	<b>12,11622</b>	<b>7,656579</b>	<b>4,737254</b>	<b>2,348722</b>	<b>0,107327</b>
..	<b>2,268459</b>	<b>2,745489</b>	<b>2,210927</b>	<b>1,968875</b>	<b>1,594875</b>	<b>0,162236</b>
<b>1%</b>	1	36,20461	10,25156	5,29375	3,145313	0,728438
	2	35,84883	8,737344	4,968164	3,569844	1,347656
	3	31,38305	8,765742	6,376875	3,26625	1,426523
	4	32,42266	9,826758	7,824688	5,741016	3,397734
	5	35,46391	9,8175	5,789531	3,230977	2,383164
	6	36,44063	12,46547	4,3875	7,167188	1,53457
	7	35,0618	9,9225	4,622305	4,087813	1,784063
	..	<b>34,68935</b>	<b>9,969554</b>	<b>5,608973</b>	<b>4,315485</b>	<b>1,800307</b>
	..	<b>1,979712</b>	<b>1,246485</b>	<b>1,190741</b>	<b>1,550189</b>	<b>0,86177</b>
					<b>0,407773</b>	<b>0,186483</b>

5.12:



5.42:

5.3.4.2

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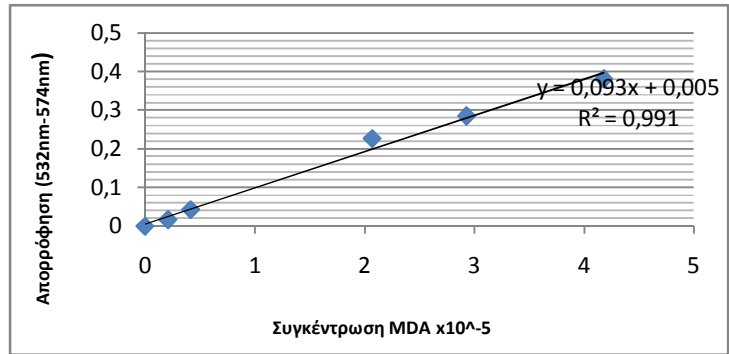
12

( BARS)

MDA ml

4.2.9.

MDA (x10 <sup>-5</sup> )	( 532nm-574nm)
0	0
0,0418	0,006
0,209	0,017
0,418	0,043
2,07	0,227
2,93	0,285
4,18	0,381



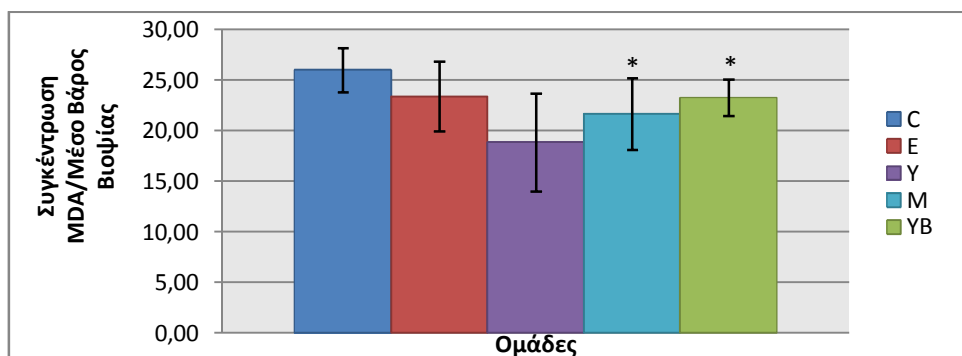
5.43:

5.13:

		( 532nm-574nm)	MDA (x10 <sup>-5</sup> )	
C	1	0,09254	0,978861	25,29
	2	0,087166	0,92088	27,01
	3	0,08627	0,911217	23,25
	4	0,088061	0,930544	25,08
	5	0,104186	1,104485	28,10
	6	0,108	1,145631	29,15
	7	0,085	0,897519	24,06
	..			25,99
	..			2,16
		1	0,083582	0,882227
	2	0,088957	0,940207	29,47
	3	0,096124	1,017515	21,11
	4	0,087166	0,92088	22,24
	5	0,093436	0,988524	21,54
	6	0,09	0,951456	25,10
	7	0,086	0,908306	25,16
	..			23,40
	..			3,43

		0,076	0,800431	18,19
		0,09	0,951456	28,23
	3	0,056	0,584682	16,15
	4	0,075	0,789644	20,89
	5	0,049	0,509169	12,83
	6	0,069	0,724919	18,64
	7	0,059	0,617044	17,05
	..			<b>18,85</b>
	..			<b>4,82</b>
	1%	1	0,092	0,973031
2		0,102	1,080906	18,41
3		0,077	0,811219	22,04
4		0,087	0,919094	21,42
5		0,102	1,080906	18,80
6		0,093	0,983819	18,25
7		0,089	0,940669	26,35
..				<b>21,67</b>
..				<b>3,54</b>
1%		1	0,086	0,908306
	2	0,095	1,005394	24,58
	3	0,094332	0,998188	24,83
	4	0,097019	1,027178	22,88
	5	0,098811	1,046505	25,34
	6	0,089853	0,949871	21,49
	7	0,097019	1,027178	23,24
	..			<b>23,27</b>
	..			<b>1,80</b>

5.14:



5.44:

(

)

P

(OneWayAnova, Post-Hoc:LSD) ó

<0,05

5.15:

C ó M 1%	0.000
C ó B 1%	0.008
E ó M 1%	0.001
1% - M 1%	0.001
M 1% - B 1%	0.009

5.3.5.3

(C) ( )

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(C).

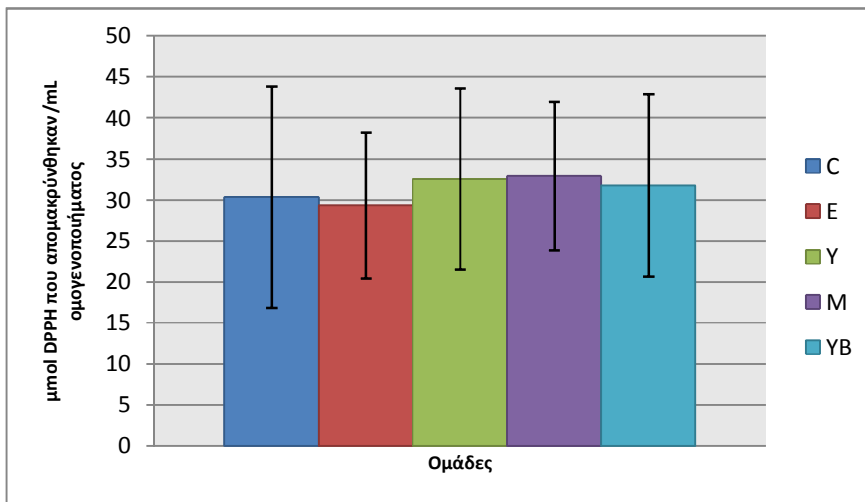
(TAC)

4.2.10. ( = 0,206)

			%	mol DPPH	/mL	
<b>C</b>	1	0,068	66,99029	1,674757	43,27538	
	2	0,098	52,42718	1,31068	38,43635	
	3	0,062	69,90291	1,747573	44,58094	
	4	0,156	24,27184	0,606796	16,35569	
	5	0,138	33,00971	0,825243	20,99854	
	6	0,151	26,69903	0,667476	12,15803	
	7	0,093	54,85437	1,371359	36,76566	
	..					<b>30,36723</b>
	..					<b>13,48067</b>
	1	0,134	34,95146	0,873786	18,99536	
	2	0,095	53,8835	1,347087	42,22844	
	3	0,063	69,41748	1,735437	36,00491	
	4	0,116	43,68932	1,092233	26,38244	
	5	0,11	46,60194	1,165049	25,38232	
	6	0,143	30,58252	0,764563	20,17317	
	7	0,098	52,42718	1,31068	36,30691	
	..					<b>29,35337</b>
	..					<b>8,893092</b>
<b>1%</b>	1	0,09	56,31068	1,407767	31,63521	
	2	0,141	31,5534	0,788835	23,40757	
	3	0,137	33,49515	0,837379	23,13201	
	4	0,059	71,35922	1,783981	47,19525	
	5	0,081	60,67961	1,51699	38,21134	
	6	0,143	30,58252	0,764563	19,65458	
	7	0,073	64,56311	1,614078	44,58778	
	..					<b>32,54625</b>
	..					<b>11,03671</b>
<b>1%</b>	1	0,073	64,56311	1,614078	43,86081	
	2	0,078	62,13592	1,553398	26,46334	
	3	0,065	68,4466	1,711165	46,49905	
	4	0,104	49,51456	1,237864	28,85464	

			61,65049	1,541262	26,80456
			50,48544	1,262136	23,41625
	/	0,104	49,51456	1,237864	34,67406
	..				<b>32,93896</b>
	..				<b>9,065517</b>
<b>1%</b>	1	0,162	21,35922	0,533981	12,05374
	2	0,079	61,65049	1,541262	37,68367
	3	0,102	50,48544	1,262136	37,01278
	4	0,251	<0	<0	<0
	5	0,07	66,01942	1,650485	39,96333
	6	0,064	68,93204	1,723301	38,98871
	7	0,134	34,95146	0,873786	24,96533
	..				<b>31,77793</b>
	..				<b>11,10615</b>

5.16:



5.45:

5.3.6.2

(C)

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( )

( 5.3.1, 5.3.2, 5.3.3, 5.3.4),

( 5.3.2) ( 5.3.1)  
P. halepensis  
( ) ( )  
(C)

( 5.43),

( 5.44)

( )

P. halepensis

UV-

#### 5.4

16

( 5.31)

( 5.38)

5.45)

24

UV

9,105,106

30

P. halepensis,

33

CMC,

5%

10%

( ), 1%

( ).

( 5.12)

( 5.11)

16

halepensis.

P. koraiensis,

C. P. koraiensis

78



invitro

invivo .107,108

3.2 invitro ,

( )

( ),

invivo

invivo ,

invitro ,

3.2),

( 3.3)

(

6 :

invitro invitro :

- 
- (0,5 g/ml - 10 g/ml) *P. halepensis* ( , )
- 200 g/ml.
- 2% DMSO ,
- *P. halepensis* 62% invitro DMSO,
- UVó , *P. halepensis*
- *P. halepensis*
- *P. halepensis*

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