

:574; 591.544

... , ... , ...

61077 , . , 4,

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**DUNALIELLA VIRIDIS TEOD.**

( , , )  
(CuR) *Dunaliella viridis* Teod. 10-, 20-, 30- 40- (CuS)  
2006 2007 . ,  
CuS- CuR-

CuS- CuR-

*Dunaliella* Teod.

: *Dunaliella viridis*,

2006, Stein, 2007),

(Conrad,

( , , 1991).

© . . . , . . . , . . . , 2009

*D. viridis*

( , 2002).

“ ” “ ” .  
: , ( , 2008).

*D. viridis*,

( )  $Cu^{2+}$ (CuR-  
Cu<sup>2+</sup>-  
(CuS) CuR-  
( , 2000).

$Cu^{2+}$

CuR- CuS-  
- 2006 - 2007 .  
CuS -  
CuR- ( )  
( )

*Dunaliella viridis* Teod. var. *viridis* f. *euchlora*,

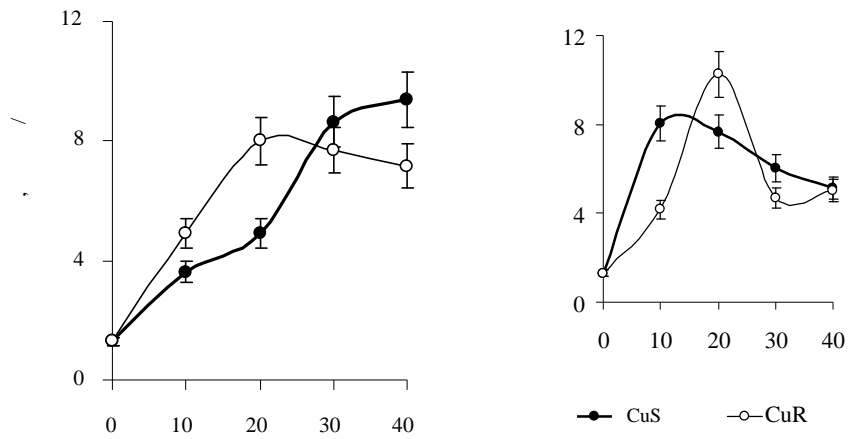
IBASU-A N 29 ( , ).

(1973).  $Cu^{2+}$  ( )

$0,31 \cdot 10^{-6}$  .  
 , CuS- ( u-sensitive). Cu-R (Cu-resistant)- Cu<sup>2+</sup>  
 $300 \cdot 10^{-6}$  ( 1000 , CuS- ).  
 250 ( - 20 ,  
 1,3 / ) (26-28 )  
 (6,5 4 -40) 40 . 10-, 20-, 30- 40-  
 , , , - .  
 - 2006 . - 2007 .  
 -  
 ( 10-, 20-, 30- 40- )  
 (3000 g, 20 ).  
 , 3000 g, 20 .  
 (Bozhkov, Menzyanova, 1995).  
 Kieselgel 60 (Merck, )  
 : (4:1).  
 : (1:2). -  
 = 400 ( , , 1975). ( / )  
 -  
 : (2:1).  
 -46, = 440 . -  
 ( / )  
 : (1:2) , ( ,  
 , 2008).  
 NaOH ( / ) 1 . -  
 1957). (Lowry et al.,  
 .

*D. viridis*

2006 .  
 CuS-  
 CuR- 20-  
 ( . 1, ).  
 CuS- CuR- ( 8 / ).  
 CuR- CuS- .



.1. (CuS) (CuR) *Dunaliella viridis* 2007 . ( ) 2006 . ( )

CuS- ( )  
 ( ) ( , 2008).  
 « »  
 ( , 2008).

CuR - CuS-

- 2007 .

- 2006 .

CuS -

10 -

8 / . , - 2007 .

CuS- , - 2006 .

CuS - (30- 40-

)

( .1, ).

CuR- , 2006 ., 20-

( 10,2 / ).

(30- 40-

( .1, ).

,

CuS- CuR-

2006 . 2007 .

2006

2007 . ,

2006 2007 . ( . ).

2007 . 5-20 , 2006 .

(S, 10<sup>6</sup>hemis\*)

CuS- CuR-

*Dunaliella viridis*

	10	20	30	40
- 2006 .	13,6	8,6	10,9	23,7
- 2007 .	75,5	177,0	148,4	121,9

\*hemis -

( ., 2008).

-

Cu<sup>2+</sup>

-

CuS- CuR-

CuS- CuR- *Dunaliella viridis*

*D. viridis*

CuS-

( . 2, ).

CuR-

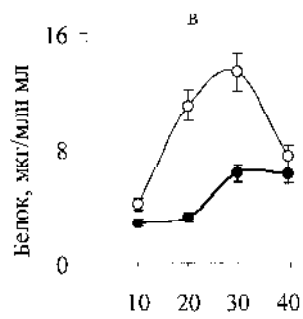
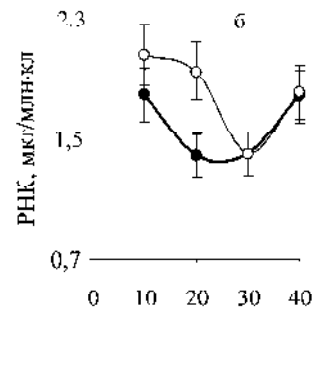
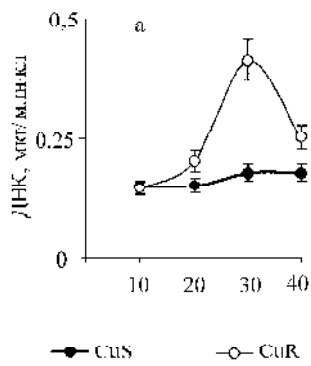
2,8 20 30-

, 40-

1,7

10 -

( . 2).

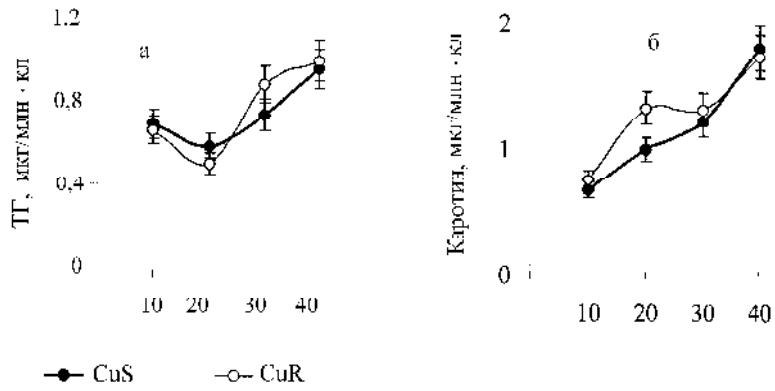


2. ( ), ( ), ( ) CuS- CuR- *Dunaliella viridis*  
10-, 20-, 30- 40- 2006 .

, “ ”  
 CuS - CuR-  
 -  
 , CuS -  
 ( . . 2, , ).  
 20- CuR-  
 CuR- ( . 2, ).  
 ( . . 1, ). 30- CuS-  
 CuS-  
 CuR-  
 CuS- ( .  
 . 2, ).  
 /  
 /  
 30- 40 CuS -  
 / CuR-  
 CuS- CuR-  
 - 2006 .  
 CuS- S-  
*D. viridis*. CuS-  
 (30-40- )  
 2 ( . . 1, ; 2, ).  
 CuR -  
 20-30-  
 (40 - )  
 CuR- ( . . 2, ). CuS-  
 CuR- (10 ) (40 )  
 . 20- 30-  
 CuR- 3  
 CuS-  
 CuS- uR- *D. viridis* -  
 ,  
 - (   
 Cu<sup>2+</sup> ).  
 , β-  
 CuS- CuR-  
 - 2006 .  
 β- CuS- CuR- ( . 3).

β-

« » (Bozhkov, Menzyanova, 1995, 1999).



3. viridis 10-, 20-, 30- 40- ( ) - ( ) CuS- CuR- Dunaliella 2006 .

*D. viridis*

( . 4).

CuS- CuR-

« »

« »

( )

Cu<sup>2+</sup>

CuR-

2007 ., « »

« » 2006 .

CuS- CuR-

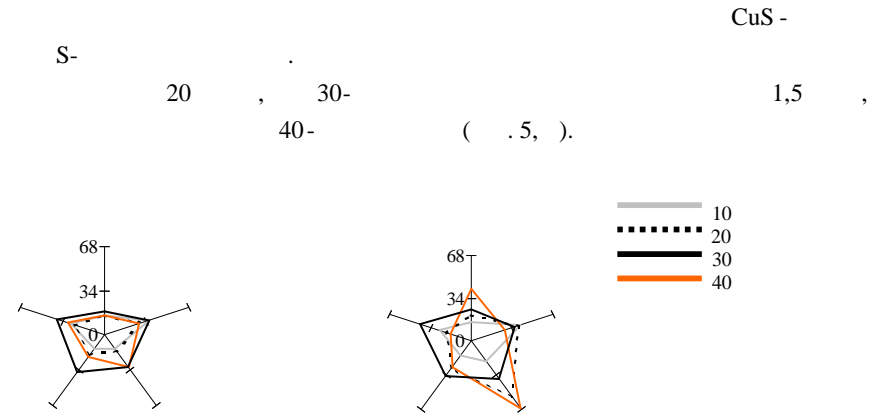
30-

3,3 7,6

10-

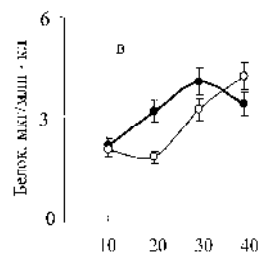
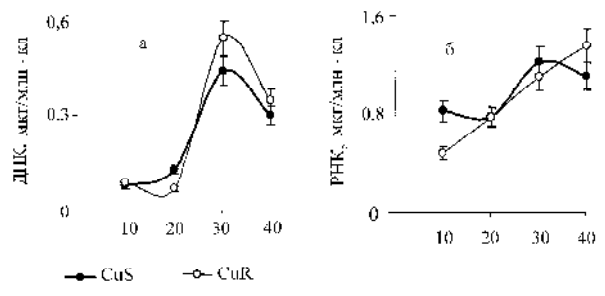
( . . 5, ).





.4. CuS- ( ) CuR- *Dunaliella viridis* ( ) 10-, 20-, 30- 40-  
- 2006 .

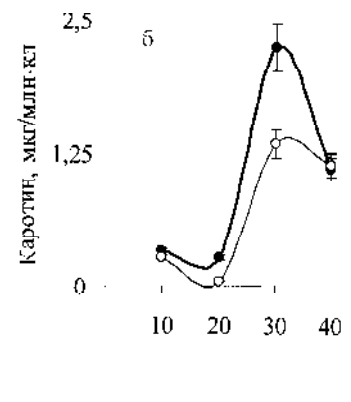
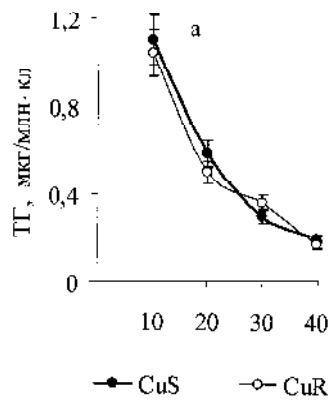
CuR-  
40 -  
2,8 10- ( . .5, ).



.5. ( ), ( ) ( ) CuS- CuR- *Dunaliella viridis* 10-,  
20-, 30- 40- - 2007 .

CuS - CuR-  
 10 -  
 40-

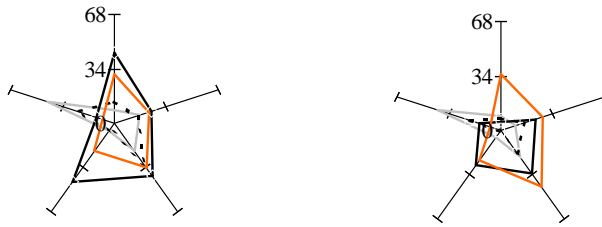
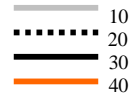
CuS- CuR- 2007 .  
 2006 . ( . . 2, ; 5, ).  
 2007 .  
 CuS- CuR- 40-  
 ( . 6, ). 2006 .  
 CuS- CuR-



.6. ( ) - ( ) CuS- CuR- *Dunaliella viridis* 10-, 20-,  
 30- 40- - 2007 .  
 2007 . 2006 . ,  
 CuS- 30-  
 ( . . 6, ).  
 CuR-  
 30-  
 1,5 , 30-  
 CuS- ( . . 6, ).  
 CuR-

2007 .

, , , - ( . 7). « »  
2007 .  
« »



.7.

( ) 10-, 20-, 30- 40-

CuS- ( ) CuR-  
- 2007 .

( , , , - )

( )

( )

( ., 2008).

), (., 2007)

*D. viridis* – - - -  
(, ,  
, 1998).

(, 2000). . . ,

2005). (, ,

*D. viridis*  
( ) -

(., 2008).

( )

( )

CuR- – *D. viridis* – CuS-

(. . . 1). , ,

(. . . 2, 3, 5, 6).

(. . . 4; 7).

2007 .

CuS- CuR-

(. . . 5, 6).

2006 .

1. *Dunaliella viridis*

2.

$\beta$ -

3.

(  
( CuS CuR)

(

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THE SEASONAL PECULIARITIES OF THE EPIGENOTYPES OF THE COPPER-SENSITIVE  
AND COPPER-RESISTANT CULTURES OF *DUNALIELLA VIRIDIS* TEOD. DURING  
ACCUMULATIVE CULTIVATION

In present paper was investigated the growth dynamics and the dynamics of para meters of a primary metabolism (of DNA, RNA and protein content) and a secondary metabolism (thre acylglycerydes ( G) and  $\beta$ -carotene content) in cells of copper-sensitive (CuS) and copper-resistant (CuR) cultures *Dunaliella viridis* Teod. on 10<sup>th</sup>, 20<sup>th</sup>, 30<sup>th</sup> and 40<sup>th</sup> day of cultivation in 2006 and 2007 years. The growth dynamics of the CuS - and CuR-cultures was revealed to be different in standard cultivation conditions in 2006 and in 2007 years. The specific parameters variability of a primary and a seconda ry metabolism resulted in forming of the specific temporal profiles of DNA, RNA, proteins, G and  $\beta$ -carotene content in microalgae cells of the CuS - and CuR-cultures in 2006 and 2007 years. The variability of specific temporal profiles of integral paramete rs of a primary and a secondary metabolism is supported to be determined by the fluctuation of the electromagnetic radiation of the Sun and to characterize epigenoty ps differences of the different *Dunaliella* Teod. strains.

*Key words*: *Dunaliella viridis*, growth dynamics, epigenotypes, DNA, RNA, threacylglycerydes,  $\beta$ -carotene.

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*Dunaliella*  
 Teod. – : .. . , 1973. – 244 .
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*Dunaliella viridis*  
 Teod. (*Chlorophyta*) // .. . – 2002. – **12**, 1. – . 59-68.
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*Dunaliella viridis* Teod.  
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