

574.64.08:57.017.6

... , ... , ...
c
... , 4, 61077 ,

***DUNALIELLA VIRIDIS* TEOD.**

Dunaliella
viridis Teod. (*Chlorophyta*), (CuS) (CuR)
20 50 / CuSO₄·5H₂O.

CuR *D. viridis*,

CuR *D. viridis*.

D. viridis

: *Dunaliella viridis*,

Dunaliella viridis

(Azachi
et al., 2002; Katz et al., 2007), (*Dunaliella*, 1992;
, 2003), (Bozhkov,
Mogilyanskaya, 1994; , 2000).

(Fisher, 1997),

(Brown, 1992),

(, 1973).

Dunaliella

D. viridis,

(- 20-50 /)

© . . . , . . . , 2010

(, , 1998).

(.) *D. viridis*
(, ,
, 1996).

(., 2002).

D. salina . . . (Teodoresco, 1906), -
1916 . . .
- *D. viridis*, 1973 . . .
D. minuta. . . ,
Dunaliella -
(, ,
) (Teodoresco, 1906).

Dunaliella , ,
(, 1973). *D. viridis* var.
palmelloides . -

(, 1973).

Dunaliella.

», « , «
» «
» ,
« »

D. viridis

(, 2002).

Dunaliella,

« ».

D. viridis (CuS *D. viridis*)
D. viridis (CuR *D. viridis*).

D. viridis

(20 50 /)

(CuS)
(CuR *D. viridis*).

Dunaliella viridis var. *viridis* f.

euchlora Teod., IBASU-A 29

IBASU -AN29

(, 1998).

D. viridis, 29 -

(/): NaCl – 116; MgSO₄ – 50; KNO₃ – 2,5; K₂HPO₄ –
0,2, 26-28 ° , 250³,
6

24 -

()

1,3-1,4 / .

CuS *D. viridis*, . .

CuS *D. viridis*,

20 / .

CuR *D. viridis*

10
 CuS *D. viridis* CuR *D. viridis*

20 /
Dunaliella

(),
 40-50
 CuS *D. viridis*, CuR *D. viridis*

: 0,1;
 0,5; 1; 5; 10; 20; 50; 75 100 / .

Dunaliella viridis – CuS
 CuR *D. viridis*.

21-22
 ()
 1,3-1,4)
 20 50 / , . .

CuS CuR *D. viridis*,

5, 20, 40 1, 2, 3, 4, 24 25

1,3-1,4

150; 200

(Seglen, 1976).

150

NaCl (125

NaCl 25

H₂O).

0,22

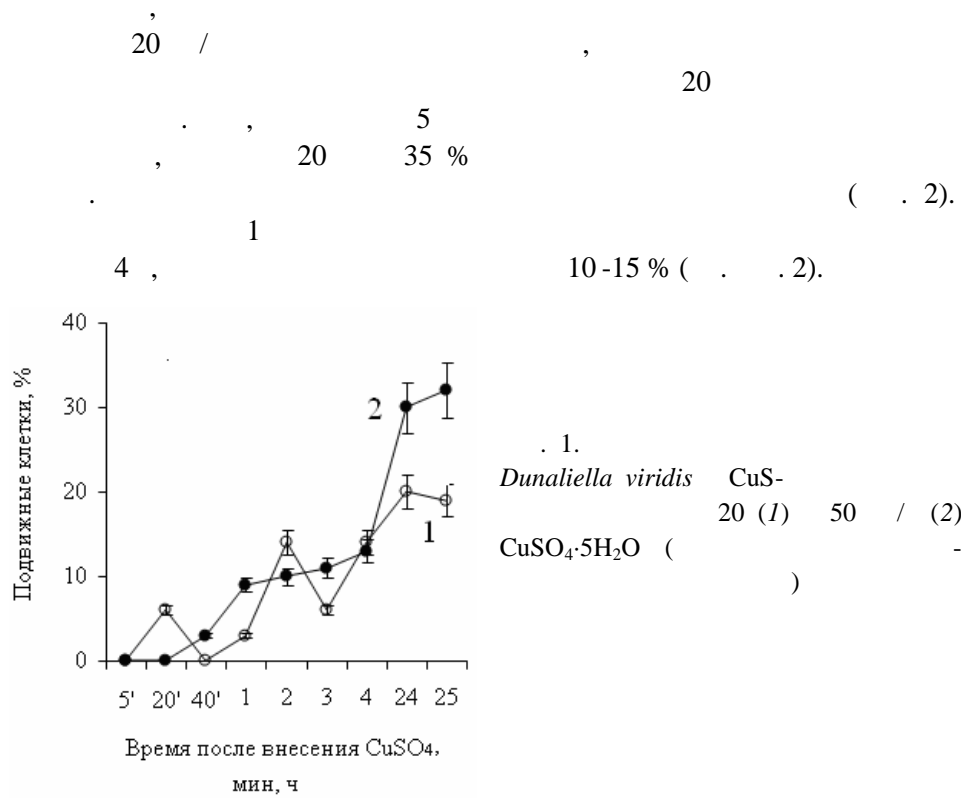
2 . 100
 100
 . 100
 .
 3-5 ,
 (,
 , 1973).

D. viridis, (CuS *D. viridis*)

1, 2, 3 4 , 5, 20, 40 ,
 CuS *D. viridis*. 5, 20 40
 93-97 % , . . 2-3 % -
 3-4
 8-9 %.

CuS *D. viridis*

CuS *D. viridis*
 « » 2-4 .
 5
 CuS *D. viridis* 20 /
 (. 1). 1 3-5 %
 , 2
 10-14 %
 CuS *D. viridis* 19-20 % (. . 1).
 2-3- 10-15 %



() ,

CuS *D. viridis* 20 /

(. 3).

CuS *D. viridis*

15 () 20 50 (

).

() . 20

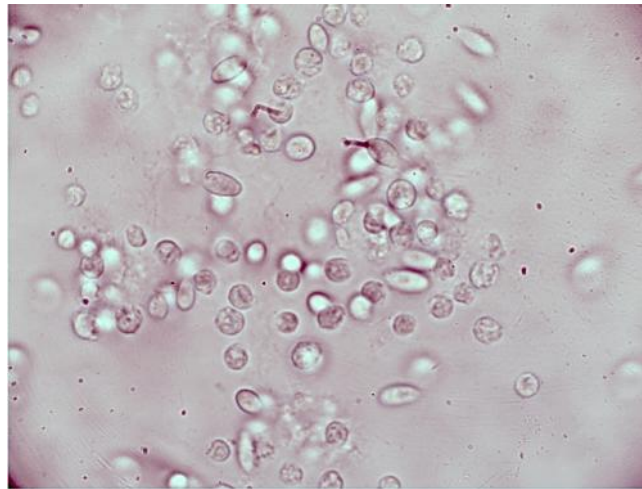
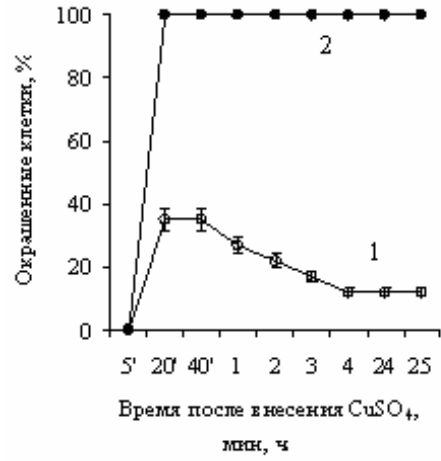
20-30

2 .

10-15 (40

).

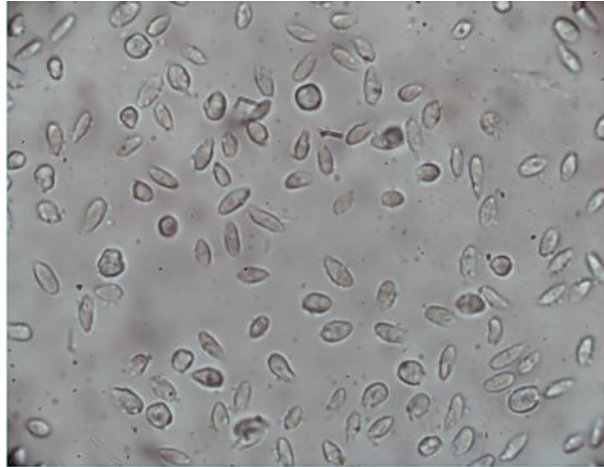
2. *Dunaliella viridis*,
0,3 %-
CuS- 20 (1)
50 / (2) $\text{CuSO}_4 \cdot 5\text{H}_2\text{O}$



3. *Dunaliella viridis*
CuS / $\text{CuSO}_4 \cdot 5\text{H}_2\text{O}$ (200)

24-25

(4).

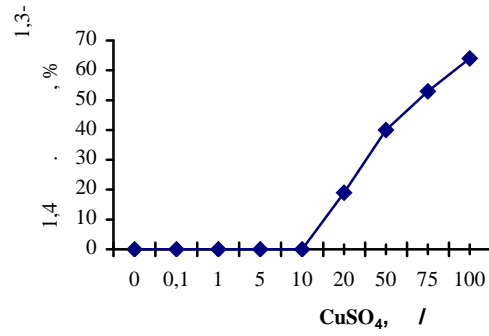


.4.
CuS *Dunaliella viridis*

(150)

100 / , 20 / 20 0,1
100 / (. 5). ,
20 100 /
20 .
-
CuS *D. viridis*. 5 (50 /) 50 /
9 % , 3 , 1
20 / (. . 1).
2-4 10-13 % 20 50 /
1 , 50 /
34 % , 20 / 30 -
. 1). 19-20 % (.
2
5 50 /
, 20 (. . 2)
50 /
CuS *D. viridis*,
(25). 25

20 / , 50 / 25



. 5.

CuS *D. viridis* 1,3-1,4

20

(50 /)

« »

(20 /).

CuS *D. viridis*

(CuR *D. viridis*)

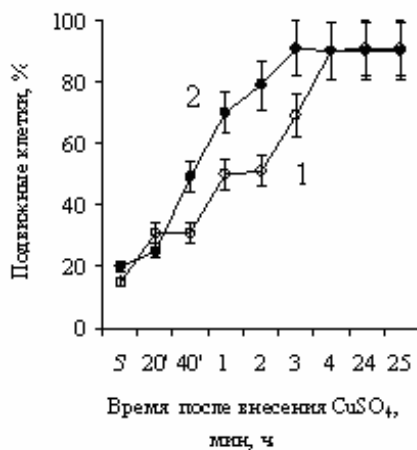
(CuS *D. viridis*).

D. viridis, (CuR *D. viridis*)

CuR *D. viridis* 20 /

5 15 % 1-2
 20-40 30 % 4
 50 %, (. 6).
 10
 CuR *D. viridis*
 (15 %),

CuS *D. viridis* (. . 1 6).



6.
Dunaliella viridis CuR
 20 (1) 50 / (2)
 CuSO₄ · 5H₂O

CuR *D. viridis*
 CuS *D. viridis*, 20
 (. 7).

CuR *D. viridis*

6

CuS *D. viridis*.

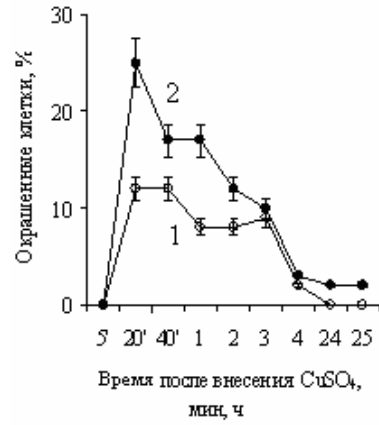
CuR *D. viridis*
 20 /

5

D. viridis, 10-15, CuS *D. viridis*, 20, CuR

25

.7. (0,6 %), CuR *D. viridis*
 CuSO₄ · 5H₂O 20 (1) 50 / (2)



D. viridis, CuR *D. viridis*
 (50 /)

viridis, 5, 50 / 20 / 50 /
 CuR *D. viridis* 20 % 4 - 95 %

(. . 6). 20 / (20 %), 20 / (12 %, . 7). 24

. 7). 50 / 20 / (.

20 - 10-15, 4- 20-30, 2-3

. . . , . . . , . . .

 . . . , 1 -
 , CuR *D. viridis* -
 .
 20 / ,
 50 / ,
 24 20 / , 50 /
 .
Dunaliella
 100
D. viridis *D. salina*
 ,
 () , ,
 ,
 ,
Dunaliella ,
 ,
 (, 1973).
 , -
 ,
 , -
 , -
 ,
 , -
 ,
 , -
 ,

(, 1989).

D. viridis

20 /

)

:

15

);

)

(40-50,

(10-

(

);

D. viridis,

(CuR *D. viridis*),

CuS *D. viridis*;

1 /
Scenedesmus acutus (Corradi, Gordi, 1993).

MnO₂ (Chen at al., 2009).

MnO₂

(Chen at al., 2008).

Dunaliella viridis 20 /

30-40 . 2-4

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CELL AGGREGATES FORMING IN *DUNALIELLA VIRIDIS* TEOD. CULTURE:
A PRIMARY REACTION TO STRESS INDUCED BY HIGH COPPER ION
CONCENTRATION

The dynamics of cell aggregates forming in *Dunaliella viridis* Teod. were studied. Two cultures of *D. viridis*, sensitive to CuSO₄ (CuS) and resistant to CuSO₄ (CuR), were studied. Almost immediately after the addition of CuSO₄ to the culture medium the cells became immobile and formed cell aggregates. The manifestation of these changes depends on the cell culture functional state. Cell recovery after CuSO₄ treatment was investigated. In CuR-culture cell

aggregates become separated and cell mobility and cell membrane integrity recovered relatively early. It is demonstrated that cell aggregation is a primary reaction of cells to high concentration of copper ions in the cell culture medium.

Keywords : *Dunaliella viridis*, copper sulfate, cell aggregates.

-, 1916. –
 . 1/2.
- *Dunaliella*
viridis Teod. // – 1998. – **8**, 2. – . 162-169.
- *Dunaliella viridis*
 Teod. (*Chlorophyta*) // –
 2000. – **10**, 1. – . 22-31.
-
 HLA-DR-
 // – 2002. – **3**. –
 . 161-166.
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 //
 . – 1996. – **6**. – 2. – C. 122-132.
- : / – :
 , 1989. – 608 .
-
 . – : , 1973. – . 21-25; 53-56.
-
Dunaliella Teod. – : . , 1973. – 244 .
-
Dunaliella viridis Teod., // – 2003. – **7**,
 1/2. – . 88-91.
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