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***Xanthomonas campestris* ATCC 13951**

***Kluyveromyces lactis* EMCC 9**

(2002/10/19 2002/7/27)

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Xanthomonath campestris ATCC 13951

- *Kluyveromyces lactis* EMCC 9

K. lactis *X. campestris*

(36) *K. lactis* *X. campestris*

Production of the polysaccharid “Xanthan” by Mixed Cultures of the Bacterium *Xanthomonas campestris* ATCC 13951 and the Yeast *Kluyveromyces lactis* EMCC 9 from Whey Milk

Mohamad Bashir I. Kassim Taha A.W. Khmis

Department of Biology

College of Education

Mosul University

ABSTRACT

In this paper production of the polysaccharide “Xanthan” from whey milk in a two-component mixed culture, was investigated *Xanthomonath campestris* ATCC 13951 was used as the source of Xanthan production while *Kluyveromyces lactis* EMCC 9 was used

as a source of the enzymes beta-galactosidase which hydrolyses lactose the main sugar found in whey. In comparing the results of monocultures of *X. campestris* in whey medium and the mixed culture of *X. campestris* and *K. lactis* it was found that mixed culture were superior in the production of Xanthan from the monoculture of *X. campestris* particularly when *K. lactis* cultured (36 hours) after the culture of the bacterium in four day incubation period.

(EPS) Extracellular

"Xanthan"

Xanthomonas campestris NRRL B-1459

Polysaccharide

(Sloneker and

X. campestris

.Orentas, 1962)

glucuronic)

(Rogovin *et al.*, Heteropolysaccharides

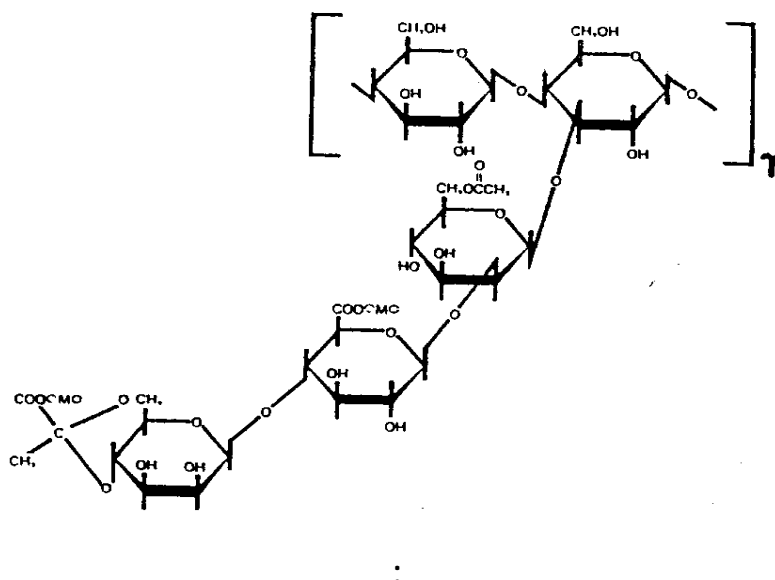
(acid

.(Sloneker and Orentas, 1962)

1961)

(Patton and Dugar,

.1981)



Enhanced Oil Recovery (EOR)

.(Kang and Cottrell, 1979)

(Higgins *et al.*, 1985)

.(Dlamini and Peiris, 1997) *Pseudomonas sp.*

X. campestris

.(Walsh *et al.* 1984; Konicek *et al.*, 1993)

—

()
) *X. campestris*

) *K. lactis* (

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Xanthomonas campestris ATCC 13951

Kluyveromyces lactis EMCC 9

(MIRCEN)

YM lactose Agar

.(YM Agar) Yeast Malt Agar

° 4

(YML Agar)

:

20 : (/)

. 0.4 0.5 0.1 5

. (Nitschke and Thomas, 1995) 7.0

15 (/ 9000) .

. 1 ° 121 (7.0)

15 (/ 9000) . 5

. (° 20-)

50 *X.campestris*

5 3 3 :(/) YM

. 20

.(Hayens *et al.*, 1955) 7.0

250

1 50

15 ° 121

. (/ 150) ° 1 ± 28

:

. 24 ° 80

:

° 600

Thermo Line Austracia BTC 9090

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: ()

.(Dubois *et al.* , 1956)

:

Soxholat apparatus

.(° 80-60)

:

Semi Micro Keldyhal

.(A.O.A.C., 1980)

:

10 (° 60)

30 (/ 9000)

)

.((/) 2:1 1:1

24 ° 60

:

(30)

()

10

° 60

24

.(Tait *et al.*, 1986)

K. Lactis

ATCC 13951

: YM Agar

() *K. Lactis*

ATCC 13951

(9)

ATCC 13951

. YM

K. lactis

Streaking method

5

° 28± 1

(Bill et al., 1982)

: *K. Lactis* ATCC 13951*K. Lactis* ATCC 13951

12

12

:

(1)

:1

(/ %)	(/ %)	
95.50	95.38	
3.8	3.8	
0.32	0.76	
0.003	0.008	
0.047	0.052	

Dlamin and Peiris, 1997; Kawahara and Obata)

.(,1998

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:*X. campestris* ATCC 13951

(3 2)

.

(/ 10.4)

.

(/ 1.75)

)

.(

-

X. campestris

Frank and Somkuti, 1979 ;Walsh et al., 1984 ; Fu and)

.(Tseng, 1990

X. campestris

:2

ATCC 13951

	/	/	/	()
7.10 (0.006)	6.73 (0.192)	3.1 (0.001)	0.50 (0.050)	2
7.38 (0.018)	6.00 (0.054)	3.7 (0.067)	0.54 (0.003)	3
6.58 (0.010)	5.30 (0.108)	8.0 (0.008)	0.38 (0.089)	4
6.31 (0.050)	4.53 (0.140)	8.4 (0.017)	0.34 (0.000)	5
6.28 (0.003)	3.05 (0.006)	8.8 (0.082)	0.48 (0.049)	6
5.91 (0.041)	1.23 (0.029)	10.2 (0.000)	0.51 (0.091)	7
6.40 (0.007)	0.81 (0.077)	10.4 (0.030)	0.62 (0.085)	8

.(S.D.)

:3

X. campestris ATCC 13951

	/	/	/	()
8.04 (0.015)	32.21 (0.091)	1.75 (0.013)	3.30 (0.002)	2
8.56 (0.013)	29.51 (0.052)	1.66 (0.007)	2.92 (0.012)	3
8.67 (0.014)	26.55 (0.081)	1.60 (0.005)	2.90 (0.000)	4
9.07 (0.012)	23.20 (0.007)	1.45 (0.031)	2.94 (0.003)	5
9.24 (0.007)	20.75 (0.101)	1.40 (0.009)	2.46 (0.002)	6
9.26 (0.061)	18.12 (0.075)	1.37 (0.054)	2.48 (0.015)	7
9.29 (0.090)	16.23 (0.003)	1.22 (0.039)	2.51 (0.021)	8

(S.D.)

K. lactis *X. campestris* ATCC 13951

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(Bell *et al.* 1982)

(1) YM Agar

() *K. lactis* *X. campestris*



) *K. lactis*

() *X. campestris*

:1

.YM Agar

(

X. campestris ATCC 13951

-1

K. lactis

(4)

(/ 1.0)

K. lactis

X. campestris ATCC 13951

:4

	/	/	/	()
7.04 (0.063)	1.05 (0.246)	0.80 (0.011)	4.24 (0.080)	2
7.11 (0.000)	0.30 (0.100)	1.00 (0.090)	7.20 (0.077)	3
7.74 (0.002)	0.37 (0.009)	0.80 (0.007)	6.44 (0.230)	4
7.78 (0.015)	0.25 (0.063)	0.80 (0.040)	6.28 (0.165)	5

(S.D.)

K. lactis

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X. campestris ATCC 13951

(5)

(12)

K. lactis

X. campestris ATCC 13951

K. lactis :5

12

X. campestris ATCC 13951

	/	/	/	()
5.78 (0.031)	5.13 (0.192)	0.00 (0.000)	6.48 (0.203)	2
6.55 (0.009)	3.93 (0.395)	0.00 (0.000)	5.88 (0.150)	3
6.56 (0.045)	2.76 (0.330)	0.00 (0.000)	6.11 (0.085)	4
6.88 (0.016)	1.02 (0.135)	0.00 (0.000)	6.62 (0.308)	5

.(S.D.)

ATCC 13951**-3****12** *K. lactis***ATCC 13951**

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1-3

:

12

(6)

(/ 2.3)

(12)

X. campestris ATCC 13951*K. lactis*

ATCC 13951

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X. campestris ATCC 13951 :6

12 *K. lactis*

	/	/	/	()
7.93 (0.006)	5.25 (0.106)	1.8 (0.004)	2.44 (0.152)	2
7.48 (0.037)	2.05 (0.089)	2.3 (0.030)	3.18 (0.200)	3
7.52 (0.002)	1.80 (0.099)	2.2 (0.001)	3.08 (0.138)	4
6.79 (0.084)	0.30 (0.272)	2.0 (0.070)	4.32 (0.060)	5

(S.D.) ...

ATCC 13951

2-3

: **24** *K. lactis*

24 (7)

12

(/ 2.9)

X. campestris ATCC 13951 :7

24 *K. lactis*

	/	/	/	()
7.68 (0.000)	5.50 (0.119)	1.90 (0.010)	3.66 (0.070)	2
7.13 (0.021)	3.65 (0.207)	2.90 (0.005)	3.72 (0.145)	3
7.91 (0.003)	3.10 (0.291)	2.40 (0.040)	3.74 (0.008)	4
7.98 (0.095)	1.80 (0.083)	2.15 (0.070)	3.44 (0.097)	5

(S.D.) ..

ATCC 13951

3-3

: **36** *K. lactis*

36 (8)

(/ 4.4)

36

X. campestris ATCC 13951

:8

36

K. lactis

	/	/	/	()
8.30 (0.103)	5.70 (0.200)	2.10 (0.050)	1.78 (0.070)	2
7.91 (0.076)	4.25 (0.129)	3.10 (0.000)	3.38 (0.108)	3
8.01 (0.002)	4.00 (0.030)	4.40 (0.007)	2.14 (0.002)	4
8.14 (0.010)	1.90 (0.270)	4.10 (0.130)	1.74 (0.090)	5

(S.D.)

ATCC 13951

4-3

: **48** *K. lactis*

(9)

3.55)

K. lactis

X. campestris

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LeDuy *et al.* (1983)

Ceratocystis ulmi

A. pullulans

..... " "

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K. lactis *X. campestris* ATCC 13951

X. campestris ATCC 13951 :9

48 *K. lactis*

	/	/	/	()
8.27 (0.051)	5.80 (0.224)	2.40 (0.050)	1.69 (0.071)	2
8.32 (0.004)	4.70 (0.167)	2.15 (0.006)	1.72 (0.126)	3
7.25 (0.069)	4.15 (0.099)	2.35 (0.011)	2.09 (0.093)	4
6.29 (0.005)	1.90 (0.180)	3.55 (0.034)	2.11 (0.002)	5

.(S.D.)

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