



/ cm/h / [ ]  
 OF / cm/h [ ]  
 [ ] [ ]  
 AR [ ]

OF

[ ] OF

OF  
 OF  
 [ ]

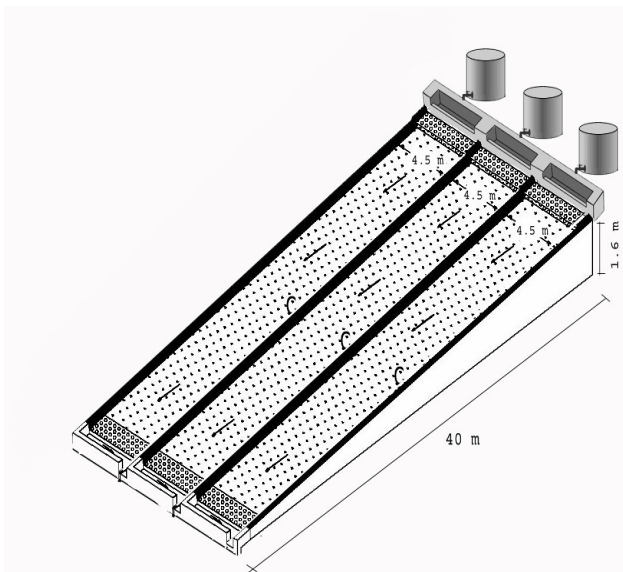
OF  
 % TSS BOD %  
 %

cm

OF

( )  
 %

( )



OF

OF

% / % / %

.....

( )  
 TBOD<sub>5</sub> ( )  
 TP TN TSS TCOD OF  
 ( )  
 [ ] ) °c °c  
 °c °c ( )  
 OF ( )  
 ( ) ) AR  
 OF / m<sup>3</sup>/m.h / / ( )  
 ( )  
 ( )  
 OF  
 COD BOD [ ]  
 ( )  
 OF  
 COD BOD  
 / ( )  
 ( ) / /  
 / m<sup>3</sup>/m.h / / OF  
 ( )  
 OF  
 ( )  
 (OLR) (HLR)  
 :  
 ( ) 
$$HLR = \frac{AR}{L}$$
 ( )  
 ( ) 
$$OLR = HLR \times C$$
 ( )  
 ( ) AR m<sup>3</sup>/m<sup>2</sup>.h HLR  
 m L m<sup>3</sup>/m.h  
 ) C kg/m<sup>2</sup>.h OLR  
 kg/m<sup>3</sup> (COD BOD

Influent	Application			Hydraulic loading rate, cm d <sup>-1</sup>	Organic loading rate, kg BOD <sub>5</sub> ha <sup>-1</sup> d <sup>-1</sup>
	Period, h d <sup>-1</sup>	Frequency, d wk <sup>-1</sup>	Rate, m <sup>3</sup> m <sup>-1</sup> h <sup>-1</sup>		
Primary effluent	7	5	0.15	2.63	39.0
	7	5	0.25	4.38	65.1
	7	5	0.35	6.13	91.1
Activated sludge secondary effluent	7	5	0.15	2.63	13.1
	7	5	0.25	4.38	21.9
	7	5	0.35	6.13	30.6
Lagoon effluent of textile wastewater	7	5	0.15	2.63	47.3
	7	5	0.25	4.38	78.8
	7	5	0.35	6.13	110.3

1. Based on 35 measurements for ARs of 0.15 and 0.25 m<sup>3</sup> m<sup>-1</sup> h<sup>-1</sup> and 30 measurements for ARs of 0.35 m<sup>3</sup> m<sup>-1</sup> h<sup>-1</sup>.

**OF**

Influent	Statistical parameter	TBOD <sub>5</sub> , mg L <sup>-1</sup>	TCOD, mg L <sup>-1</sup>	TSS, mg L <sup>-1</sup>	TN, mg L <sup>-1</sup>	TP, mg L <sup>-1</sup>	Turbidity, NTU
Primary effluent	Mean	149.0	428.0	125.0	82.3	20.4	56.9
	Std. dev.	17.0	52.3	20.0	9.7	5.5	8.9
	Range	115-172	332-503	95-159	68-99	10-32	36-72
Activated sludge secondary effluent	Mean	50.3	130.3	100.3	35.0	10.2	35.3
	Std. dev.	10.1	17.5	14.4	4.6	2.8	8.7
	Range	37-75	115-185	67-132	27-45	6-15	28-65
Lagoon effluent of textile wastewater	Mean	180.4	899.7	140.0	25.1	7.7	38.4
	Std. dev.	19.5	141.6	16.7	3.4	0.7	7.4
	Range	150-213	740-1209	105-161	19-31	6.5-9.1	26-49

1. Based on 100 measurements.

**OF**

Type of influent	TBOD <sub>5</sub> , %	TCOD, %	TSS, %	TN, %	TP, %	Turbidity, %
<b>Acclimation phase</b>						
Primary effluent	49.2	36.5	60.7	19	18.1	32.1
Secondary effluent	48.8	29.8	54.7	30.2	24.3	46.2
Lagoon effluent	57	57.2	64	26.8	17.2	31
<b>Second phase</b>						
Primary effluent	74.5	54.8	66.2	39.4	35.8	67.7
Secondary effluent	52.9	52.9	66.5	44.4	39.8	50.1
Lagoon effluent	65.7	58.7	70.3	41.7	41.3	54.9

COD BOD

OF ( ) ( )

TCOD

OF

OF

TCOD %

OF

%

**OF**

Type of influent	AR, $m^3 m^{-1} h^{-1}$	Statistical parameter	TBOD <sub>5</sub> , $mg L^{-1}$	TCOD, $mg L^{-1}$	TSS, $mg L^{-1}$	TN, $mg L^{-1}$	TP, $mg L^{-1}$	Turbidity, NTU
Primary effluent	0.15	Mean	24.1	174.9	35.3	41.2	11.5	14.1
		Std. dev.	7.8	29.9	8.9	6.7	3.0	3.4
		Range	13-44	120-236	21-57	30-56	6-17	8-21
	0.25	Mean	38.2	194.2	41.0	54.2	12.6	19.4
		Std. dev.	5.2	33.3	9.5	8.6	3.3	2.6
		Range	30-54	139-253	27-57	39-67	7-18	15-26
	0.35	Mean	53.9	215.0	51.9	55.4	15.7	22.4
		Std. dev.	7.6	36.1	8.5	6.7	5.1	4.2
		Range	40-69	146-285	37-64	40-65	6-26	15-33
Activated sludge secondary effluent	0.15	Mean	20.1	52.6	28.4	16.3	5.1	14.6
		Std. dev.	4.0	4.9	3.8	2.5	1.5	2.8
		Range	14-29	44-65	22-39	12-21	3-8	11-21
	0.25	Mean	24.5	62.7	32.6	20.6	5.4	18.4
		Std. dev.	5.5	16.6	7.0	3.8	1.7	5.1
		Range	17-38	45-109	23-50	14-28	3-9	14-33
	0.35	Mean	26.5	70.1	40.4	21.6	8.2	20.0
		Std. dev.	5.3	7.8	8.0	2.8	2.4	5.1
		Range	19-40	59-91	28-59	16-27	4-12	14-34
Lagoon effluent of textile wastewater	0.15	Mean	45.8	313.6	27.0	13.5	4.4	15.1
		Std. dev.	5.7	60.9	3.9	1.9	0.7	2.6
		Range	35-56	205-433	21-38	10-17	3-6	11-21
	0.25	Mean	63.9	371.4	44.2	13.9	5.0	17.6
		Std. dev.	7.9	45.8	6.3	1.6	0.8	3.3
		Range	51-87	289-478	31-56	11-17	4-7	12-24
	0.35	Mean	77.8	434.3	55.3	16.5	4.2	19.2
		Std. dev.	8.7	58.9	7.1	3.0	0.7	3.7
		Range	58-95	358-557	43-67	12-23	3-5	12-25

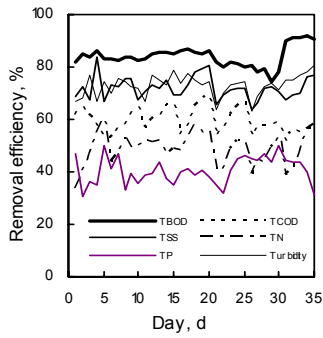
1. Based on 35 measurements for ARs of 0.15 and 0.25  $m^3 m^{-1} h^{-1}$  and 30 measurements for ARs of 0.35  $m^3 m^{-1} h^{-1}$ .

**AR OF ( ) :**

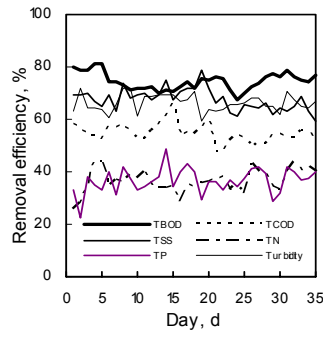
Type of influent	AR, $m^3 m^{-1} h^{-1}$	TBOD <sub>5</sub> , %	TCOD, %	TSS, %	TN, %	TP, %	Turbidity, %
Primary effluent	0.15	84.0	59.5	71.9	48.7	40.6	72.9
		(4.0)	(4.8)	(4.4)	(6.3)	(5.2)	(4.1)
		74.5	54.7	67.5	36.5	36.7	66.3
	0.25	(3.3)	(3.7)	(4.1)	(4.5)	(4.8)	(3.3)
		63.3	49.6	57.8	31.8	29.2	63.3
		(2.5)	(3.2)	(3.6)	(4.0)	(5.4)	(3.2)
Activated sludge secondary effluent	0.15	58.7	58.5	71.6	53.3	50.7	54.3
		(4.7)	(4.0)	(3.2)	(5.0)	(5.4)	(5.2)
		52.4	53.9	68.7	40.1	45.0	51.4
	0.25	(4.4)	(4.8)	(4.1)	(5.8)	(5.6)	(3.7)
		46.7	45.3	58.1	38.9	21.2	43.8
		(4.5)	(2.6)	(3.3)	(3.8)	(6.0)	(5.2)
Lagoon effluent of textile wastewater	0.15	74.0	65.4	80.1	47.6	41.4	60.2
		(3.8)	(4.1)	(2.2)	(3.4)	(5.3)	(3.7)
		64.6	57.7	67.6	43.2	38.7	52.7
	0.25	(2.4)	(2.3)	(5.2)	(3.2)	(5.3)	(2.9)
		57.4	52.0	62.0	33.1	44.0	51.1
		(2.8)	(3.1)	(3.2)	(3.1)	(4.2)	(2.5)

1. Based on 35 measurements for ARs of 0.15 and 0.25  $m^3 m^{-1} h^{-1}$  and 30 measurements for ARs of 0.35  $m^3 m^{-1} h^{-1}$ .

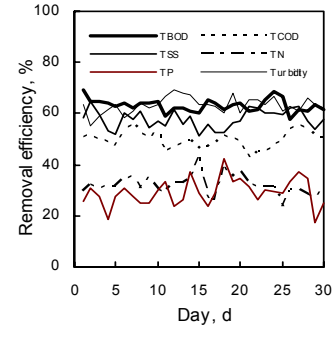
(a) Primary, AR = 0.15



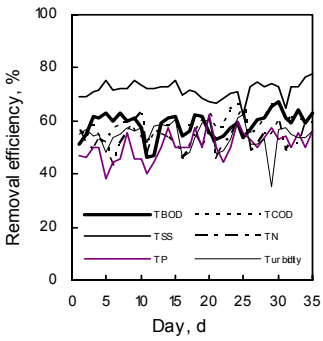
(b) Primary, AR = 0.25



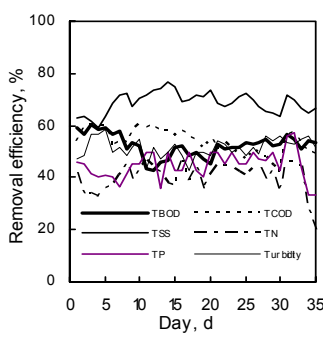
(c) Primary, AR = 0.35



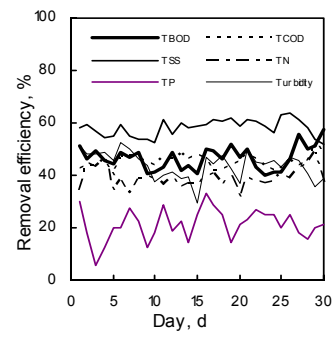
(d) Secondary, AR = 0.15



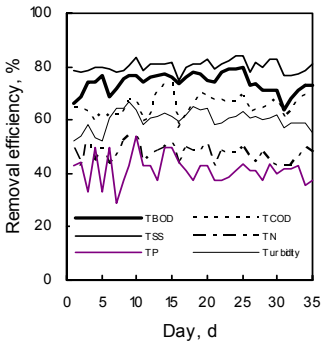
(e) Secondary, AR = 0.25



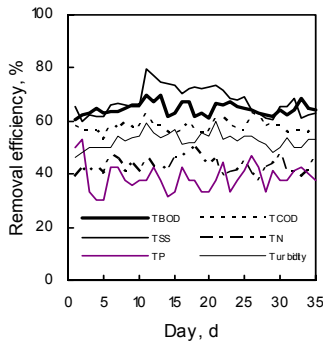
(f) Secondary, AR = 0.35



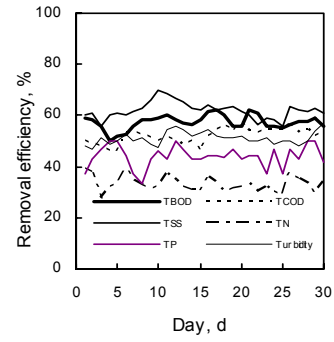
(g) Lagoon, AR = 0.15



(h) Lagoon, AR = 0.25



(i) Lagoon, AR = 0.35

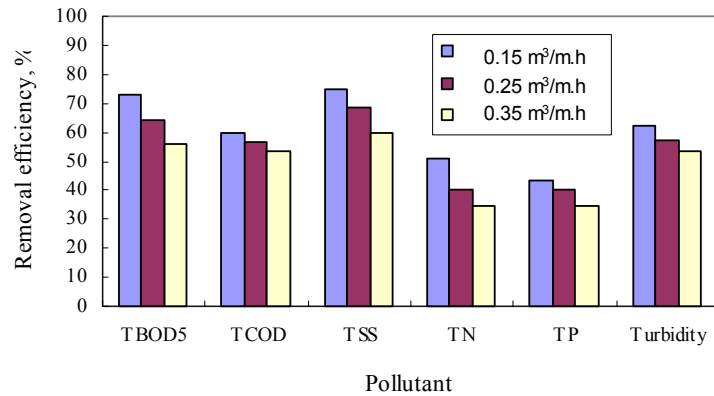


OF

:

$\frac{\text{m}^3}{\text{m.h}}$

AR



AR OF

:

A		n k A		TCOD		(TBOD <sub>5</sub> )	
5mg/L OF		BOD <sub>5</sub>		COD		OF	
A	[ ]	0.37m <sup>3</sup> /m.h	0.25	0.16	( )		TCOD
A		0.71	0.51	0.38	TCOD TP TN	OF	AR
n k	OF	BOD <sub>5</sub>	( )				%
R <sup>2</sup> = 0.997		0.487	0.012			(% )	( )
n k	[ ]				% ) TBOD <sub>5</sub>		
[ ]		0.136	0.043		(% ) TSS		(% )
	[ ]					( )	
	TBOD				)		OF
					( )		(
							AR
	[ ]					AR	
		OF					
	( )					( )	
							OF
R <sup>2</sup>	( )						
/		0.99	0.71				
		TP					
R <sup>2</sup> = 0.33							
	( )						
	( ) AR			[ ]		OF	
B				[ ]			
	( )					BOD <sub>5</sub>	
							:
$\frac{C}{C_0} = Be^{-kt}$					$\frac{C-5}{C_0} = A \exp(-\frac{k}{q^n} z)$		( )
	( )	BOD <sub>5</sub>	C	C <sub>0</sub>			
t	B	q mg/L	OF				
min <sup>-1</sup>	k (min)	m		z m <sup>3</sup> /m.h			





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- 1 - Overland Flow (OF)
  - 2 - Application Rate (AR)
  - 3 - Total 5-day Biochemical Oxygen Demand (TBOD<sub>5</sub>)
  - 4 - Total Chemical Oxygen Demand (TCOD)
  - 5 - Total Suspended Solids (TSS)
  - 6 - Silt Loam
  - 7 - Orchard Grass
  - 8 - Reed Canary
  - 9 - Tall Fescue
  - 10 - Kentucky Bluegrass
  - 11 - Rye Grass
  - 12 - Hydraulic Loading Rate (HLR)
  - 13 - Organic Loading Rate (OLR)
  - 14 - Determination Coefficient (R<sup>2</sup>)
-