



Metabolismo microbico

nelle acque della laguna di Venezia

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WP2. Struttura e attività del comparto microbico nella Laguna di Venezia

Obiettivo principale

- valutazione del ruolo funzionale della componente microbica e delle sue variazioni spazio temporali, in relazione alla degradazione della sostanza organica



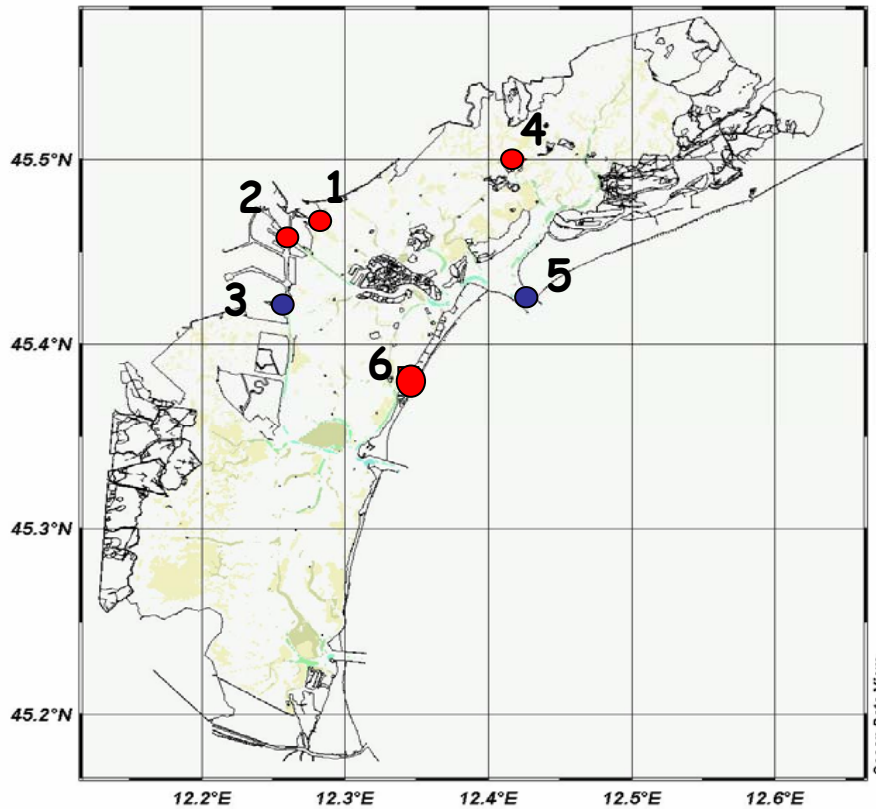
Linea 3.12

Catena trofica e produzione primaria e
secondaria nel metabolismo lagunare



Struttura, dinamica e caratteristiche funzionali delle
comunità biologiche dominate da macrofite e da alghe
planctoniche nella Laguna di Venezia

Responsabilità scientifica: A.Pugnetti CNR ISMAR



6 STAZIONI (bacino settentrionale e centrale)

● 1 - S. Giuliano

● 2 - Marghera

● 3 - Fusina

● 4 - Palude della Rosa

● 5 - Lido (Bocca di Porto)

● 6 - Lido (Fanerogame)

● Tutti i parametri

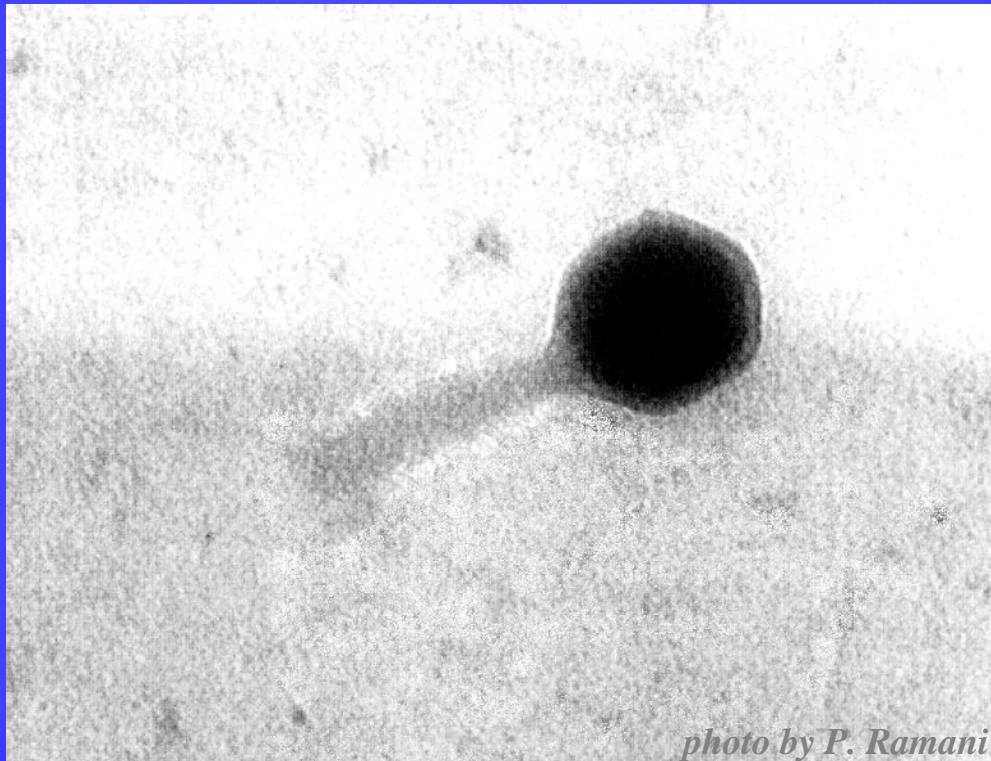
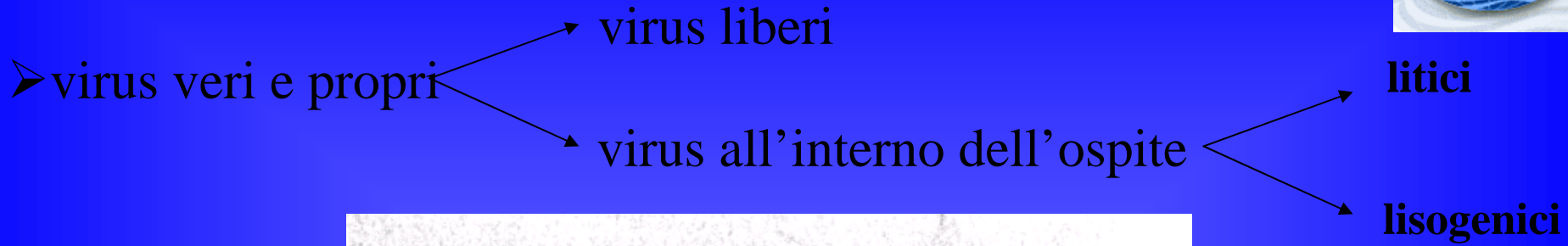
● Parametri microbici

- campionamenti effettuati contemporaneamente per i vari parametri
- misure effettuate in tempi rapidi

campagne di studio stagionali

OTTOBRE 2004 (AUTUNNO '04), GENNAIO 2005 (INVERNO '05), APRILE 2005 (PRIMAVERA '05), LUGLIO 2005 (ESTATE '05), OTTOBRE 2005 (AUTUNNO '05)

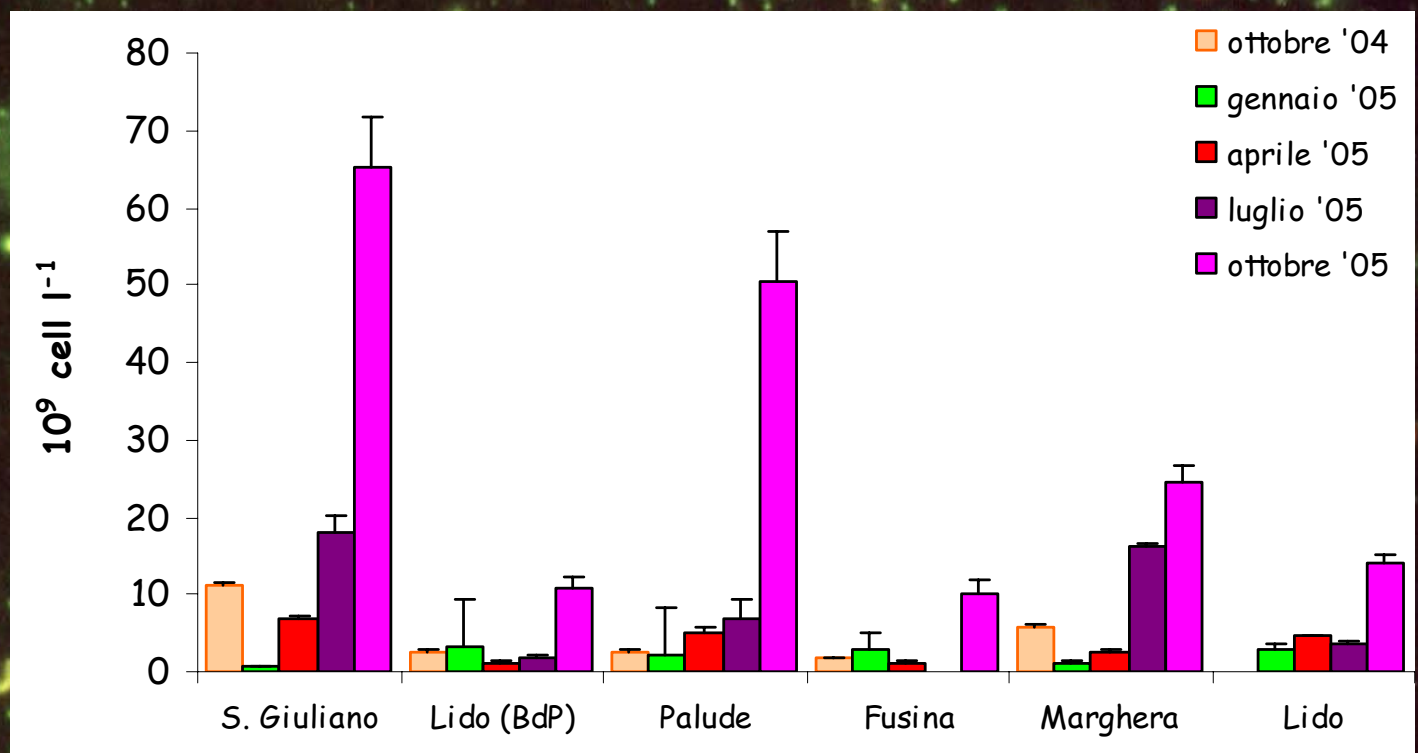
“VLP”



➤ acidi nucleici



Abbondanza Virale

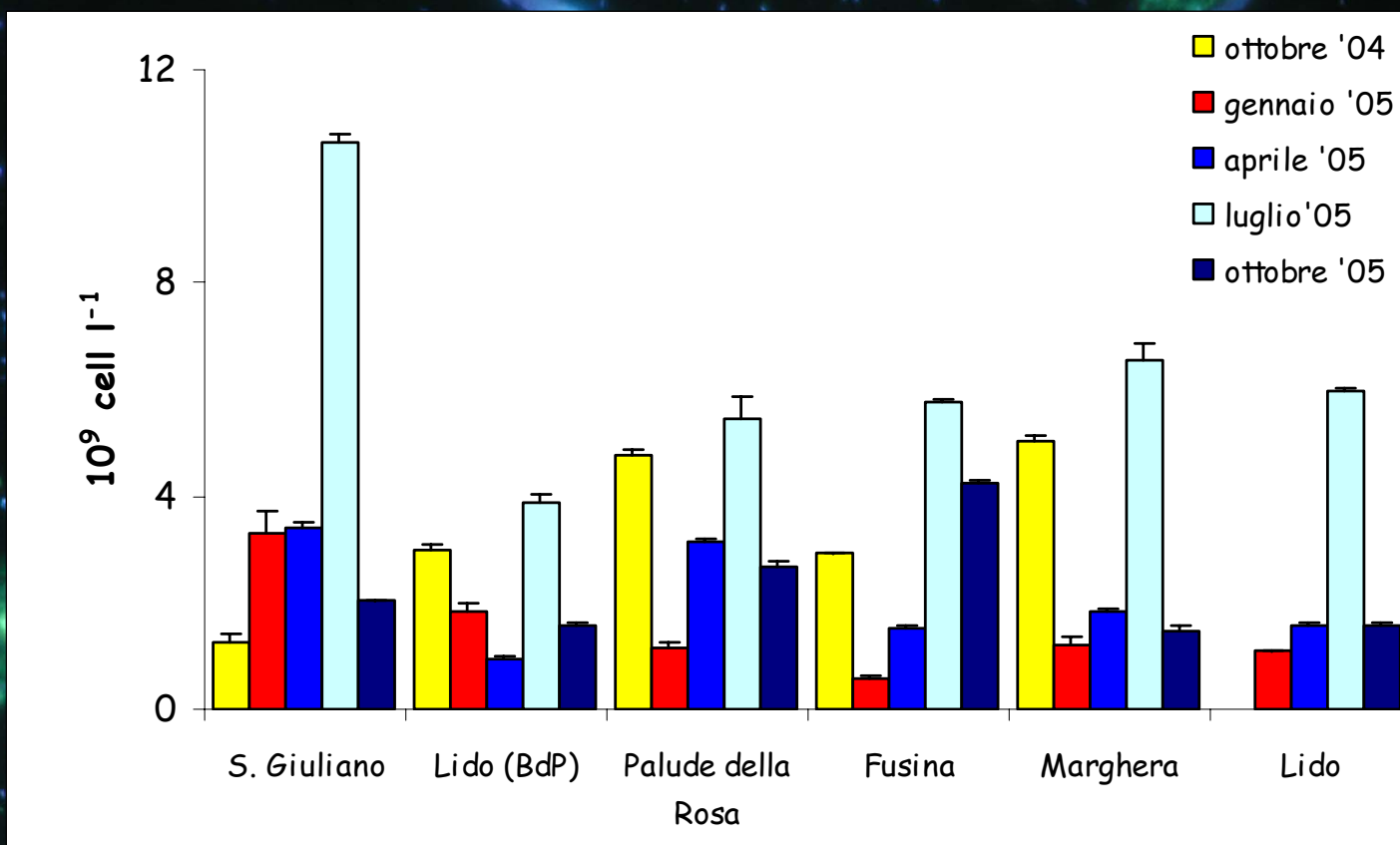


	VLP			
	*10 ⁹ cell l ⁻¹	media	min	MAX
S. Giuliano	20	1	65	127
Lido (BdP)	4	1	11	101
Palude della Rosa	13	2	51	157
Fusina	4	1	10	103
Marghera	10	1	25	100
Lido	6	3	14	83





Abbondanza Batterica



	Batteri				
	*10 ⁹ cell l ⁻¹	media	min	MAX	CV%
S. Giuliano		4	1	11	90
Lido (BdP)		2	1	4	52
Palude della Rosa		3	1	5	50
Fusina		3	1	6	69
Marghera		3	1	7	75
Lido		3	1	6	89



$$\text{VLP} \longrightarrow \text{VBR} = \frac{\text{abbondanza VLP}}{\text{abbondanza batteri}}$$

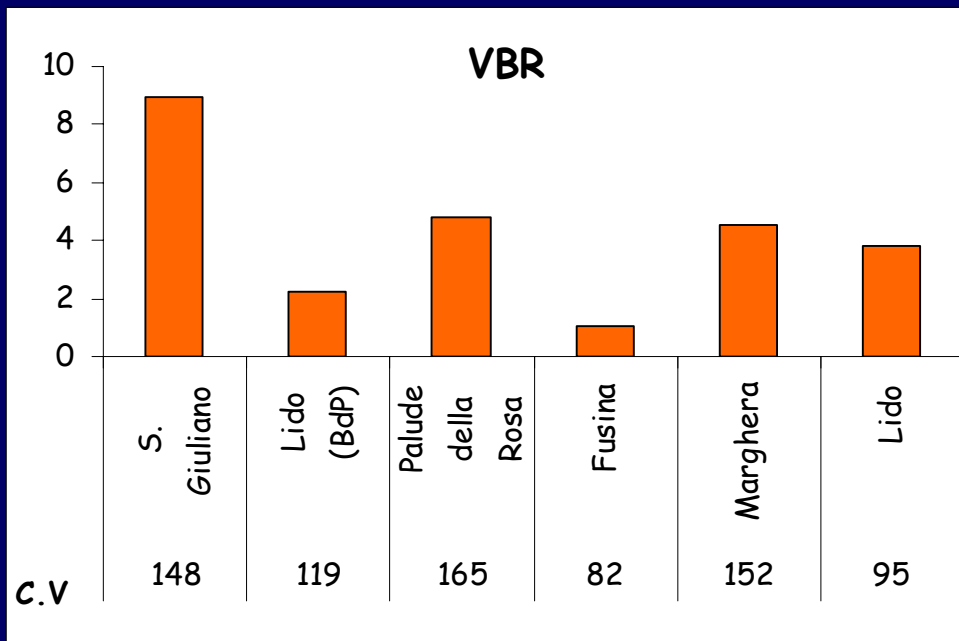
- mare: 5-10 (20)
- ghiaccio: fino 72
- sedimento: 0.11 – 71
- acqua dolce: <1

$\text{VBR}_{\min} = 0.5$ Lido (BdP) luglio

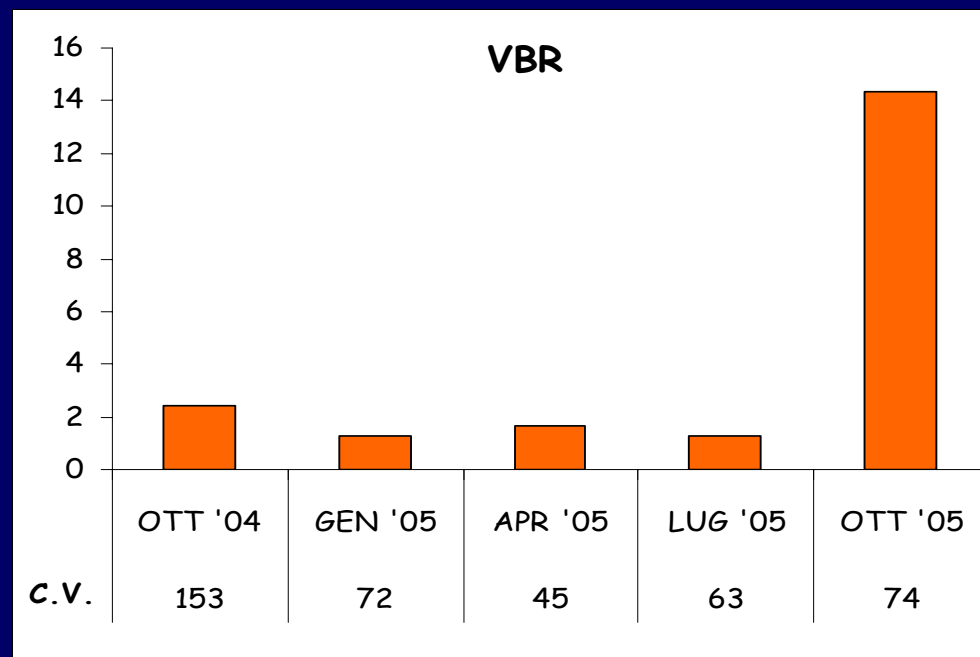
$\text{VBR}_{\max} = 31.9$ S.Giuliano ottobre 05

$\text{VBR} = 4.4$





Virus / Bacteria





PLANCTON	DIMENSIONI	ORGANISMI
FEMPTON	0.02 – 0.2 μm	Virus
PICO	0.2 – 2 μm	Batteri (autotrofi ed eterotrofi)
NANO	2 – 20 μm	Protozoi flagellati, Ciliati, Diatomee, Dinoficee
MICRO	20 – 200 μm	Diatomee, Dinoficee, Tintinnidi, Radiolari, Ciliati, Foraminiferi





*10 ⁵ cell l ⁻¹	Nanoplancton			
	media	min	MAX	CV%
S. Giuliano	29	2	94	137
Palude della Rosa	24	1	73	121
Marghera	74	4	210	109
Lido	17	4	45	112

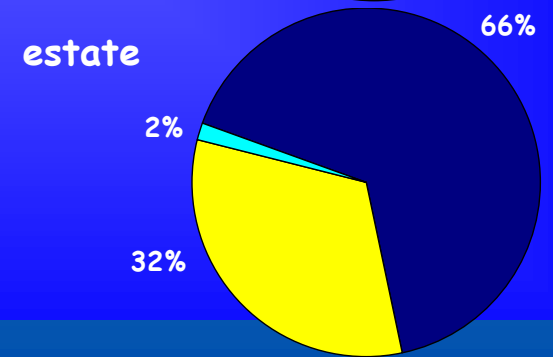
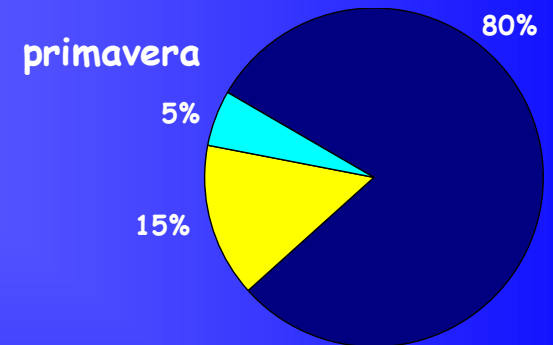
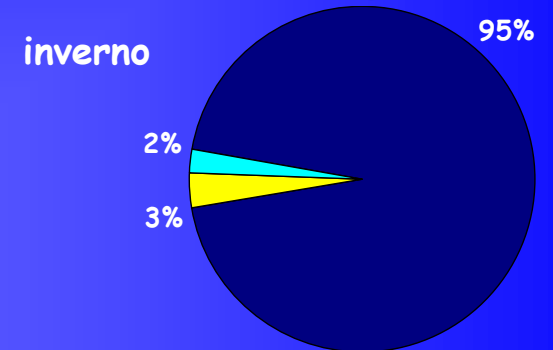
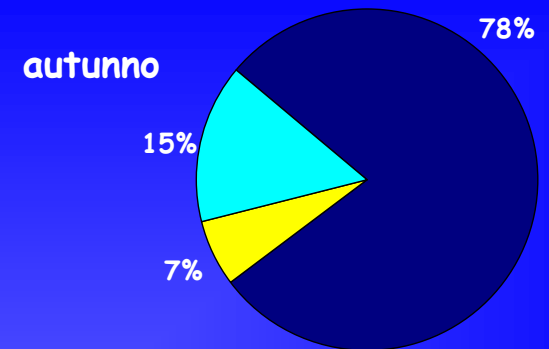
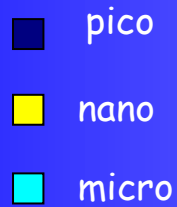
cell l ⁻¹	Microprotozoi			
	media	min	MAX	CV%
S. Giuliano	2132	128	4720	88
Palude della Rosa	1046	164	1960	70
Marghera	3002	728	6575	91
Lido	6104	102	14728	101

ind l ⁻¹	Micrometazoi			
	media	min	MAX	CV%
S. Giuliano	58	8	128	90
Palude della Rosa	23	0	48	79
Marghera	80	0	284	145
Lido	63	2	184	133



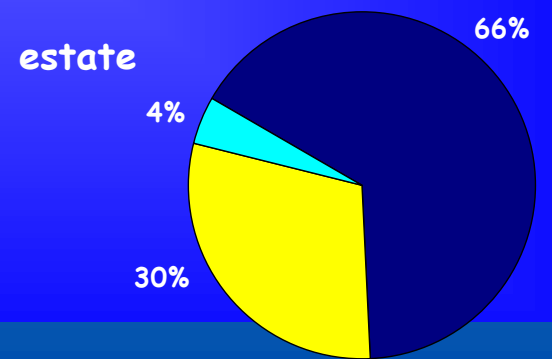
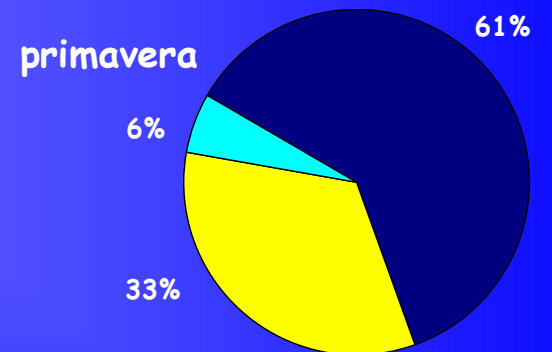
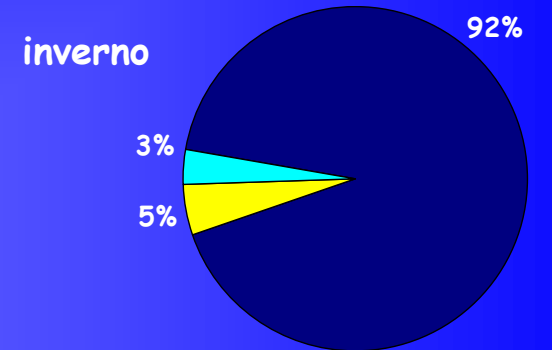
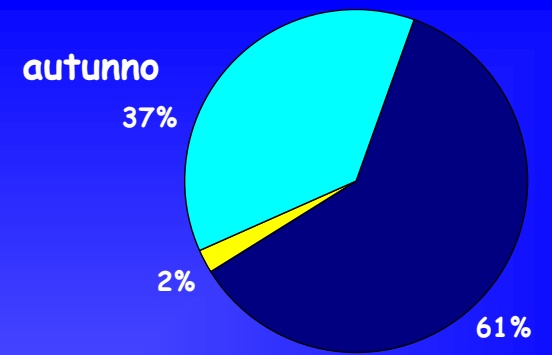
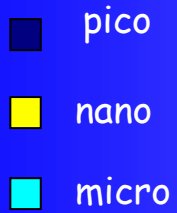
Palude della Rosa

ETEROTROFI

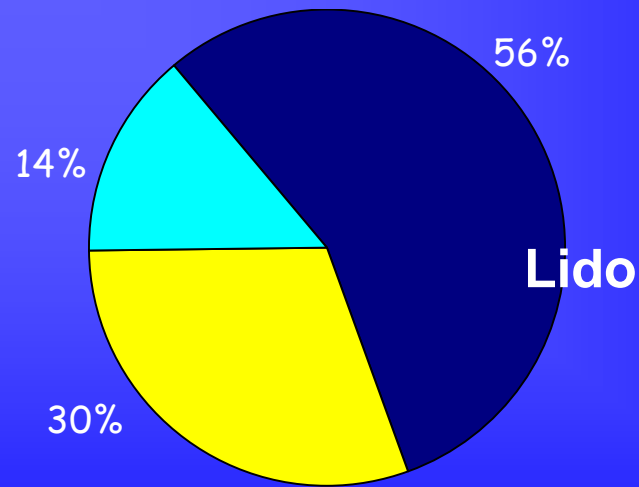
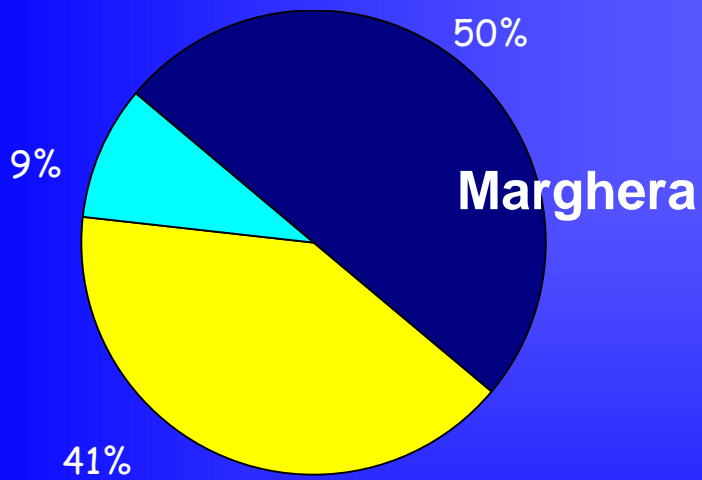
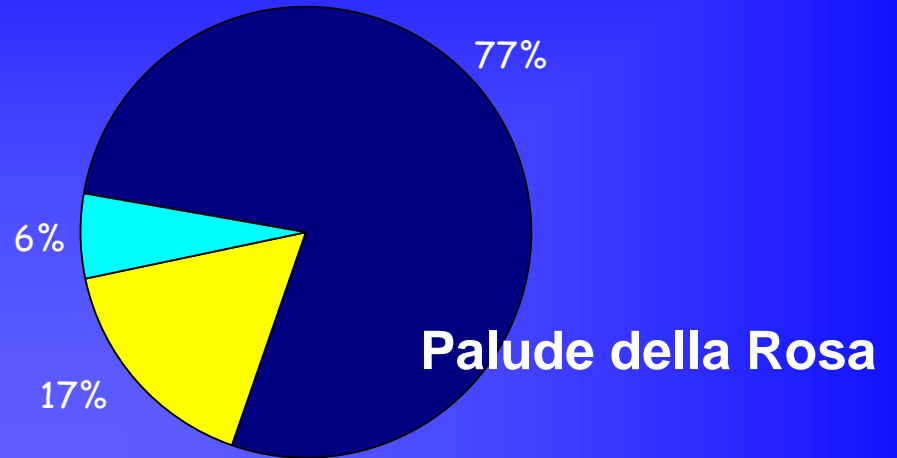
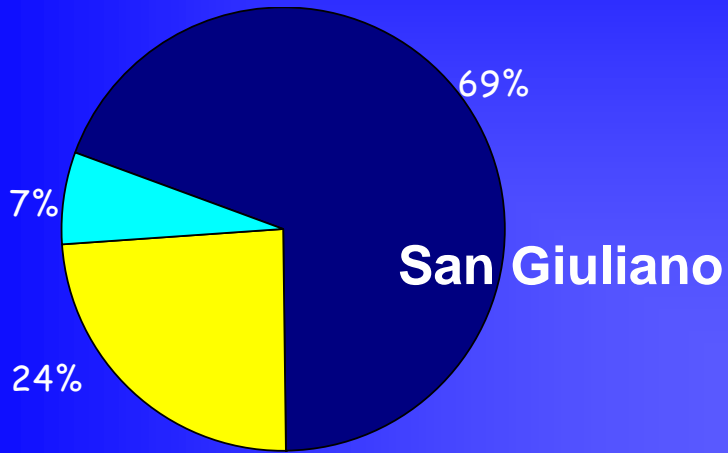


S. Giuliano

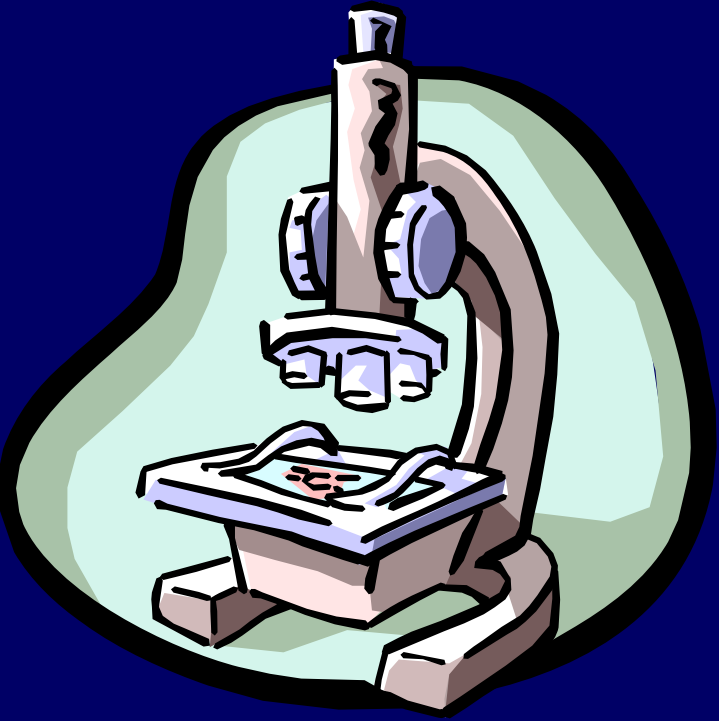
ETEROTROFI



Contenuto percentuale medio di C



■ pico ■ nano ■ micro

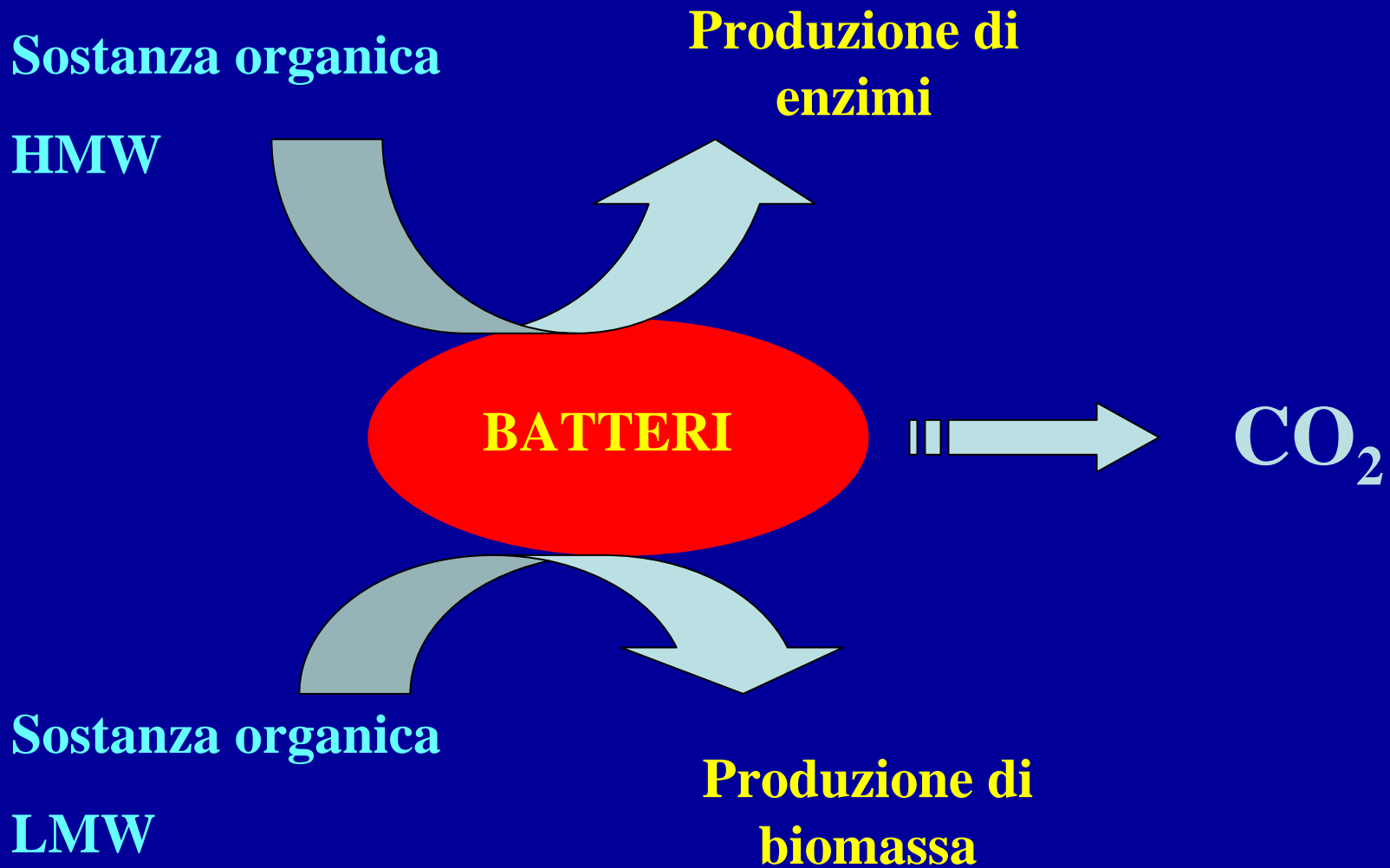


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Composizione della comunità
planctonica eterotrofa

?

Dominata dai batteri



Attività esoenzimatica batterica

β -glucosidasi
 α -glucosidasi

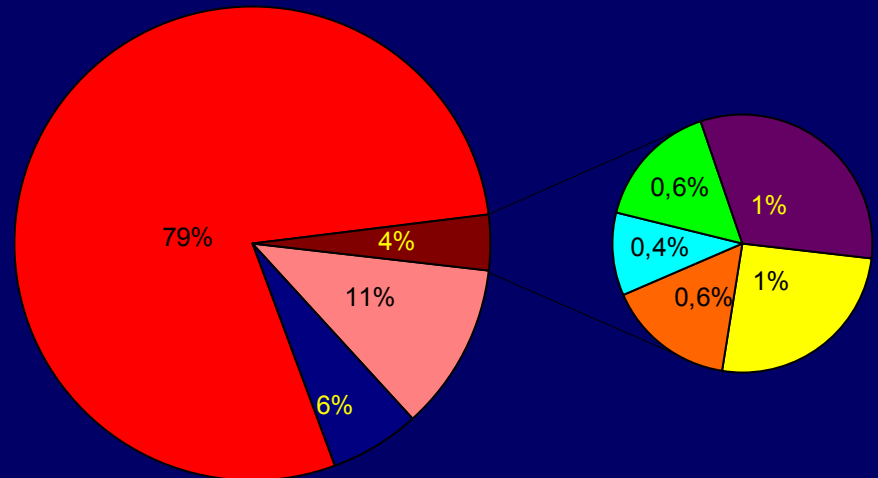
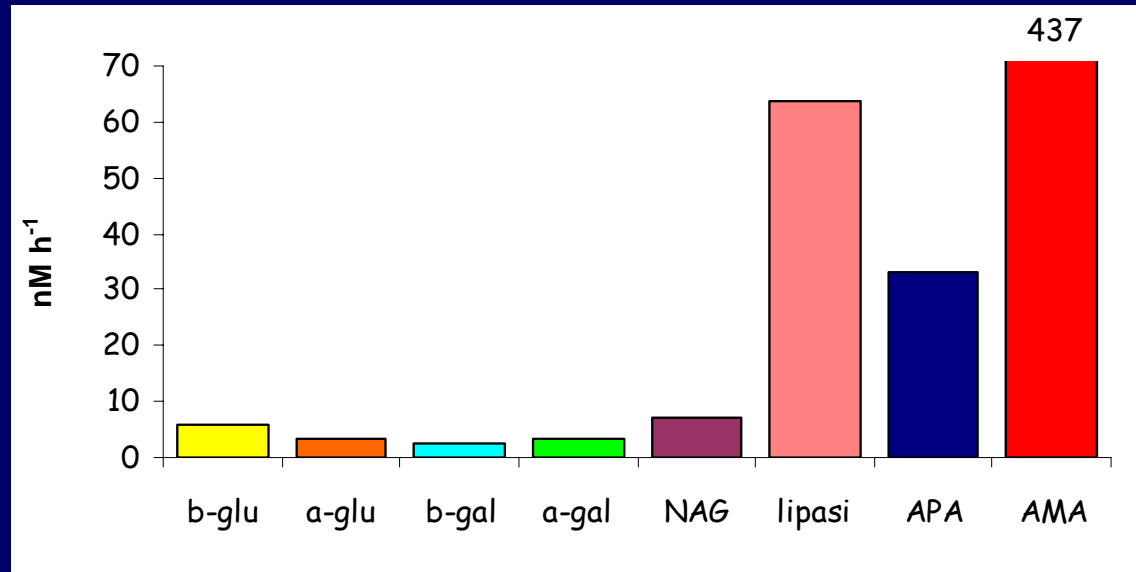
β -galattosidasi
 α -galattosidasi

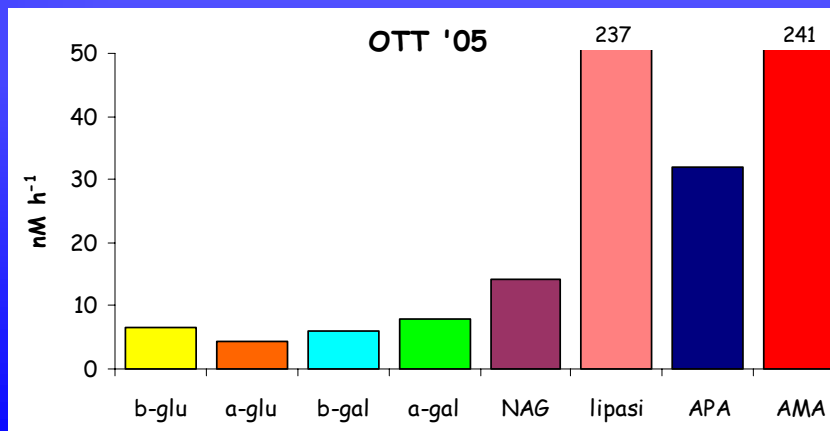
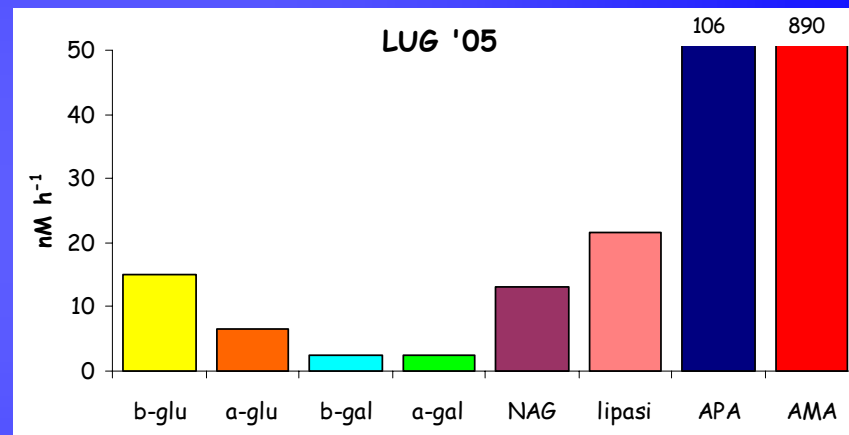
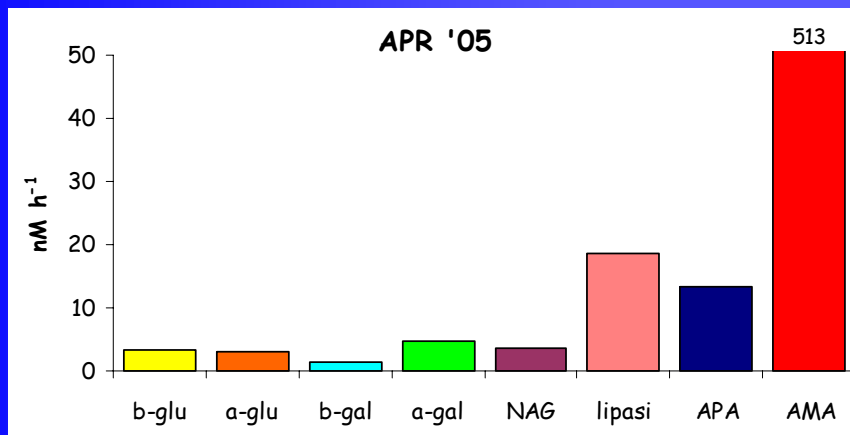
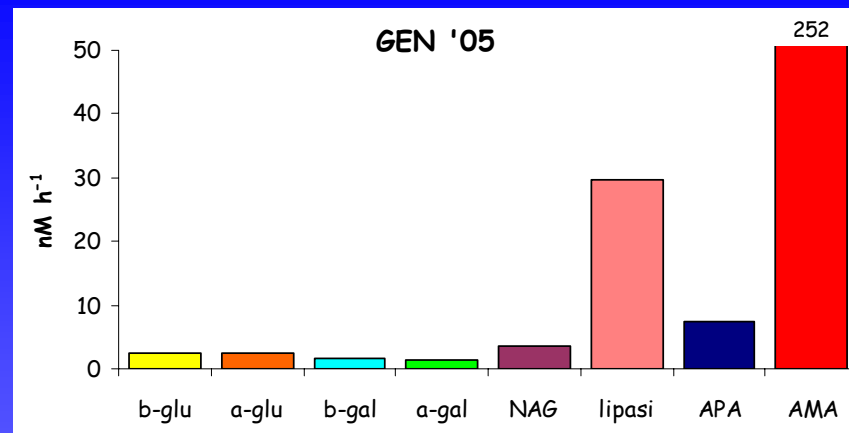
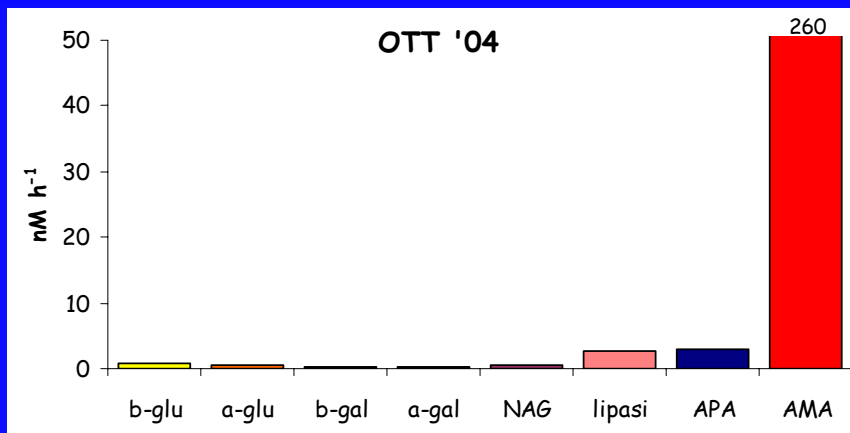
N-acetil galattosaminidasi
(NAG - chitinasi)

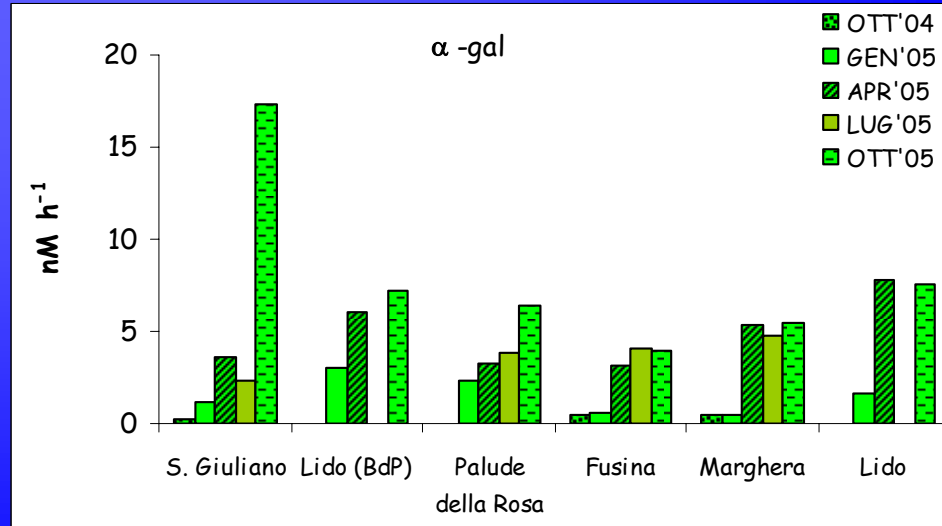
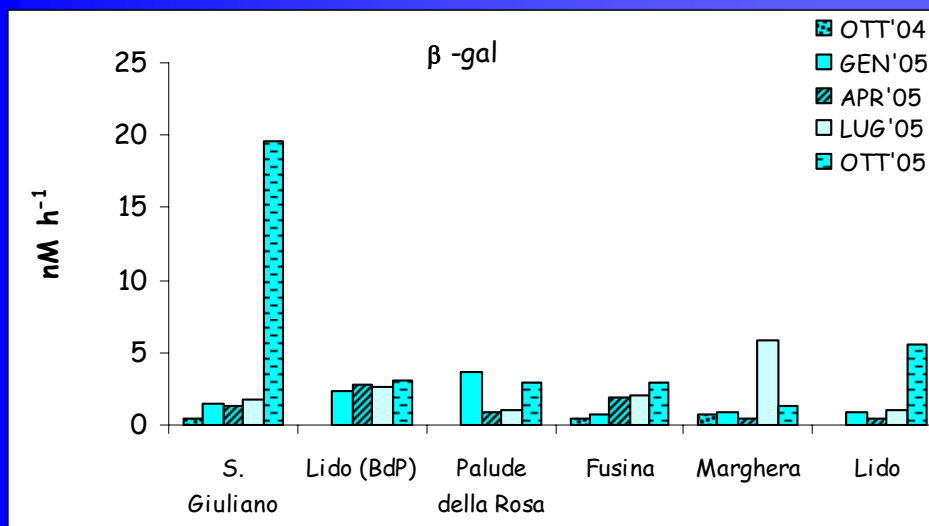
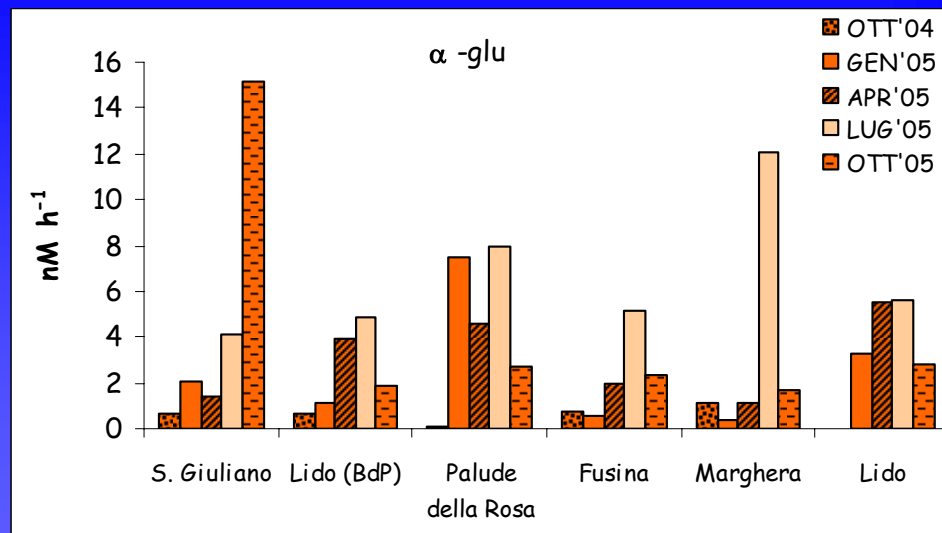
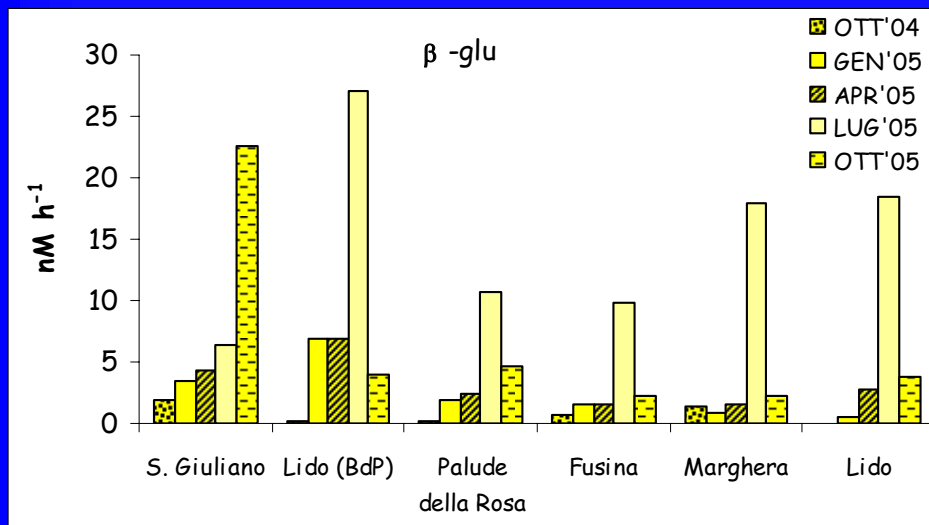
Lipasi

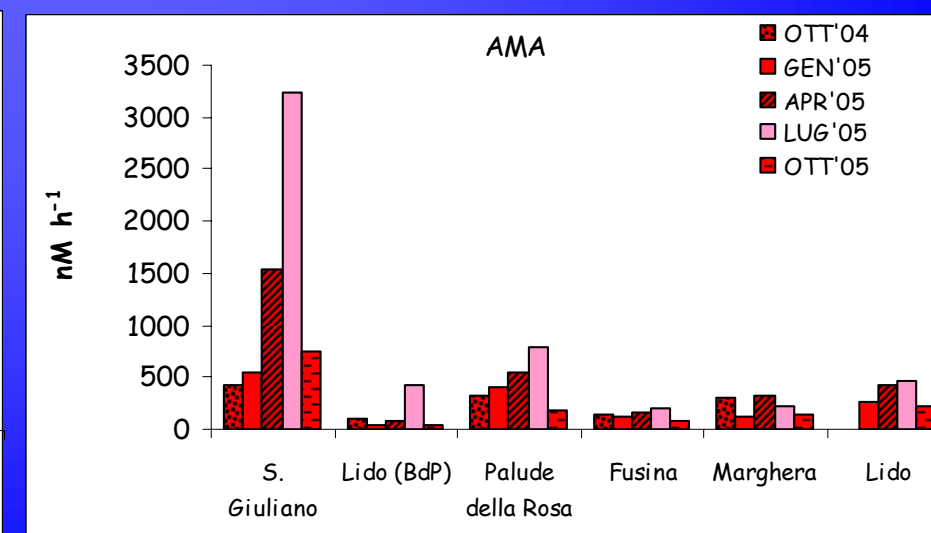
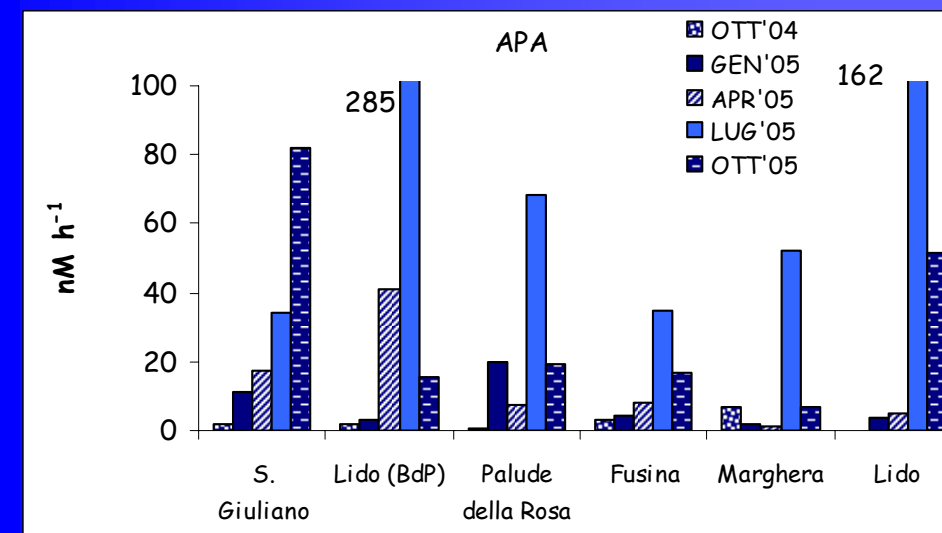
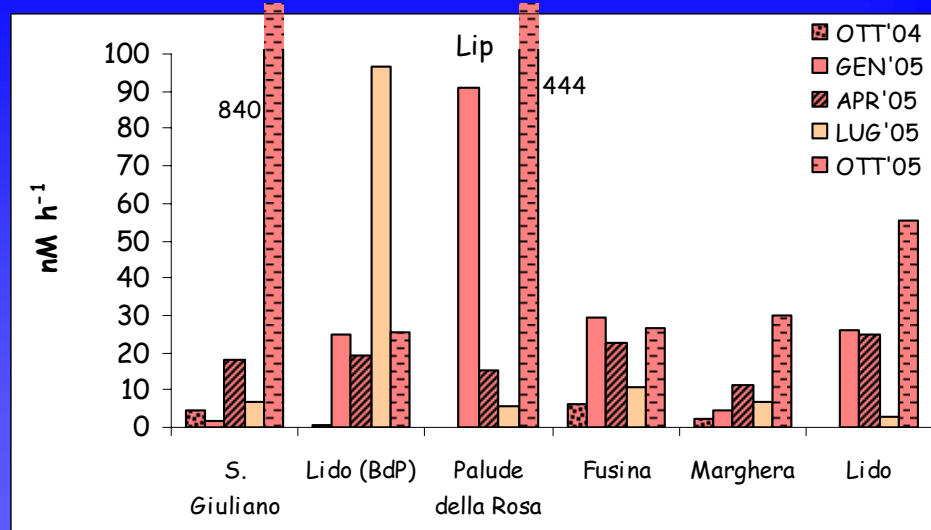
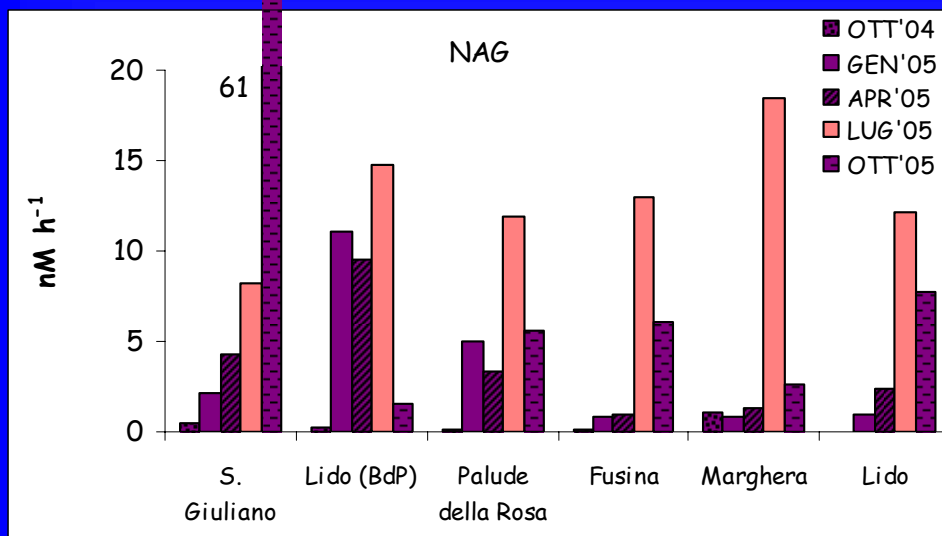
Fosfatasi alcalina (APA)

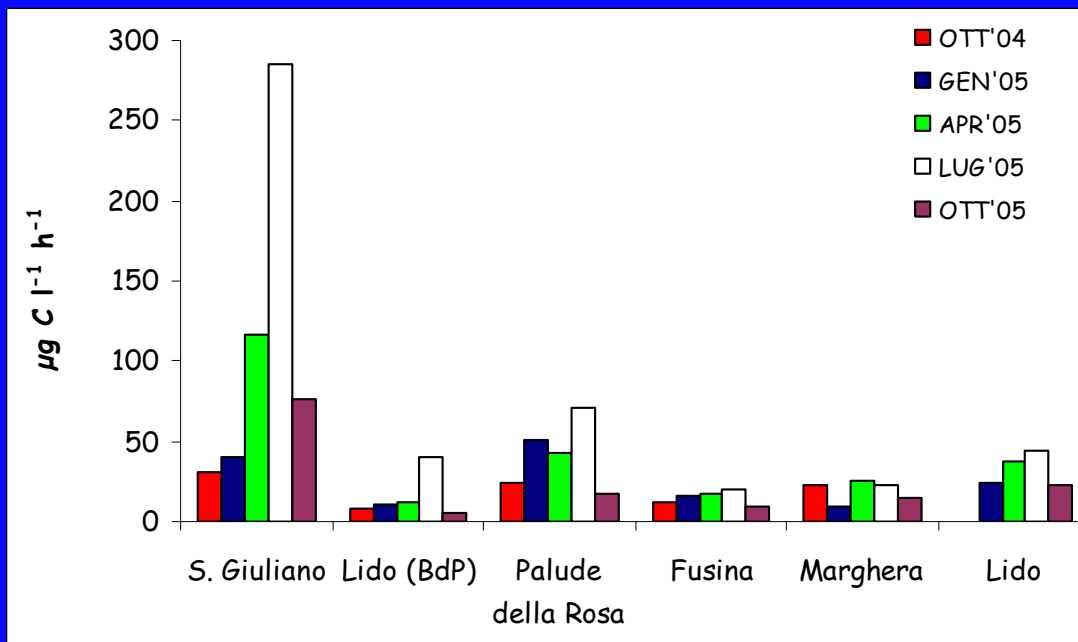
Aminopeptidasi (AMA)



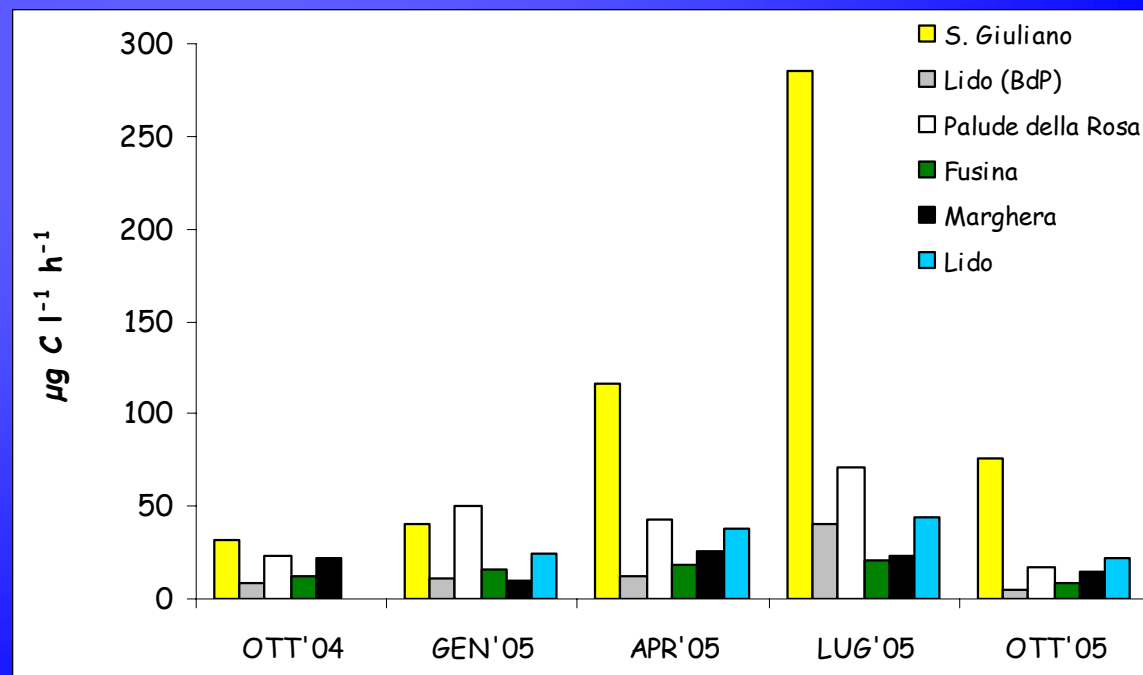




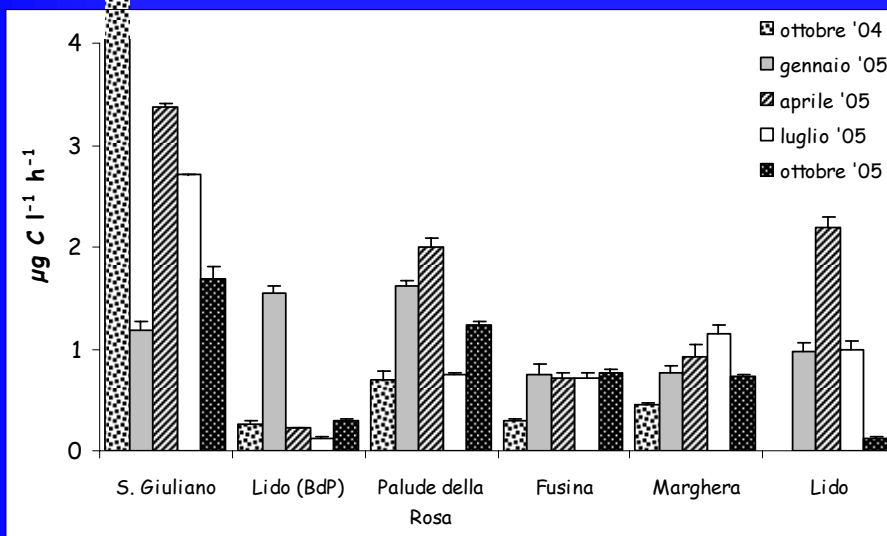




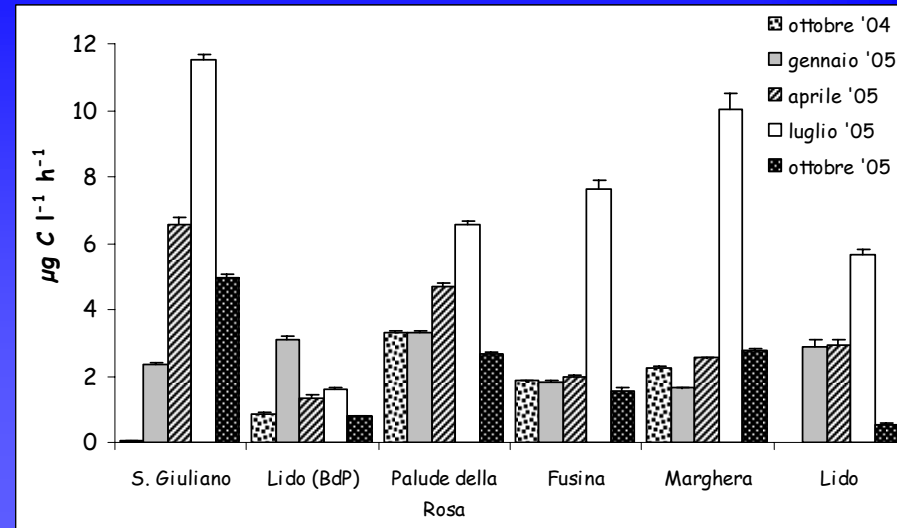
MOBILIZZAZIONE



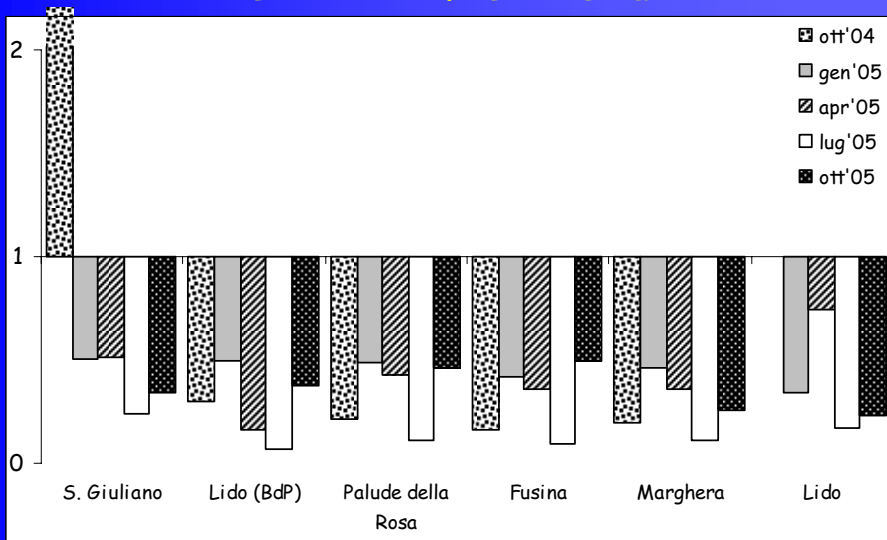
BCP TdR



BCP Leu



BCP TdR / BCP Leu



Il metabolismo della comunità batterica risulta essere prevalentemente rivolto alla sintesi di proteine piuttosto che alla sintesi di biomassa

Bacterial Carbon Demand (BCD)

$$\mathbf{BCD = BR + BCP}$$

$$\mathbf{BGE = BCP / BCD}$$

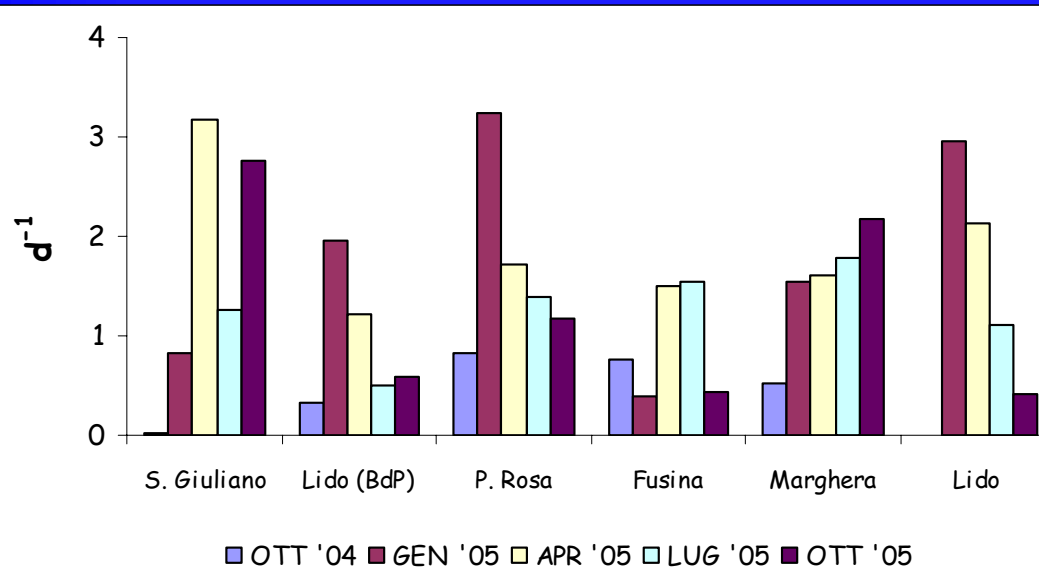
In assenza di misure sperimentali dei tassi di respirazione, è possibile ricavare la BCD supponendo una BGE definita

$$10\% < \mathbf{BGE} < 50\% \text{ (Rivkin e Legendre, 2001)}$$

In Laguna di Venezia, è ragionevole supporre

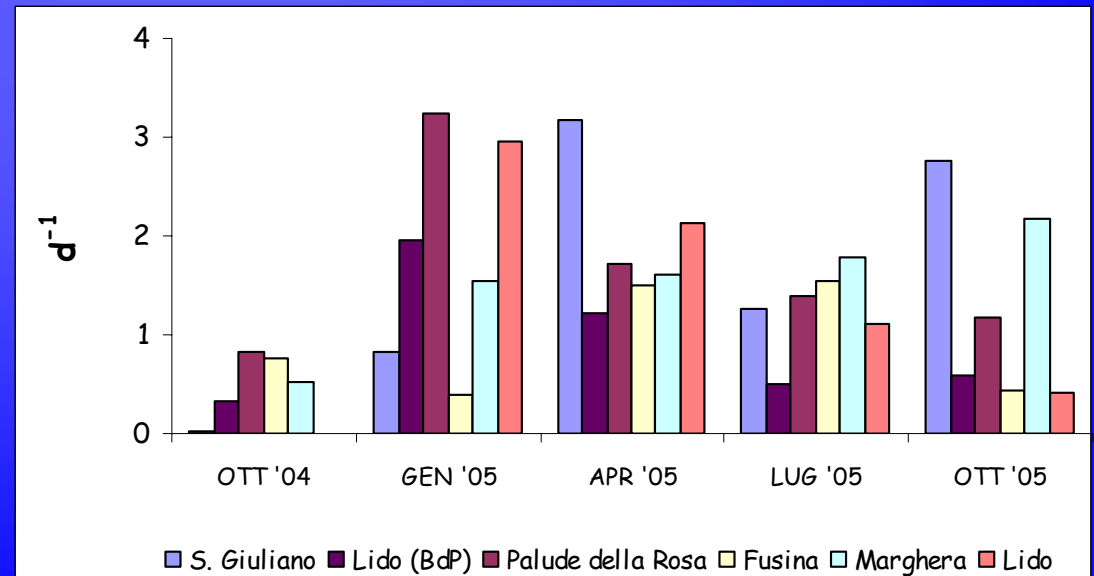
$$\mathbf{BGE = 30\%}$$

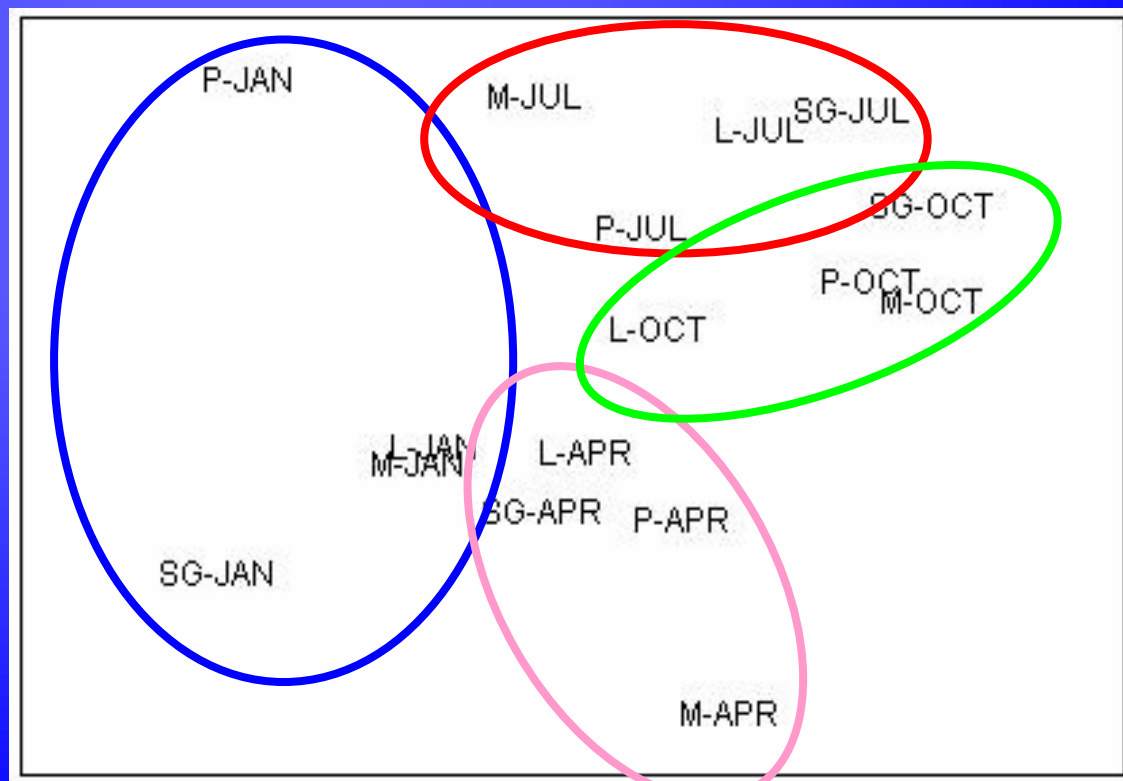
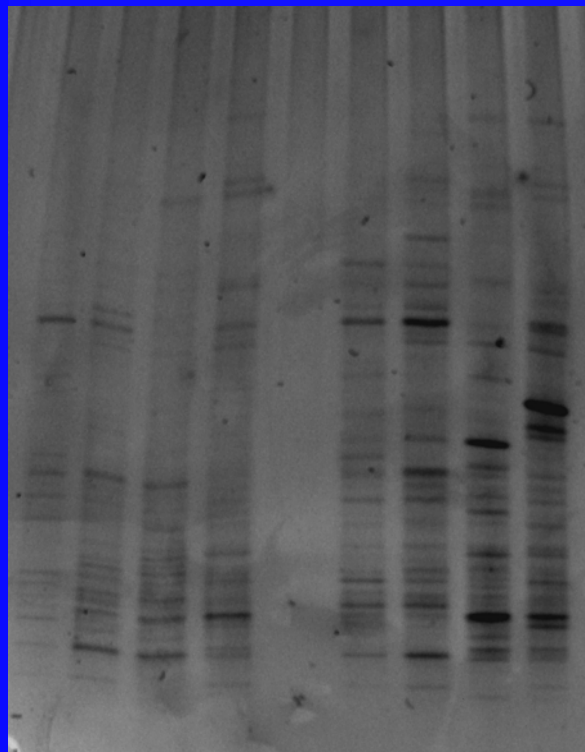
Tasso di crescita della comunità picoplanctonica



	min	MAX	C.V.(%)
S. Giuliano	0,03	3,2	82
Marghera	0,5	2,2	40
Fusina	0,4	1,5	61
Lido (BdP)	0,3	2,0	74
Palude della Rosa	0,8	3,2	56
Lido	0,4	3,0	68

	min	MAX	C.V.(%)
OTT '04	0,03	0,8	66
GEN '05	0,4	3,2	62
APR '05	1,2	3,2	37
LUG '05	0,5	1,8	35
OTT '05	0,4	2,8	79







Ruolo dei batteri

Notevole biomassa

Tassi di crescita non particolarmente elevati
(grazing???)

Intensa attività di degradazione della sostanza organica
(mobilizzazione di metalli????, di inquinanti????)

Prevalenza di processi catabolici
(laguna come sorgente di CO_2 ???????)