台灣東北沿岸海域病毒裂解與微細鞭毛蟲攝食對細菌死亡率影響之季節變化

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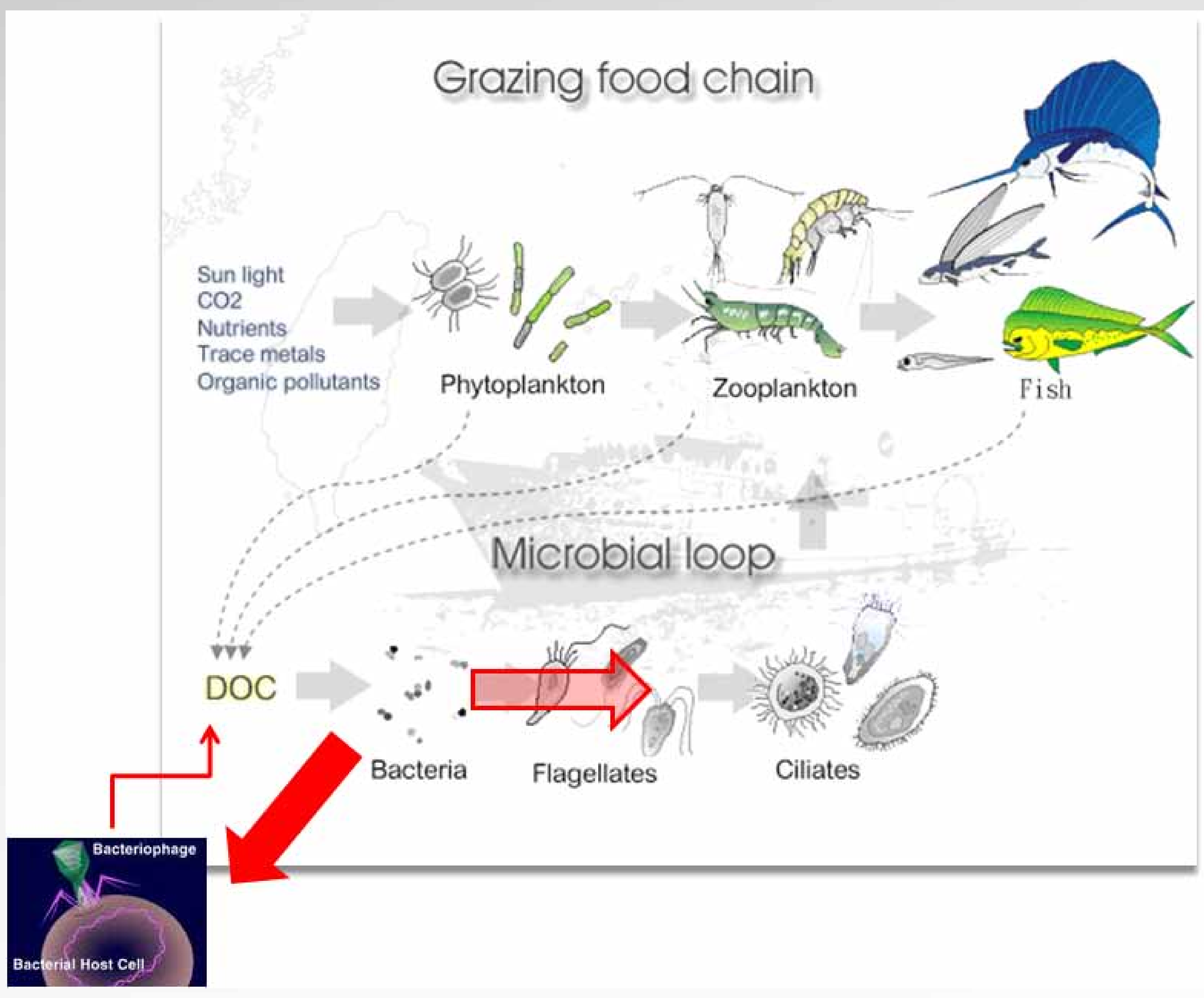

細菌是水體有機物質主要利用的角色,而微細鞭毛蟲攝食與病毒裂解則是對細菌死亡率重要的影響因子.但是微細鞭毛蟲攝食的重要性即是將細菌的生物量及能量透過攝食過程,往上一階食物階層傳遞.而病毒對細菌裂解作用,則立即將細菌生物量與能量釋放於水體中.本研究發現台灣東北沿岸海域, 於夏季期間微細鞭毛蟲是細菌主要的攝食者,且其移除細菌能力之重要性超過病毒.但在冷季期間,病毒對細菌的裂解作用則超過微細鞭毛蟲.

Sampling

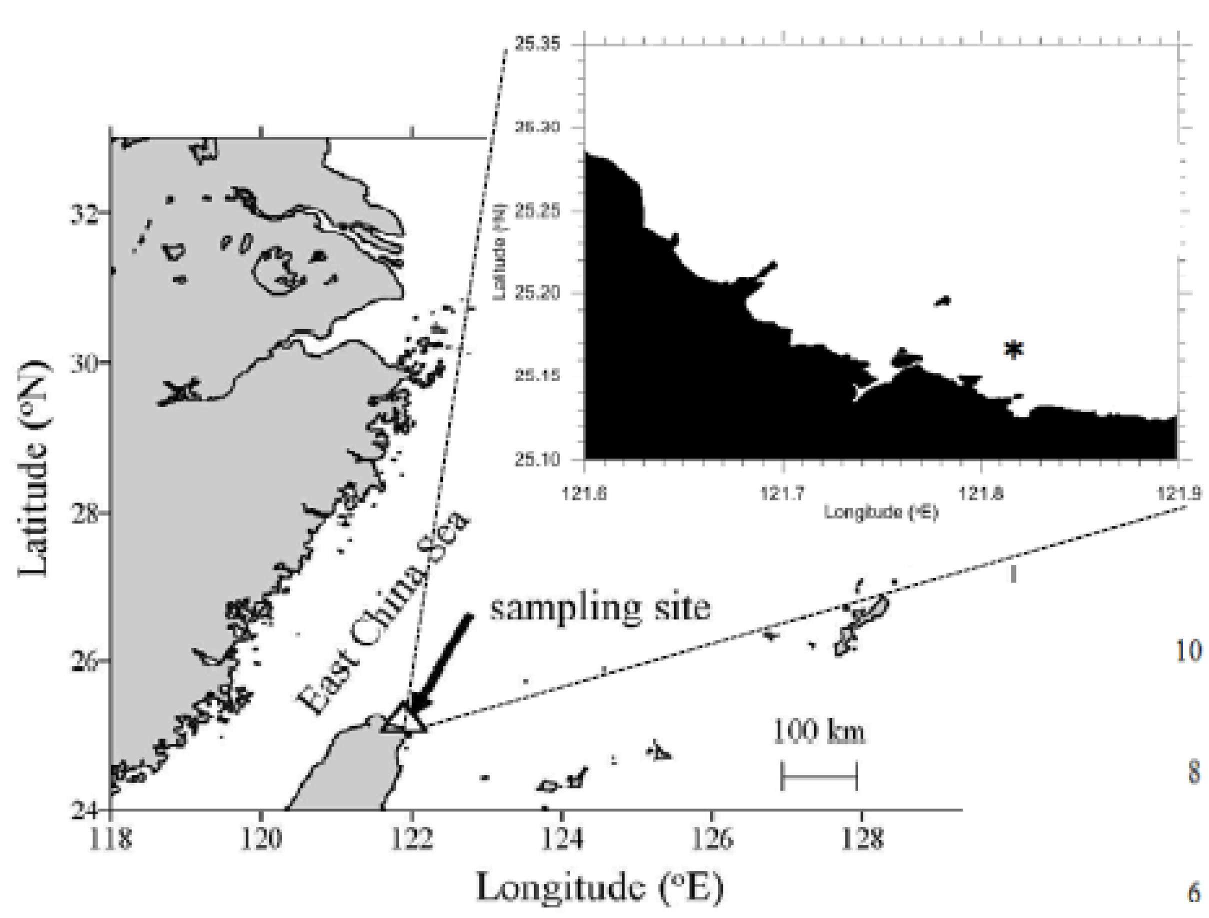

Fig. 1. Map of sampling stations.

Results

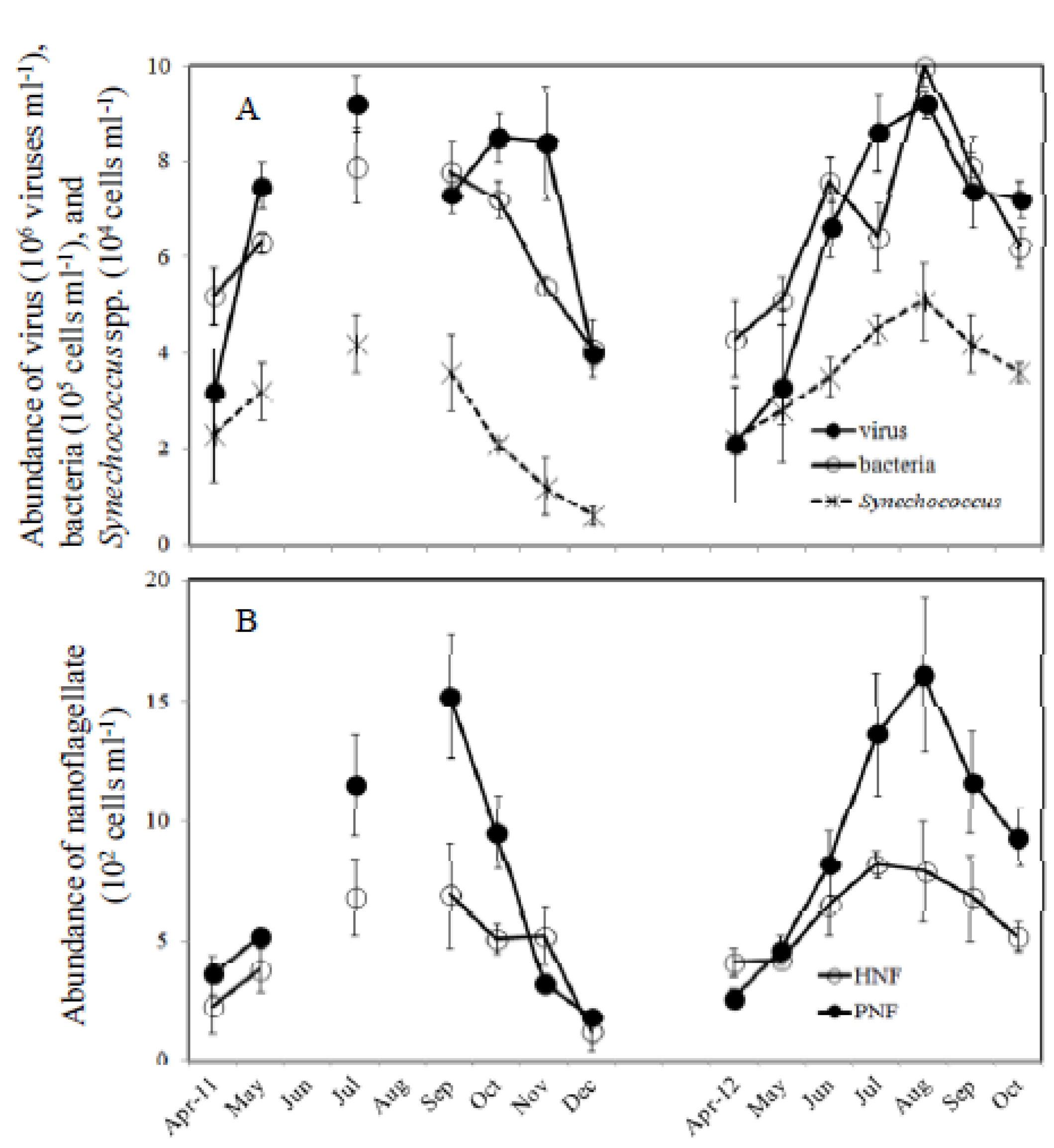

Fig. 2. (A) Seasonal variations of bacterial (10^5 cells mL^{-1}), viral (10^6 viruses mL^{-1}) and *Synechococcus* spp. abundance (10^4 cells mL^{-1}) and (B) heterotrophic nanoflagellate (HNF) (10^2 cells mL^{-1}) and pigmented nanoflagellate (PNF) (10^2 cells mL^{-1}) of surface water (5 m) during the study period.

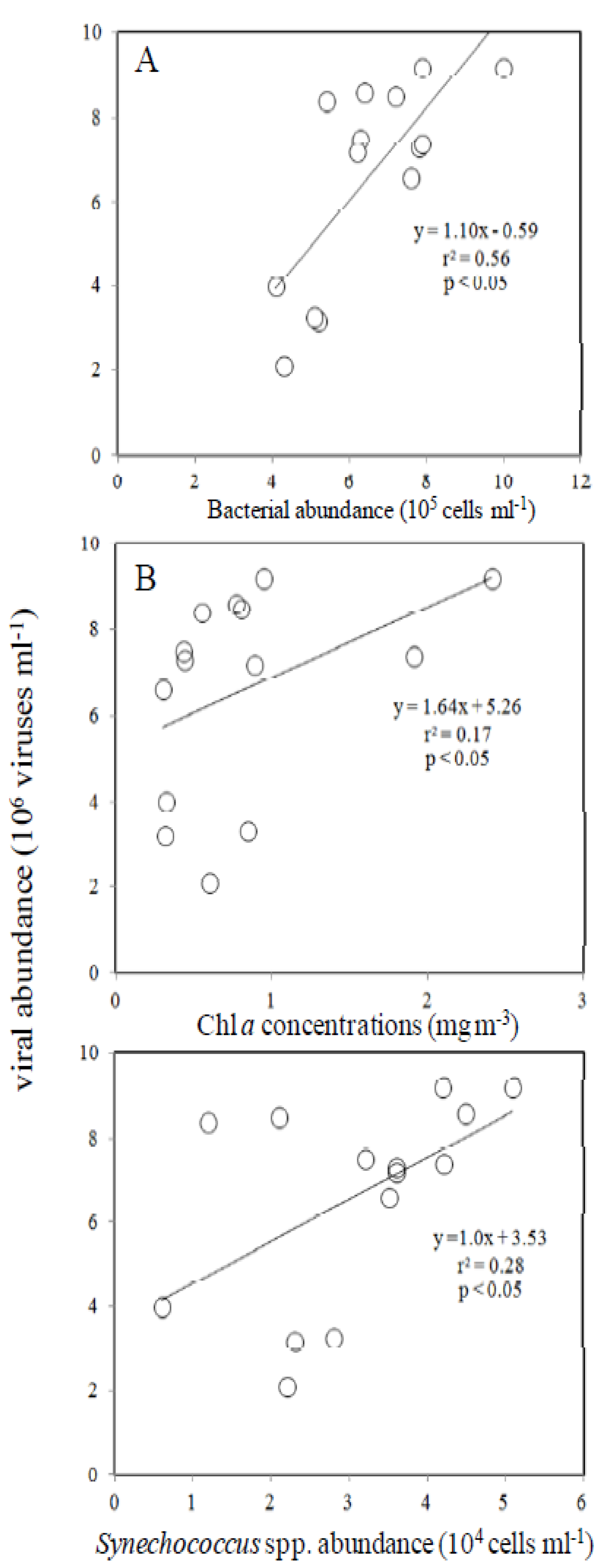

Fig. 3. Relationships between viral and bacterial (A), Chl *a* concentrations (B) and *Synechococcus* spp. abundance (C).

Table 2. Dilution-based specific growth rates in 30 kDa experiments (μ), nanoflagellate grazing (mg) and viral lysis rates (mv) for the heterotrophic bacteria. Daily bacterial carbon production (BP) and the fraction of carbon losses by nanoflagellate grazing (G), viruses (V) and the ratios of nanoflagellate grazing (mg) to total mortality of bacteria (mg + mv) were calculated for each experiment. sd: standard deviations. ND: no data, –: grazing or viral lysis estimates were not statistically significant ($p > 0.05$).

2011	μ (30 kDa) ± sd (h^{-1})	mg ± sd (h^{-1})	mv ± sd (h^{-1})	BP ± sd (μg C L^{-1} d^{-1})	G ± sd (μg C L^{-1} d^{-1})	V ± sd (μg C L^{-1} d^{-1})	mg ± sd (%) ((mg)/(mg + mv) × 100 %)
Apr	0.078 ± 0.006	0.037 ± 0.008	0.038 ± 0.004	16.85 ± 0.52	7.99 ± 0.05	8.21 ± 0.005	49 ± 0.5 %
May	0.083 ± 0.008	0.039 ± 0.009	0.040 ± 0.003	18.83 ± 0.65	8.85 ± 0.08	9.07 ± 0.009	49 ± 0.3 %
Jun	ND	ND	ND	ND	ND	ND	ND
Jul	0.360 ± 0.051	0.148 ± 0.015	0.047 ± 0.006	102.38 ± 9.11	42.09 ± 0.65	13.37 ± 0.004	76 ± 1.1 %
Aug	ND	ND	ND	ND	ND	ND	ND
Sep	0.420 ± 0.015	0.142 ± 0.028	0.300 ± 0.011	123.98 ± 6.23	41.92 ± 1.12	88.56 ± 2.33	32 ± 0.6 %
Oct	0.270 ± 0.012	0.180 ± 0.022	0.145 ± 0.021	72.90 ± 1.33	48.60 ± 0.84	39.15 ± 0.95	55 ± 0.4 %
Nov	0.170 ± 0.009	0.099 ± 0.011	0.101 ± 0.009	47.12 ± 2.39	27.44 ± 0.29	28.00 ± 0.32	50 ± 0.6 %
Dec	0.090 ± 0.011	0.033 ± 0.006	0.124 ± 0.014	17.50 ± 0.98	6.42 ± 0.06	24.11 ± 0.41	21 ± 0.4 %
2012							
Apr	0.095 ± 0.012	0.045 ± 0.008	0.051 ± 0.005	14.71 ± 0.87	6.97 ± 0.09	7.89 ± 0.041	47 ± 0.6 %
May	0.158 ± 0.033	–	0.131 ± 0.011	29.01 ± 0.45	–	7.34 ± 0.091	–
Jun	0.280 ± 0.098	0.120 ± 0.012	–	76.61 ± 1.06	32.83 ± 0.22	–	–
Jul	0.121 ± 0.045	0.082 ± 0.005	–	27.88 ± 2.09	18.89 ± 0.31	–	–
Aug	0.150 ± 0.047	0.050 ± 0.008	–	54.00 ± 3.39	18.00 ± 0.09	–	–
Sep	0.310 ± 0.084	–	0.180 ± 0.008	88.16 ± 2.08	–	38.39 ± 0.32	–
Oct	0.127 ± 0.092	0.050 ± 0.006	0.092 ± 0.010	28.35 ± 3.12	11.16 ± 0.06	20.53 ± 0.22	35 ± 0.7 %

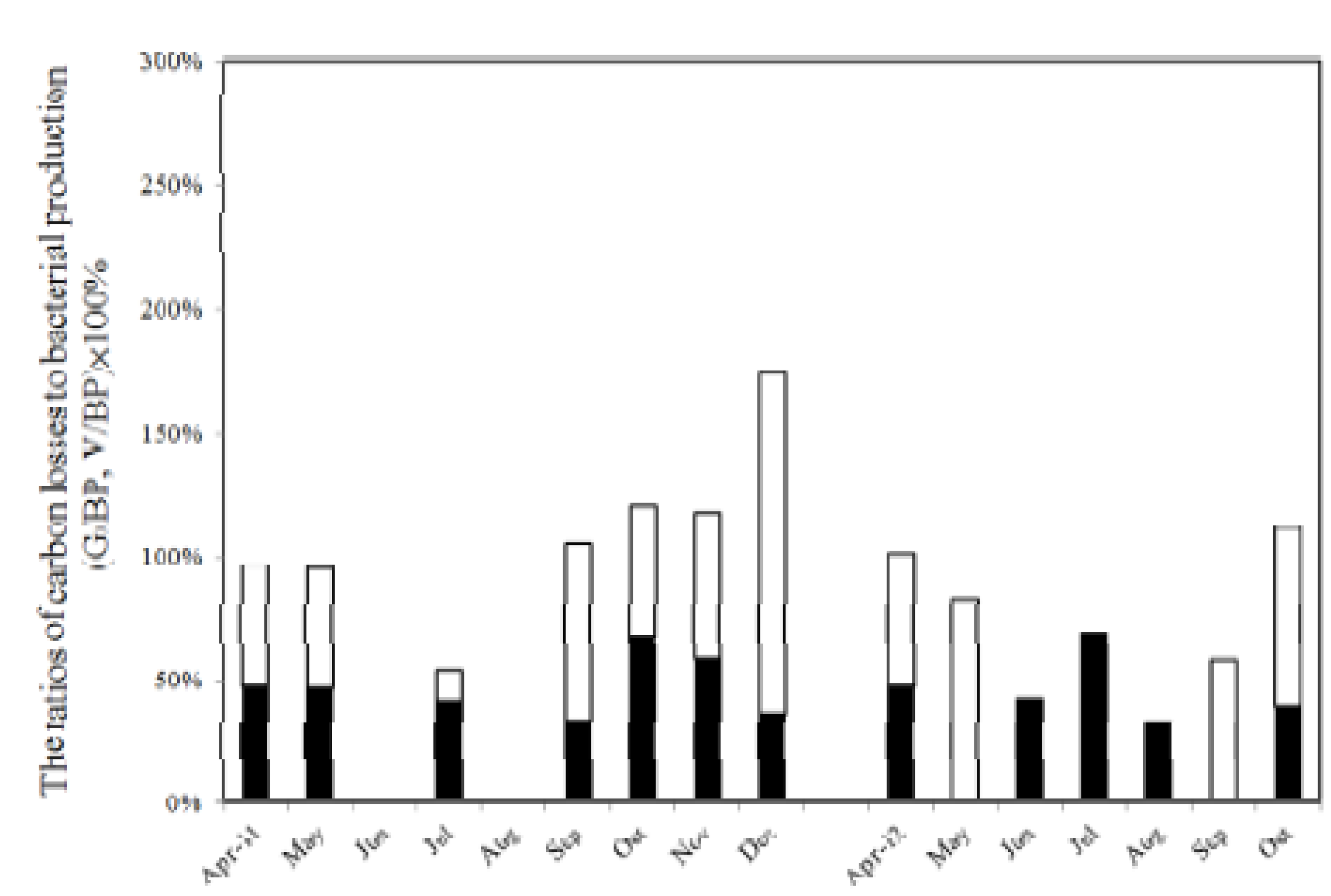

Fig. 5. Seasonal variations in the ratios of carbon losses by nanoflagellate grazing (■) and viral lysis (□) to bacterial production (BP) during the study period.

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