Seasonal changes in faecal indicators distribution in Northernmost part of the Adriatic Sea

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Coastal contamination by wastes in the northernmost part of the Adriatic Sea is described by using multivariate analysis on microbiological indexes.

Coastal contamination is of particular interest because it is the result of waste discharges from both industrial and domestic sources. The polluting agents are of physical, chemical or biological nature. In order to establish the influence of the wastes, treated or untreated, on the coastal seawater of the Northern Adriatic Sea, the microbiological quality of the water was evaluated by analysis of faecal pollution's indicators.

Seasonally, from January 1991 to December 1991, a monitoring program was carried out in 28 stations, located at 200m (st. 0), 500m (st.1), 1000m (st.2) and 3000m (st.3) offshore, in the Gulf of Trieste stretching from the mouth of the River Tagliamento to the Bay of Muggia (Fig. 1).

Water samples were analyzed for Total Coliforms, Faecal Coliforms and Faecal Streptococci by the multiple tube technique (Standard Methods, 1989). Simultaneously in every station, physical - chemical parameters were determined by the multiprobe 401 Idronaut.

For classifing the stations on the basis of faecal pollution's indicators a cluster analysis, multivariate analysis method, was carried out (LAGONEGRO and FEOLI, 1985). The correlation coefficient among faecal pollution indicators was also calculated (Tab.1).

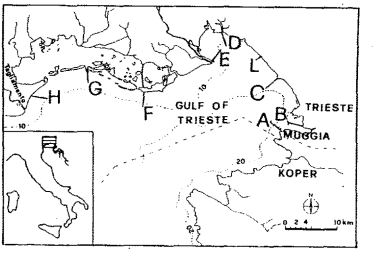

Fig. 1 : Map of the stations

Tab. 1: Correlation coefficient among faecal pollution indicators.

	MARCH			JUNE			SEPTEMBER			DECEMBER		
	TC	FC	FS	TC	FC	FS	TC	FC	FS	TC	FC	FS
TC	1.00	0.83	0.48	1.00	1.00	0.20	1.00	1.00	0.21	1.00	0.41	0.44
FC		1.00	0.51		1.00	0.20		1.00	0.21		1.00	0.84
FS			1.00			1.00			1.00			1.00

TC = Total Coliforms FC = Faecal Coliforms FS = Faecal Streptococci

degree of freedom = 26 significance level = 0.01 R = 0.4736

In summer (June) and in autumn (September) similar distribution of faecal indicators was observed and it revealed mostly urban pollution. In fact, the stations influenced by urban wastes are connected among each other (Fig. 2: group 1.1.1). Water column stratification in this periods probably does not allow the faecal input to dilute. It remains confined to the surface.

Spring (March) and winter (December) cruises show different situations. In March some stations seems to be affected by fresh water inputs, whereas other stations suffer urban wastes. Homogeneous conditions of the water column during the winter cruise (December) helped to dilute both river and urban inputs. Probably, for this reason, most of the stations are placed in the same group (Fig. 3 : group 1 . 1 . 2) .

Some seasonal differences have been observed also considering the correlation coefficient between pollution indicators. In June and September the correlation coefficient was highly significant only between Coliforms, while in March and December highly significant values were calculated between Coliforms and Streptococci (Tab. 1).

The method used to analyse distribution of faecal indicators seems to give correct informations about the real pollution conditions of the investigated area.

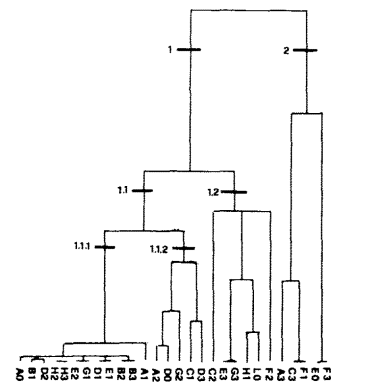

Fig. 2 : classification of the stations in the summer cruise.

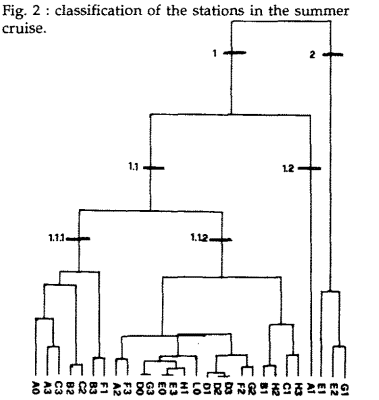

Fig. 3 : Classification of the stations in the winter cruise.

REFERENCES

LAGONEGRO M. And FEOLI E., 1985.- Libreria Goliardica, Trieste, pp. 1-182.
STANDARD METHODS, 1989. - Clesceri L.S., Greenberg A.E., Trussell R.R. eds., pp. 9-208.