



MICROBIOLOGICAL POLLUTION OF SEA WATER SAMPLES COLLECTED FROM BUTRINTI LAGOON IN ALBANIA

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SYNOPSIS

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Evaluation of *E. coli* number in sea water is considering as indicator of microbiological contamination. Our study was based on analytical control of sea water samples collected from three stations (North, West and South) of Butrinti lagoon for enumeration of *E. coli*. 144 collected sea water samples were analyzed according to standard filtered membrane method. Periodically, sampling was performed each month in three planned fixed stations. From 2 year monitoring (2005-2006) were concluded that sea water zone of Butrinti lagoon was indicated by the normal effect of microbial pollution. Average values of *E. coli* per 100 ml except (highest values) were calculated respectively in range 2-3 (*E. coli*). The highest values of *E. coli* were detected on November 2005 and on December 2006 respectively with 23 and 21 *E. coli* per 100ml sea water.

INTRODUCTION

Butrinti lagoon located in south part of Albania is the biggest reservoir of mussels' production. The total production of mussels was evaluated to more than 10.000 tons per year (SULAJ et al., 2004). Lagoon is located near Sarana city not surrounded by populated rural areas. The control aim was to keep control on pollution sources. There are some villages far from it and the waste water coming in winter time indicates water quality of lagoon. Considering it as main source of mussel production in Albania the control of sea water at the same time with mussel breeding was carried out for each year started from 1999 (TOPI et al., 1998). It means that pollution level of water environmental indicated directly to mussel's contamination. Ministry of Agriculture, Food and Consumer Protection approved on 1999 monitoring program of sea water zones and bivalve mollusks and Butrinti lagoon was part of it. Analytical reports of 2002 and 2004 confirmed the level of microbiological contamination of this

sea water zone was higher than acceptable level. Analogue studies are using enumeration of *E. coli* in sea water is used as indicator of microbial pollution (ANONYMUS, 1991). In different studies are reported some groups of pathogenic strains are very dangerous for the public health. Pathogenic group *E. coli* O157:H7 caused the most of food intoxication and it is detected with high prevalence in contaminated mussels (SULAJ et al., 2006). Today there are many intoxications cases having as major pathogenic agent *E. coli*. It caused at least 60, 000 infections and 50 deaths per year in USA. This group of strains of *E. coli* is leading cause of kidney failure in children and produces a verotoxin (enterotoxin) similar to Shiga toxin. For the mussel breeding the EU legislation recommended low level of pollution indicators and for *E. coli* not exceed the value 49 cell/100ml. Regularly monitoring carried out during these years contributed to evaluate lagoon contamination and to take protection measures. The average values of *E. coli* reported on 2002 were ranged 4-6 *E.coli*/100ml (SULAJ et al., 2004). The analytical control of mussels the sea water monitoring is currently again approved as National Plan of Monitoring of Live Bivalve Mollusks and Approved Sea Water Zones. This study had used filtration method as one of the appropriate analytical tests to enumerate *E. coli* in collected sea water samples.

MATERIALS AND METHOD

Sea water samples from Butrinti lagoon (Fig. 1) were taken from three stations located in North, West and South parts 0, 5 m deep and were packed in sterile bottles with volume 1000 ml. Samples were kept in environmental conditions and were transported to the Institute of Food Safety and Veterinary within 6 h. The samples were labeled and were accompanied by the documents provided by local veterinary inspectors in Saranda district. The analytical procedure for enumeration of *E. coli* was performed by laboratory technicians of FSVI applying the filtration membrane method. From each samples (1000ml) was used 100ml for filtration with membrane 0, 45 μ . The glass bottles of membrane filtration equipment were sterilized and membrane unit used were commercial product (CLESCERI et al., 1992). After filtration membrane was moved to the lactose TTC agar plates which were incubated at 36 \pm 2 $^{\circ}$ C for 21 \pm 3h. The control for presence of lactose positive colonies with yellow colour was realized. Not less than 10 typical colonies were tested for oxidase test and from all negative colonies were transferred the material to 9ml trypton broth 1%. All tubes were incubated at 44 \pm 0.5 $^{\circ}$ C for 21 \pm 3 h. Each tube was tested for indol production adding 0, 2-0, 3 ml Kovac reagent. Oxidase negative and indole positive colonies were identified with further biochemical test using API 20 E strips. The calculation of *E. coli* was based on above mentioned tests (oxidase negative, indole positive, API 20 E confirmation).



Figure 1: Map of Butrinti Lagoon

RESULTS AND DISCUSSION

From the data results on Table 1, microbiological pollution of Butrinti lagoon is related to meteorological condition because the above highest values of *E. coli* were caused by rains and rural waste water was discharged into the lagoon. In general, Butrinti lagoon remains unpolluted sea water zone ensuring a very good water environment for the mussel breeding. Water of Bistrice River is used to control the salinity and in rainfalls it was stopped running into the lagoon. The possible contamination remains some discharges of rural waters coming from some villages near the lagoon (SULAJ et al., 2002). Even though the considerable distance from the lagoon when it was rain the possible pollution was present. The high values of *E. coli* confirmed during our study are related to the rainfalls during the time when samples have been collected. Other analogous studies in Italy, France are reporting the effect that have the discharging of waste water into lagoon and other indicated factors as temperatures, salinity and water movement (MARTINEZ et al., 1998, OTAVANI et al., 1993). In our case the direct effect was caused by waste water. Referring to previous studies the microbiological contamination in lagoon is decreased. It was reported on 1998 that *E. coli* level of sea water samples of Butrinti lagoon in winter was higher than in summer time because of waste water discharge into it (TOPI et al., 1998). On 2002 and 2004 the highest level of *E. coli* was respectively 37 and 54 cells for 100ml (SULAJ et al., 2004). Sea water quality and protection of this sea water area has been a serious engagement of veterinary and fishery inspectors of Saranda district. The

contamination of Butrinti lagoon is considered at the acceptable level and protection of it by pollution indicators remains a future objective of veterinary inspection and environmental protection.

Table 1. Enumeration of *E. coli*/100ml sea water samples collected from Butrinti lagoon from 2005 to 2006

Month	Sampling point	2005		2006	
		<i>E. coli</i> /100ml		<i>E. coli</i> /100ml	
Jan	N	2	3	2	3
	W	2	5	1	0
	S	0	0	2	1
Feb	N	5	2	0	3
	W	3	0	0	2
	S	1	2	2	5
Mar	N	4	0	2	2
	W	0	4	1	3
	S	0	2	0	1
Apr	N	1	1	2	2
	W	0	3	0	1
	S	3	2	1	2
May	N	1	0	3	1
	W	2	3	5	2
	S	3	1	0	1
Jun	N	3	1	2	2
	W	0	0	1	3
	S	2	2	2	5
Jul	N	1	1	4	1
	W	0	2	6	3
	S	1	1	2	2
Aug	N	0	4	1	1
	W	2	2	5	2
	S	1	5	0	2
Sep	N	0	3	1	0
	W	0	2	3	2
	S	2	3	0	1
Oct	N	1	3	1	2
	W	2	2	4	2
	S	0	0	2	0
Nov	N	4	23	1	3
	W	0	0	3	2
	S	1	1	1	2
Dec	N	2	0	2	4
	W	1	0	4	21
	S	2	1	2	1

CONCLUSIONS

Microbial pollution of sea water samples collected in lagoon of Butrinti remains at the acceptable level.

Discharges of waste water in winter time from some rural areas near Butrinti Lagoon indicated with increasing of *E. coli* (on 2005 with 21 *E. coli* /100ml and on 2006 with 23 *E. coli*/100ml).

Keeping always control of this kind of discharges into lagoon is recommendation for state veterinary and fishery inspectors operating in this sector.

REFERENCES

- ANONYMOUS, (1991). Council Directive 91/492/EEC. Laying down the health conditions for the production and placing on the market of live bivalve molluscs (91/492/EEC). *Off. J. Eur. Communities* 268, 1 – 14.
- CLESCERI SL, GREENBERG EA, EDATON AD, (1992). Standard Method for examination of waste water. 20th edition., 9-47; pp: 9-66
- ISO 9308, (2000). Isolation and enumeration of *coliforms* and *E.coli* with filtration method.
- MARTINEZ-MANZARES ET AL., (1998). Relationship between indicators of fecal pollution in shellfish growing water and occurrence of human pathogenic microorganisms in shellfish. *Journal of Food Protection*. Vol. 55. 8, 609-614.
- SULAJ K., BELI E., BIJO B., (2002). Bacteriological monitoring of Albanian coastline and live bivalve mollusk on spring. *Journal of Veterinary, Albania*, No. 2, 3-13.
- SULAJ K., BELI E., BIJO B., TELO D., SHALARI Y., (2004). Bacterial monitoring of Albanian water coastline and live bivalve mollusks on 2003. *Albanian Journal of Agriculture Science*. Agriculture University of Tirana. Vol. 1. No. 3. 87-92.
- SULAJ K., TELO D., SHALARI Y., ALEKSI. (2006). Monitoring of bacteriological indicators and *Salmonella spp.* in production zones of bivalve mollusks in Albania on 2004. Balowis 2006. *International Scientific Conference on water Observation and Information System for Decision Support*. 23-26 May 2006, Ohrid, Macedonia.
- TOPI B., POLLETI R., BELI E., MONE S, XINXO A., DERVISHI I., TELO A., SULAJ K., (1998). Monitoring of microbial Bio-toxicological pollution of aquatic eco-system of the Adriatic and Ionian seas. *Journal of Veterinary, Albania*. Vol 1.N o. 1, 3-15
- OTTAVANI, D., BACCHIOCHI, I., BOLLETA, G., ROCCHIGIANI, E., (1993). Micro-bio-toxicological studies on mussels from Adriatic coast in the province of Ancona, Italy. *Food Industry*, 32, 367-370.

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