

# MARINE SCIENCE AND TECHNOLOGY BULLETIN

## The environmental and socio-economical effects of a biologic problem: Mucilage.

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### ABSTRACT

This study was conducted at two stations, Guzelyali and Abide, selected in the shoreline of Dardanelles Strait. Monthly observations were performed between October 2008 and August 2009 to investigate the effects and causes of mucilage, which is an important ecological problem. In order to determine the causes of mucilage, atmospheric data were collected. The results suggested that sudden temperature variations, wind speed and rainfall may have direct effects on the continuance of mucilage. Except summer, mucilage has been observed all through the year. Biologic and socio-economic effects of mucilage were also investigated in this study. Mucilage has a negative effect, especially on flora and fauna in the marine ecosystem. Additionally, there are many socio-economic problems on fisheries, tourism activities and human health. Therefore, although it is not possible to control the mucilage occurrence, the effects of this problem on marine environment, biodiversity and economy can be mitigated by using some protection aspects such as the control of anthropogenic effects causing eutrophication, fishing period and etc.

### Introduction

The substrates in aquatic coastal habitats are important areas for biodiversity of species due to variety of their shapes. These areas which are important on ecosystem for productivity, growth, feeding and surviving of fish species, may have encounter many biological problems such as climate change and invasive species. Additionally, another biological problem for aquatic habitats is mucilage which also occurred at Dardanelles Strait and Marmara Sea in 2007-2008. Mucilage is an accumulation of organic materials occurred by various aquatic organisms depending on existent climate and trophic conditions including gelatinous ekzopolymeric particles produced by organisms such as phytoplankton in stress (Degobbis et al. 1995; Innamorati et al. 1995; Vollenweider and Rinaldi 1995; Mecozzi et al. 2001).

Mucilage can be detrimental for invertebrates and fishes since it blocks the gills, diffuse to substrate, cover the feeding and protection area in coastal aquatic ecosystem. Additionally, it has negative effects on tourism activities and fisheries industry by blocking filtering systems of boats and nets' mesh (Marchetti 1990; Stachowitsch et al. 1990; Artüz 2008). During the mucilage occurrence, false layer of water column can be observed as well, which may have negative effects for production, feeding and migration of fish species (Figure 1). Studies showed that atmospheric conditions are also effective on mucilage occurrence and distribution (Rinaldi et al. 1995; Mecozzi et al. 2001). Therefore, to investigate the effects and causes of mucilage, atmospheric data were collected, biologic and socio-economic effects of mucilage were also determined in this study.

### Material and Methods

This study was conducted at two stations, Guzelyali (40° , 02'' .350' N, 26° , 20'' .302' E) and Abide (40° , 05'' .467' N, 26° , 20'' .831' E), selected in the shoreline of

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Dardanelles Strait (Figure 2). Monthly observations were performed between October 2008 and August 2009.

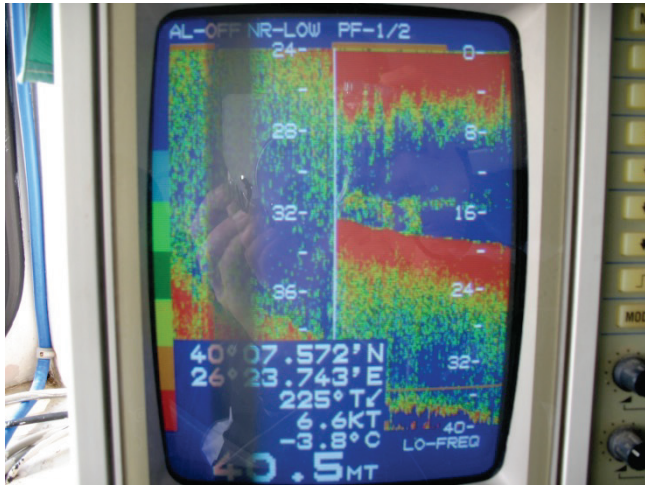


Figure 1. False layer of water column due to mucilage (courtesy of Adnan Ayaz)

**Study Area**

Guzelyali is located in the Asian shoreline of Dardanelles Strait. Its population increases in summer season because of summer houses. Guzelyali is an unprotected area against the wind and current system, anthropogenic and tidal impacts. Its substrate is usually muddy and sandy. The location of Abide is in the Europe shoreline of Dardanelles Strait. It is a semi-enclosed area. Its substrate is muddy with *Posidania oceanica* beds.

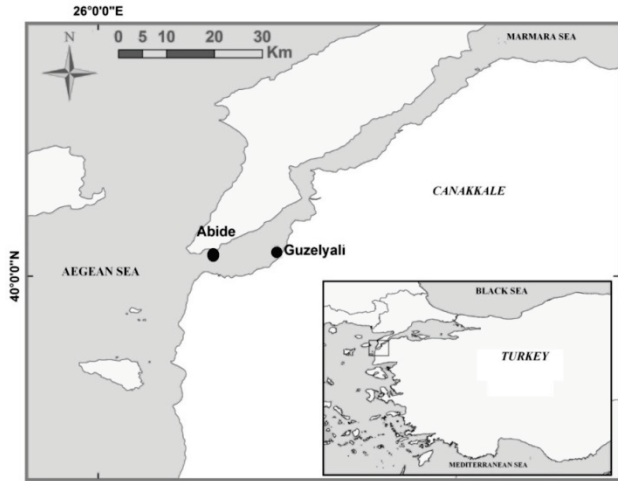


Figure 2. The location of Guzelyali and Abide in Dardanelles Strait

**Results**

In order to determine the causes of mucilage, atmospheric data were collected (Figure 3). According to the results, it can be suggested that sudden temperature variations, wind speed and rainfall may affect the mucilage occurrence. Except summer, mucilage has been observed all through the year. During the study period, despite of a large mucilage occurrence, small layers were determined through the water column.

The weekly average of temperature values during the

period of mucilage occurrence showed sudden changes when compared with the previous weeks. The maximum and minimum temperature values during the mucilage occurrence were; 21.84°C-17.31°C in October 2007, 11.84°C-8.26°C in December 2007 and 26.81°C-16.01°C in June 2008, respectively. The maximum wind speed values were determined as; 12.44 m/sec in October 2007; 11.99 m/sec in December 2007 and 9.30 m/sec in June 2008, respectively.

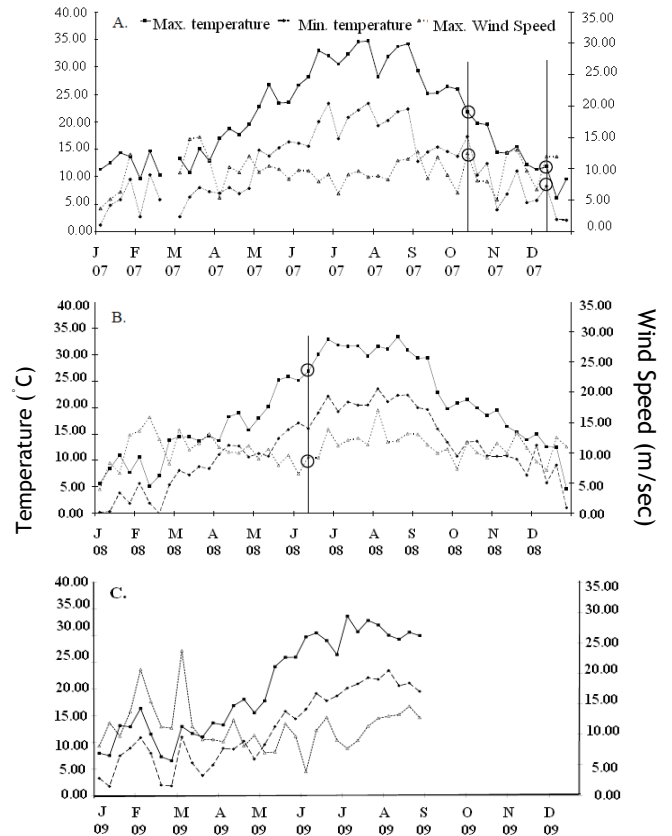


Figure 3. Maximum temperature, minimum temperature, maximum wind speed values and mucilage occurrence period in A. January 2007- December 2007, B. January 2008- December 2008, and C. January 2009- December 2009

**Discussion**

Although it is not possible to control the mucilage occurrence, the effects of this problem on marine environment, biodiversity, and economy can be mitigated by using some protection aspects such as the control of anthropogenic effects causing eutrophication, fishing period and etc. Despite the fact that there are not direct impacts of mucilage on human health, microbial contamination which can be a problem may occur depending on low circulation in the water column. Therefore, swimming in areas covered by mucilage can be a risk and not suggested. Since, there is not any knowledge about the time of mucilage occurrence, meteorological data can be shared to collaborate between universities and meteorology centers around the world to understand the reason better. Additionally, monitoring of mucilage occurrence is an important aspect to determine the effects on aquatic environment and to take necessary precautions in the affected systems.

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