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INTRODUCING THE TOXIC ALGAE AND THEIR IMPACT ON ECOSYSTEM

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ABSTRACT

The algal blooms (Blooms) attract the attention of international community. This is because this phenomenon in addition to having risks to human health and marine life makes to economic losses in local, regional, and international levels. The negative effects include damage from the cell level to the death of live creatures through the mechanism of toxin production and the condition of oxygen shortage. This accumulation of algae due to the created color by algae called red, brown or green killer. Accumulation of cells pigments is the most important reason causing colors of these blooms. Examples of these killers include visible green blooms of the cyan algae in coastal areas, two species of brown killer *Aureococcus* and *Aureoumbra*, some species of Dinoflagellata such as *Alexandrium* spp., *Gymnodinium* spp., and *Noctiluca* spp (leads to red color of water) and some examples of large algae. Although in some algae colored blooms are not observed such as Dinoflagellata, *Pfiesteriapiscicida*, several species of Dinophysis and micro benthic species like *Gambierdiscus*, this specie grows on a large surface of macro algae in tropical waters. Risks of macro algae due to excessive growth on coral rocks are remarkable. Climate change including global warming contributes to the formation of the algal blooms. The interaction between three factors heat, acidity and increasing foods resulted in forming bloom. In particular, each of these three factors led to increasing a certain species of algae, that in this study it is tried to discuss challenges of environment impact on forming harmful algal blooms.

Keywords: Toxic alga, red killer, global warming, climate changes.

INTRODUCTION

Algal bloom is said to rapid reproduction of some species of plant floating. As long as flourishing area is few, it is as a food source for the larvae of fish and snail, in the case of high volume and density, change of water color and finally decreasing of oxygen make to damage. Mostly phytoplankton and single-celled protista are the causes of red killer phenomenon. Due to having photosynthetic pigments if the phytoplankton accumulates it makes to change of water color from dark purple to pink, red and brown. Almost 30 algae species of Dinoflagellata, Diatomas, cyanofita, ... cause bloom. Important factors of oceanography like a certain level of temperature, salinity currents, nutrients, rare elements, vitamins and chemicals and upwelling (water displacement due to natural causes and handling of articles from the floor to the surface and growth of phytoplankton) play a role in this phenomenon.

Red alga bloom and killer algae (Harmful Algal Bloom)

- ✓ All red algae blooms unlike HABs algae are not killer.
- ✓ 50 percents of red killer and 75 percents HABs is a kind of Dinoflagellata.

How to creat killing

- ✓ Toxin entrance through the food or gills
- ✓ Direct impact on creatures like damage to grills and skin ulcers
- ✓ Making condition of oxygen shortage

Cysts transfer by ballast water of ships

One of the global problems in this case is the harmful transfer of non-native aquatic because of discharging ballast water of ships to the sea. The results show that given the state of the world shipping fleet, each year about 10 billion tons of ballast water is displaced by ships and at least every day 3000 to 4000 species of these live creatures change its location. This can be the effect of ship ballast water of Persian Gulf in 2008 and arrival of specie *Cochlodinium polykrikoides* can be noted. Some damaging effects are loss of more than 400 thousand tons of aquatic water on the coasts of UAE, Iran and destructive ecological changes and diversity of aquatic species in this area. *C. Polykrikoides* specie is a kind of Dinoflagellata including spherical systems or elliptical shape with a diameter of 25-45 microns. It is without walls, consists of a spiral and deep belt, its cysts wall is grained and creates mucous-like substance and makes to cover gills and finally death of fish. This specie grows in a thermalrange of 15 to 30

and after the temperature, Salinity (30 to 36) and radiation (90 micromoles per square meter bloom) are the effective factors in reproduction of it.

Red algal killer efficiency in Iran

- 1) One of the biggest red algal killer species in Iran is *Noctiluca*. Every year after monsoon in at the mouth of river after rainfall has been seen.
- 2) *Gonyaulax* sp caused death of aquatic in November after monsoon in Chabahar coasts.
- 3) *Pyrodinium bahmense* is especially for the warm waters of high salinity and areas of Mangrove forests. By producing strong poison makes to pollution of fishes such as Yaryd and Shrimp (Mojri, 2009).

CONCLUSION

Entrance of municipal, industrial and agricultural wastewater containing chemical fertilizers contribute algal blooms. These fertilizers include lots of phosphate and nitrogen that by entrance to sea water cause to enrich seawater and plankton blooms. If this phenomenon is continued, it makes to non-supplying enough light to algae and in addition to loss of aquatics, corals in Persian Gulf and around Kish Island gradually become white and will be destroyed. They moved from their home to coral reefs make

them as a host and endanger their life. Human intervention in the environment (ballast water of ship) and water pollution is the main reason for this phenomenon. Safe phytoplankton is the primary and main food of marine creatures and by destroying them because of countless increasing harmful sea algae, have destructive effects on life of other marine creatures. The toxin produced by harmful algae in a large volume has negative effect on life of aquatic, bird, marine mammals and human life. Phytoplankton and water identifying and identifying coastal waters of Persian Gulf, especially Hormozgan province, is necessary for preventing more death of marine life such as commercial species. Some HABs make to poisoning humans, fishes, and other creatures and produces some harmful toxin phytoplankton that stimulate central nervous system of fish and paralysis it. The first carrier of toxin for human is shellfish, especially bivalves that toxin quickly accumulated in it. Human poisoning is by Dinoflagellata in shellfish, neurotoxin diatoms and cyanobacteria toxins. Therefore, the best way to preventing unchecked spread of bloomant its harmful effects is water sampling, identifying plankton specie causing bloom, determining bloom density

and recording physical and chemical features of water.

Factors of bloom spread include

- 1) Increasing temperature and distant waters loss to the beach and finally emergence of cysts.
- 2) The growth and decreasing of phytoplankton resulted from nutrients, vitamin, and heavy metals in seawater.
- 3) Accumulating phytoplankton resulted from conditions of oceanographic or meteorological in the process of transmission, distribution and mixing by winds.
- 4) Periodicity of sunshine and rainfall in growth of these organisms.

Factors increasing micronutrients and in ocean and marine areas

- 1) The upwelling Phenomenon
- 2) Entering produced and accumulated micronutrients in the land resulted from agricultural activities by wind and rain into the sea.
- 3) The possibility of dissolution of mineral compositions such as iron because of sea floor activities such as volcanism and earthquake.
- 4) Discharge of industrial and household effluents that are full of substances such as nitrates, Phosphates that

makes to providing lots of foods for phytoplankton in the sea and immediate increase in their population.

The ways of increasing attention and awareness of float prosperity in the world:

- 1) Raising public awareness of toxic species
- 2) Raising the use of coastal waters in breeding and reproduction
- 3) Unusual climate and coastal change (Eutrophication) that is a stimulated factor for creating bloom
- 4) Carrying Dinoflagellata and their resistant cysts via shellfish stocks through the ballast water of ships
- 5) Predicting Prosperity and the importance of Cysts stage (Negarestani, 2008)

Common methos of decreasing algal bloom

Depending on the type of Plankton species, its reducing method is different. The most common method to control and reduce bloom density is clay flocculation. In the countries of East Asia, Australia, America, Sweden, Japan and South Korea, clay was used that is known as marine snow. Water filter or anti-alga bacteria can be used.

Since the red killer are increasing continuously around the world, providing an

international studies to evaluate and measure factors of increasing killer and also to get solution for preventing red killer creating are necessary. By constructing some control base on sea coasts, especially infected areas, it is investigated water regularly if there are signs of infection, immediately area closed for any fishing and passing ships and boats (Badieh Peyma, 2010). Global warming makes to rapid increasing of bloom of algae Dinoflagellata. by increasing global temperatures *Prorocentrum* spp, *Ceratiumfurca* ‘*Dinophysis* spp. Species in Norway coasts and *Noctiluca scintillan* specie in the south of North Sea are spread(Edwards *etal*, 2008).

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