

## Seasonal changes of red tide and nutrients in Bisan-Seto sea area

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The fishery industry damage such as fish death by the outbreak of red tide occurred frequently in the Seto Inland Sea, and the damage reached billions of yen. Growths of red tide plankton are affected by nutrient density and its ratio. However it is not easy to consider measures of the best inflow load control of red tide, because the extent of the impact by the nutrient load from the land region on the water quality environment in the sea area are not understood. Moreover, bleaching phenomenon of the laver production that changed originally the black becoming yellow and pale brown was occurred. The cause were reported about various effects that the plankton diatom compete nutrients with laver, decrease of the nutrient load from the land region with rainfall, the inflow of low nutrients and low salinity water etc. But causes of these programs were not clarified, and the technological development for improvement strategy of red tide outbreaks and laver bleaching was requested.

Then, we tried to clarified dynamics of Nutrients continued between the land region and the sea area, and identified with the sea area where possibility of causing the fishery industry damage was high. In addition, measures of the nutrient control on the agricultural side were examined in the land region related to nutrient environment in the sea area, and the objective of this theme was development of recycling technique with agriculture that the nutrients load is decreased into the sea area.

The objective of this study was tried to produced the data base used GIS (Geographic Information System: ArcGIS, ESRI) on results of water survey, red tide observation and laver production from 1995 to 2005 in Bisan-Seto sea area, and analyzed on production process of red tide plankton and laver from distribution characteristic of each results targeted on identification of the nutrient load source into the this sea area.

The red tide outbreak number increased in April between the sea area around Shoudo Island and eastern coastal area in Kagawa prefecture located the eastern Bisan-Seto sea area, and was confirmed the red tide in summer (July and August) of every year. In the same sea area, a large scale red tide had not been occurred though it was slightly confirmed since September. In the central Bisan-Seto sea area, the red tide outbreak was not occurred for the almost area though it was confirmed about once every two years in the Port of Sakaide. In the western Bisan-Seto sea area, the red tide outbreak was confirmed in large sea area between coastal areas in Kasaoka city, Okayama prefecture and offshore of Takuma Bay in Kagawa prefecture though frequency was low. The concentration of nutrients affected on the red tide outbreak was higher from October through December than other seasons, and the distribution that centered on Kojima port and Mizushima port were formed in Okayama prefecture. On the other hand, the concentration of nutrients from February through September was low by the whole area in Bisan-Seto, the red tide outbreak that needed both 100 ug/l-DIN and 15 ug/l-DIP did not meet this requirement. However, as stated above that the red tide was occurred, the examination of nutrient concentrations about existence of red tide outbreaks was needed. And nutrient concentrations were needed for laver production were empirically more than 70-100 ug/l-DIN and 7-14 ug/l-DIP, the nutrient concentration in winter from January through March confirmed on this result had fallen below it. Therefore, it was suggested that comparative examination based on the scale of the laver bleaching about the data every year was required.