EFFECTS OF SALINITY ON BIOLOGICAL METABOLISM IN BRACKISH WATER ECOSYSTEM

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SUMMARY

Concern on the global warming caused by the increment of greenhouse gases such as CO_2, CH_4 and others has indeed become more and more pressing. The share of the anthropogenic greenhouse effect is 49% by CO_2 and 17% by CH_4. As regards CH_4, the greenhouse effect rising potential relative to CO_2 is 32 times, the increase per year 1.1%, and the most may originate from biological resources. According to the report issued by IPCC in June of 1990, the 45% of methane emission may derive from paddy field, lake, marsh and coastal zone. In 1960, Takai elucidated that the reductive development under waterlogging occurred successively from aerobic oxygen respiration, via nitrate respiration, manganese, iron and sulfate reductions, to methane fermentation. Deduced from this theory, sulfate reducing reaction may predominate over methane forming reaction in the coastal zone where the supply of sulfate ion from sea or brackish water is abundant.

From the above idea, this study aims to make clear of the interaction between sulfate reducing bacteria and methane forming bacteria, and to contribute the progress of knowledges on the sources of methane emission to the atmosphere. The first and second years' results showed that the predominance of sulfate reducing reaction suppressed methane fermentation under the presence of sea water using a lagoon sediment.

To confirm this competitive interaction between the both reactions, organic matter and sulfate contained in the lagoon sediment has been washed down with deionized water. Using the soil sample, the incubation experiment has been conducted under waterlogging with sea water, sea water diluted solution or deionized water, either in the addition of glucose solution or without the addition. In breif, the amount of sulfide produced at each plot was in the following decreasing order: Sea water Plot> Sea Water 1/2 Plot> Sea water 1/4> Deionized Water. The addition of glucose enhanced significantly sulfide formation. The decreasing order for sulfide formation coincided with the increasing order for methane production. The above result reveals that methane fermentation might be retarded by the progress of sulfate reduction in the brackish ecosystem.

By chemical analysis for sea water and its diluent with fresh water or organic waste water, it has been found that the dilution effect for cations such as K^+ and Na^+ takes place.