COMMUNITY STRUCTURE OF PLANKTONIC COPEPODS IN I-LAN BAY AND THE ADJACENT KUROSHIO WATERS OFF NORTHEASTERN TAIWAN

BY

CHUN-YEIN LEE1,4), CHANG-TAI SHIH2) and CHIEN-CHUNG HSU3)

1) Marine Fisheries Division, Fisheries Research Institute, 199 Hou-Ih Road, Keelung 20246, Taiwan
2) Department of Environmental Biology and Fisheries Science, National Taiwan Ocean University, Keelung 20248, Taiwan
3) Institute of Oceanography, National Taiwan University, Taipei 10617, Taiwan

ABSTRACT

Our knowledge on seasonal fluctuation of the planktonic copepods in the waters off northeastern Taiwan is limited. To estimate whether the regional fishery production is at a reasonable level or not, the study of marine copepods could be necessary. Plankton samples for copepod studies were collected by a ring trawl net with 335 µm mesh size at five fixed stations along a transect extending eastward from I-Lan Bay to about 40 nautical miles (approx. 72 km) offshore, in 2004. A total of 137 species of copepods belonging to 4 orders, 25 families, and 53 genera were identified. Twenty-six dominant species contributed to the main components of seasonal abundance of the copepod community. Four of these, i.e., Cosmocalanus darwini, Clausocalanus minor, Oithona plumifera, and Oncaea venusta, were the most widely distributed species that occurred at all stations in each season. The principal results have shown that copepod abundance was higher in the continental shelf waters and lower in the Kuroshio waters, but the number of species was higher in the Kuroshio waters than that on the continental shelf, except in autumn. Apparent seasonal fluctuations in the composition of dominant species were observed by replacement rates at all stations. Geographical variation in distributional associations of the copepod community occurred over a seasonal scale, and the intermediate region was mainly influenced by the Kuroshio Current. Calanus sinicus might be considered an indicator species for the intrusion of eddy waters from the East China Sea into I-Lan Bay and its adjacent waters.

RÉSUMÉ

Notre connaissance des fluctuations saisonnières des copépodes planctoniques dans les eaux au large du nord-est de Taiwan est limitée. Afin d’estimer si la production régionale des pêches se situe à un niveau raisonnable, l’étude des copépodes marins pourrait s’avérer nécessaire. Des échantillons de plancton destinés aux études de copépodes ont été récoltés à l’aide d’un filet à plancton de 335 µm...

INTRODUCTION

Marine planktonic copepod communities comprise an incredibly wide diversity of species that form the basis of food webs (Huys & Boxshall, 1991). Their grazing plays a key role in the recycling of all biogenic elements in the oceans. For, the abundance of copepods can dramatically affect the structure of oceanic food webs because of their controllable regulation of the material and energy fluxes. The role of copepods as secondary producers in marine ecosystems makes their potential influence on fishery resources critical. However, copepod communities may change in response to unusual hydrographic conditions. This has been the primary reason why researchers have attempted to determine how hydrographic factors affect the seasonal and/or long-term community dynamics of copepods (Clark et al., 2003). Seasonal fluctuations of abundance and distribution in planktonic copepods are highly related to the hydrographic characteristics of the marine environment (Yang et al., 1999a, b). Certain copepod species are also known to be indicators of water masses and oceanic currents.

Coastal and inshore fisheries are two of the most important domestic economic activities in Taiwan. The fishery production from the northeastern waters off Taiwan, especially the landings from the surrounding waters of Kuei-Shan Island, is not only abundant but sustainable throughout the year (Jean, 1987; Lee et al., 1996). To maintain these fisheries at a reasonable level, a long-term investigation and monitoring of planktonic copepods, information on which with regard to seasonal fluctuation has not been established before, could be one measure of major importance.

The primary objectives of this research are to illustrate the relationship between copepod distribution and hydrographic factors, especially the Kuroshio Current.