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Organophosphate Pesticide Concentrations in Coral Tissues of Indonesian Coastal Waters

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Abstract: In this study we evaluated the persistence of diazinon, chlorpyrifos, profenofos, parathion, malathion and ethion in dead coral tissues of Indonesian coastal waters (Java, Bali, Sulawesi and Komodo). Comparison of the residue levels in coral tissues showed that the highest presence of organophosphate concentrations was detected in a coral sample collected from Java coastal waters. While medium amounts of a contaminant diazinon can still lead to detectable in Bali and Sulawesi coastal waters. Prominent contamination of organophosphate was not found in a sample collected from Komodo. Neither parathion nor malathion were detected in any of the samples. This result implies that the geographical variations of organophosphate compounds are determined by the possible usage of these chemicals around coastal waters at the present or in the past. There is need for further work to identify sources and fate of pesticide contaminants, as well as to improve monitoring of pesticide use.

Key words : Organophosphate, coral tissues, GC-MS

INTRODUCTION

Indonesia is the world's largest archipelagic country with approximately 17,508 islands containing valuable coastal and marine resources such as coral reefs. About 85,707 km^2 or 14% of total corals in the world extending all the way in the Indonesian sea (Tomascik *et al*., 1997). Coral reefs are some of the most productive ecosystems on earth and are certainly the most productive and species-rich environments in the oceans (Veron, 1986). It has commonly been known that in developing countries, reefs near coastal areas, are under serious stress from coral mining, cyanide, blasting and land pollution in particular agricultural runoff as the results of the application of pesticides to control the pests and weeds. The use of pesticides, herbicides and fungicides in Indonesia began when the government launched plantation rehabilitation programme in the 1960's. Consequently, large-scale application of these toxic materials in agriculture areas can contribute to the presence of those compounds in surface and ground water, lakes, estuary and ultimately in the coastal areas.

Organophosphates are being increasingly used to substitute for the organochlorines due to their rapid breakdown into environmentally safe products. Most of this compounds have far more immediate toxicity than DDT and other related products (Wolterding, 1981) and their entry into the sea, might be, poses many challenges to the existing coral reefs and even to live in this vicinity in general. There are more than thirty different active compounds of organophosphate pesticides on the market today and they each cause acute and sub-acute toxicity (Table 1). However, there is a lack of information available on those pesticide effects to the coral reefs. In the tropical areas, studies on pesticide occurrence in environmental samples are rare and focus mainly on organochlorine pesticides (Caldas *et al*., 1999; Botello *et al*., 2000), which have been banned from use in most countries during the last two decades. Glynn *et al.* (1984) reported that herbicides 2,4-D and 2,4,5-T can have a deleterious effect

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