

THE USE OF AN ICHTHYOTOXIC PLANT IN ARTISANAL COASTAL CUTUCA (*MYROPHIS PUNCTATUS*, LÜTKEN - OPHICHTHIDAE) FISHERIES ALONG THE NORTH BRAZILIAN COAST

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Fish poisoning with ichthyotoxic plants is one of the most interesting methods in the history of native fishing. It has long been an ancient practice in various parts of the world. In many tropical areas of the world fish are often caught by stupefying or poisoning them with plant extracts (Brandt 1984). Sahrhage & Lundbeck (1992) estimated that there are about 400 plant species suitable for this purpose, of which 100 grow in South America. After poisoning with the Leguminosae *Tephrosia toxicana* and *Lonchocarpus nicou*, in South America the most widely used plants which contain rotenone, the fish can easily be collected and consumed without difficulty (Sahrhage & Lundbeck 1992). Rotenone is also used for eradication of unwanted species (e.g., "piranhas" *Serrasalmus* spp.) in Amazonian lakes and unwanted fish in pond fisheries (Brandt 1984).

There is little information about fish poisoning in marine environments. Bourgois (1989) reported on saltwater fishing using *Tephrosia vogelii* on an island of the Comoros archipelago. A paste is obtained by grinding leaves together with tobacco and lime; this fishing method can bring an appreciable amount of fish to coastal villagers. In North Brazil a similar fishery method is commonly practiced on *Myrophis punctatus* (Ophichthidae), locally called cutuca.

M. punctatus lives in sandy substrate in shallow (< 20 m) coastal waters, such as intertidal lagoons and bays or small tidal channels. It is geographically distributed from South Carolina (USA) to southeast Brazil (Figueiredo & Menezes 1978, Cervigón 1991). The largest specimens (304–350 mm) are reported from Venezuela and southeast Brazil (Fi-

gueiredo & Menezes 1978, Cervigón 1991). However, along the north Brazilian coast, which is influenced by macro tides (4–5 m), *M. punctatus* inhabits mangrove forests on sand-mud or even mud substrate. During low tide *M. punctatus* lives in burrows of the fiddler crab (*Uca* sp.) which are found close to small tidal channels. According to Bölke (1978) and Figueiredo & Menezes (1978), members of the Ophichthidae family leave their burrows for feeding only at night. Supposing a similar behavior for *M. punctatus*, it would stay in the crab burrow for approximately 18 hours per day. During this time extreme variations in salinity, temperature and dissolved oxygen levels can make the environment stressful. For reproduction some ophichthid species migrate offshore, to spawn in a pelagic habitat (Cervigón 1991).

Along the north Brazilian coast cutuca is commonly captured by local "ribeirinhos", the inhabitants of small villages close to the mangroves, using ichthyotoxic plants for fishing. This paper describes fishing for *M. punctatus* as it is practiced in the Bragantina region using ichthyotoxic plants (NE Pará coast – Fig. 1) and its use as fish bait.

The fast-acting poison cunabic acid, a Kaurene derivative (-Kaur-16-en-19-oic acid) of *Ichthyothere cunabi*, Mart (Compositae, Heliantheae), is toxic for many organisms (molluscs and crustaceans) other than fish (Hegnauer 1977, Bremer 1994). The "cunabi" bush has a height of 1.5 m and is cultivated by the locals together with other plants. The poison is made out of a mixture of leaves, seeds, wood ash and mashed "malagueta" (chilli pepper). The paste

is left in airtight plastic bags for at least 8 hours until the end of the fermentation process. About 4 to 5 kg of cunabí paste is needed for poisoning at least 5 small tidal creeks. Fishing is carried out during low tide at full and new moon in the so called "siribeiral", interior environments of the mangrove forest dominated by *Avicennia* trees. In these areas *M. punctatus* withdraws into mud burrows. Places with high *M. punctatus* abundance can be identified by experienced fishermen by the noise the fish make in their holes.

For poisoning, almost 1 kg of cunabí per tidal creek is mixed with the surrounding water. This kind

of fishery is best suited to areas with slow-running water to increase the efficiency of the poison. The current can be reduced by cutting off the water flow. Fish affected by the poison immediately jump out of the water or out of their burrows, making collecting easy. Only larger cutucas (> 300 mm) are collected and are sold for US\$ 0.20 each. Most other fish are rejected and left in the mangrove forest. However, large fish like aimoré (*Guavina guavina*, Eleotridae) are collected for consumption. The "ribeirinhos" sell an average of about 200 *M. punctatus* to a fishing boat. To catch this amount of cutuca they need approximately 3.5 h of hard work in the mangrove forest.

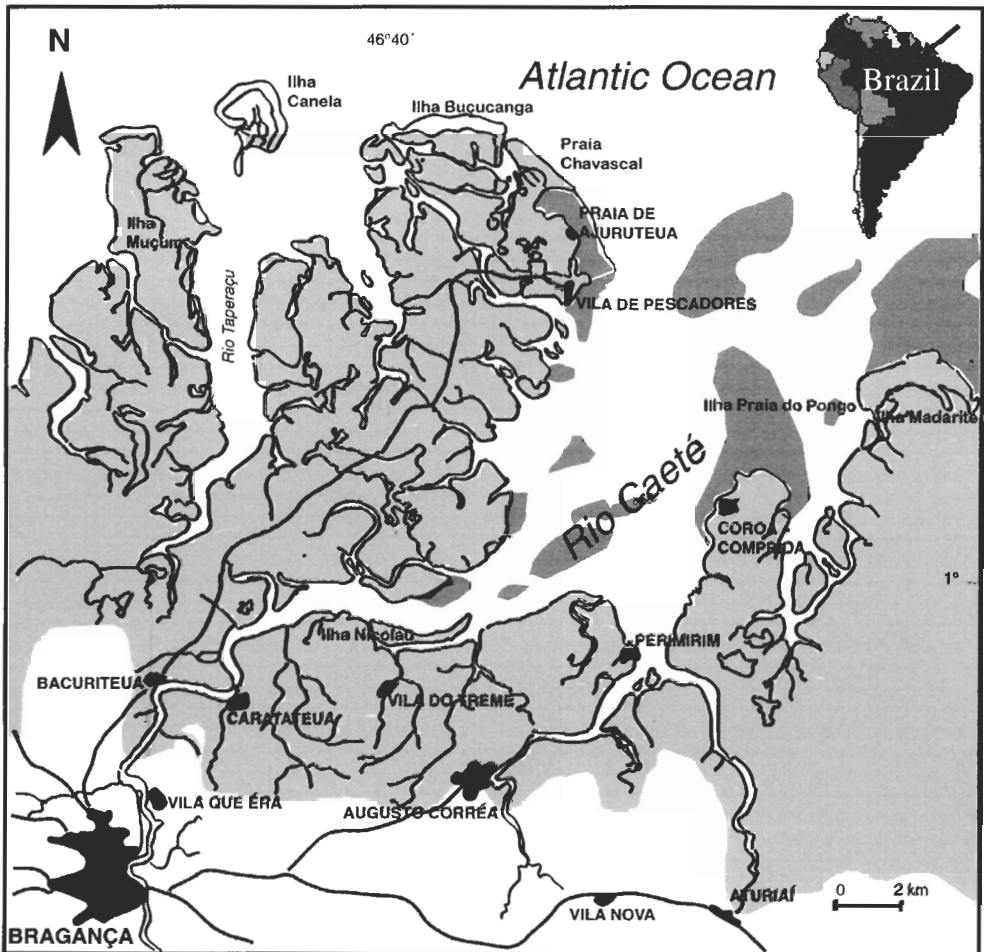


FIG. 1. Map of the Caeté estuary

TABLE 1. Fish species which are caught with cutuca (*Myrophis punctatus*) bait and other fisheries methods on the north Brazilian coast, with landings at Bragança from 1986-1989 in metric tons (MT) (Barletta *et al.* 1998).

Local name	Species	Family	Fishery site	Landings (MT)
Bagre	<i>Arius hertzbergii</i>	Ariidae	Estuary	281
Bagralhão	<i>A. passani</i>	Ariidae	Estuary	31
Gorijuba	<i>A. parkeri</i>	Ariidae	Coast	380
Cangatã	<i>A. quadricutis</i>	Ariidae	Coast	831
Bandeirado	<i>Bagre bagre</i>	Ariidae	Estuary/Coast	326
Jurupiranga	<i>A. phrygiatus</i>	Ariidae	Estuary/Coast	—
Uritinga	<i>A. proops</i>	Ariidae	Coast	233
Raia-lixia	<i>Dasyatis</i> spp	Dasyatidae	Estuary/Coast	325
Raia-pintada	<i>Aetobatus narinari</i>	Myliobatidae	Coast	—

In artisanal longline and handline fishing cutuca is popular as bait because it stays hooked for a reasonable time. The price for 100 fish is approximately US\$ 20.00. However, the payment is not made in cash but in food fish. Economically important fish species caught by using this kind of bait are summarised in Table 1. They are traded on the fish market in Bragança and/or exported to Belém (both in Pará State) and Fortaleza (Ceará State) (Barletta *et al.* 1998).

The stunning or poisoning of fish with extracts of vegetable poisons is common in many other tropical areas of the world (Lundbeck 1972, Brandt 1984, Sahrhage & Lundbeck 1992). The method is popular because it is effective, cheap and easily obtainable. The active substances of these plants are mostly strong protoplasm poisons with a stupefying effect on peripheral, sensory, and motor nerves and muscles. Poisoned fish suffer from cramp and suffocation because of the breakdown of the red blood cells (Brandt 1984).

Ichthyotoxics are normally used in food fisheries or for removal of unwanted species in pond fisheries. However, in this case cunabí is used to obtain a bait for the long line artisanal fishery on the north Brazilian coast.

This fishing method is a very efficient one for obtaining bait (*M. punctatus*), but it can have adverse effects on the environment because of its non-selectivity. Plants poisonous to fish also affect other water-living organisms, such as molluscs, crustaceans, amphibians and some reptiles (Hegnauer 1977, Heywood *et al.* 1977, Brandt 1984, Seyani &

Chiotha 1991, Bremer 1994). Studies should first be carried out to find out how this poison affects fish physiology, and the lethal amount for each species living in this habitat should be analysed, as in the experiments of Chiotha *et al.* (1991).

Fish poisoning seems to be a very useful and simple method of catching fish, especially if the poison is used carefully and economically. However, as it is actually practiced there is a certain danger that fish stocks could become endangered. Therefore this kind of fishery should be forbidden on a large scale and a more selective method of capturing cutuca, larger than 300 mm, should be developed in the near future. Pressure on cutuca can be reduced if other baits become accepted by the local fishermen.

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