

**NOTES ON THE DISTRIBUTION OF
INVASIVE FRESHWATER SNAIL
POMACEA CANALICULATA (LAMARCK, 1822)
AND *P. INSULARUM* (D'ORBIGNY, 1835)
IN INDONESIA**

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Received 24 November 2011/Accepted 10 December 2011

ABSTRACT

The freshwater snails *Pomacea canaliculata* and *P. insularum* have been reported as important invasive species causing damage to crops and predominantly wetland rice in Asia. These snails are known as “Golden Apple Snail” (GAS), an introduced species from Argentina. *Pomacea canaliculata* or known as “keong mas, keong murbei” was introduced in Indonesia around 1983, and after more than 20 years, it now can be found very abundant at various habitats such as marshes, ponds, irrigations, lakes and rice fields in almost all places in Indonesia.

Based on the collections of these snails deposited in the MZB (Museum Zoologicum Bogoriense, Research Center for Biology) and secondary data (references), the distribution of these two snails was studied. *Pomacea canaliculata* is widely distributed, while *P. insularum* is only found at Lake Semayang and Lake Balikpapan in Kalimantan. The distribution map is presented and will be useful as a basic information to manage these invasive snails.

Key words: distribution, snail, invasive, *Pomacea canaliculata*, *P. insularum*, Indonesia

INTRODUCTION

The freshwater snails *Pomacea canaliculata* and *P. insularum* have been reported as important invasive species causing damage to crops and predominantly wetland rice in Asia. Reports on the serious damage to rice in Malaysia, Philippines, Japan, Vietnam and Indonesia have been published (Hyunh 2006; Cuong 2006; Adalla & Magsino 2006; Wada 2006; Suharto *et al.* 2006; Yahaya *et al.* 2006). These snails are known as “Golden Apple Snail” (GAS), an introduced species from Argentina. *Pomacea canaliculata* or named as “keong mas, keong murbei” was introduced in Indonesia around 1983, and after more than 20 years, the snail has spread and became

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very abundant in various habitats such as marshes, ponds, irrigations, lakes and rice fields in almost all places in Indonesia. In 2004, the first author visited Lake Semayang, Lake Loa Kang and Lake Balikpapan in East Kalimantan and collected shells of *Pomacea*, and unexpectedly shells that have similar characters with *P. insularum* (D'orbigny 1835) were found which have not been recorded before. This finding added the number of invasive snails in Indonesia to two species. Hayes *et al.* (2008) did not list *P. insularum* from Indonesia but he reported that this snail is present in Singapore and Malaysia. Rawling (2007) already stated that this snail is distributed widely in Southeast Asia and assumed that it was introduced to Indonesia from Malaysia. The occurrence of *P. paludosa* in Indonesia also have been reported by Suharto *et al.* 2006; Isnaningsih & Marwoto (2011), but based on our examination, the shells are similar to *P. canaliculata* as mentioned by Cowie *et al.* 2006 who also noted that *P. paludosa* has not been detected in Asia. Detailed study on the occurrence of *P. paludosa* in Indonesia is still needed.

Damage to ricefields in Indonesia caused by *P. canaliculata* have been reported in medias such as newsletters, radios, and televisions (see appendix). Presently, even the data on their distribution in Indonesia is largely a speculation. The public awareness about the danger of the GAS (Golden Apple Snails) in general is very limited. Identifying the freshwater snails found in rice fields or irrigations is also difficult for the farmers and the local people. Usually they only recognised the occurrence of *P. canaliculata* based on the color of the egg capsules which are pink or bright reddish. Preliminary study on the distribution of *P. canaliculata* and *P. insularum* is needed to evaluate the distribution of these two species. The aim of this study is to present a basic data on the distribution of *P. canaliculata* and *P. insularum* in Indonesia. The data would be necessary for future studies and also to manage the invasive snail becoming pest in rice and threatens some native snails.

MATERIALS AND METHODS

The author used about 500 specimens deposited in the MZB (Museum Zoologicum Bogoriense, Research Center for Biology) and secondary data from references dated from 2005 up to 2011. All information of the localities where the snails have been collected from 1990 to 2011 were recorded and marked on the distribution map. Yellow dots represent the localities based on references and red data for the localities based on MZB's specimens of *P. canaliculata*, while the occurrence of *P. insularum* was indicated by star.

RESULTS AND DISCUSSION

Pomacea canaliculata of MZB collection came from 90 localities in Indonesia, distributed from the northern Sumatra (Aceh, Bukit Kese, Bengkulu Sibaganding, Manggung Pariaman, Danau Kerinci, Jambi, Danau Ranau, Lampung, Sigarung-garung, Tanggamus, Lampung, Krakatau), Java (Bogor, Tasikmalaya,

Cianjur, Sukabumi, Krawang, Depok, Bekasi, Rawapening, Tuban, Jogja), Bali (Lake Tamblingan, Lake Bratan), Sulawesi (Maros, Manrepo, Buton, Palu, Bone, Pangkep), Kalimantan (Tau Lumbis, Lake Semayang, Lake Balikpapan, Malinau), and Papua (Wamena, Biak). While *P. insularum* was only recorded from three locations i.e Lake Semayang, Lake Loa Kang and Lake Balikpapan in East Kalimantan. The distribution of *P. canaliculata* and *P. insularum* is presented on Figure 1.

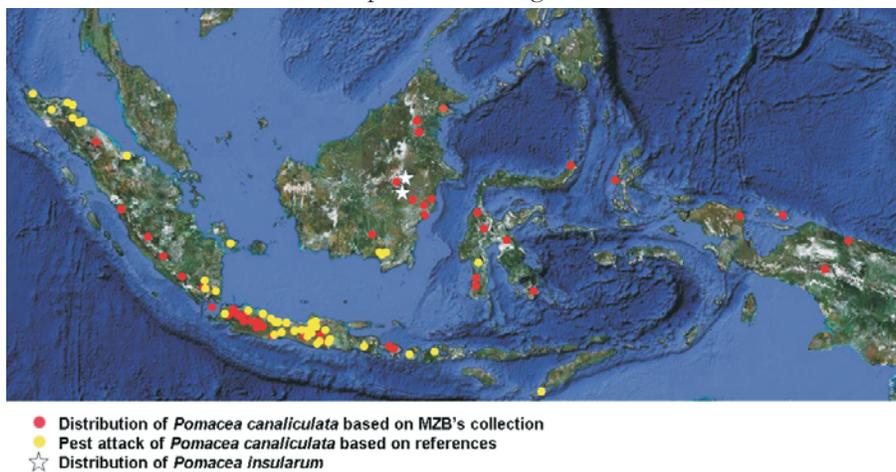


Figure 1: Map of the distribution of *P. canaliculata* and *P. insularum* in Indonesia

The distribution map (based on MZB collections & secondary datas) shows that *P. canaliculata* is more widely distributed compared to that of *P. insularum* found only in Lake Loa Kang and Semayang in Balikpapan, Kalimantan. According to reports from newspapers and magazines the invasive snail *P. canaliculata* has damaged about 10 ha of ricefields in some places such as in Java, Sumatra, Sulawesi, Kalimantan, Sumbawa, Lombok or totally about more than 100 ha mainly in Aceh North Sumatra and some areas in Java. It seems that *P. insularum* possesses less physiological adaptability compared to *P. canaliculata* and need a specific habitat such as big lakes with muddy substrates and water hyacinth or water plantations like in Lake Loa Kang, Semayang and Balikpapan. Cazzaniga (2006:39) explained about the pattern of distribution and habitat of *P. canaliculata* in Argentina basically tropical and subtropical and fail to thrive in salty, very alkaline, poorly vegetated environments, with high risk of desiccation. Furthermore, he concluded that the fast expansion of this snail in Southeast Asia might be caused by some biological reasons but the main factor is human actions, since the snail has potential economic value. *Pomacea canaliculata* can be usually found in irrigated rice fields areas, or marshes and ponds. The populations will increase in rainy season and the juveniles or young snails will spread widely. The expansions of *P. canaliculata* in Indonesia are usually caused by human activities, especially in Jawa, Sumatra and Sulawesi where people have cultured the snail to be consumed (as edible snail) without realising the risk of the invasive snail (Isnainingsih & Marwoto 2011). On the contrary, the local people in Balikpapan, East Kalimantan, generally prefer to consume freshwater fishes rather than snails.

Conchological

The shell morphology description is based on general description to compare the two species, for detailed morphology and anatomy study see Cowie *et al.* 2006. The invasive snail *P. canaliculata* and *P. insularum* have similar shells. The shell differ mainly in having relatively higher spire and less broadly in *P. canaliculata* compared to that of *P. insularum* (Rawling *et al.* 2007), and the shell size of *P. canaliculata* is relatively smaller (Cowie *et al.* 2006). The shell characters of both species are described as follows .:

Pomacea canaliculata (Lamarck, 1822)

Shell (Fig.2) globose, somewhat thin or transparent with smooth surface. Dextral coiling. Yellowish or dark brown, around the suture shell's color become pale. Sometimes there are dark spiral bands that become brighter at the body whorl. Spire high and pointed. Whorls 5.25 - 5.50, and rapidly increasing in size, the body whorl more globose. Umbilicus perforate. Suture curved to form deep channel. Apertural shape elongate cylindrical and the columellar lip not thickened.

Measurements: Height of shell 12.58 - 69.66 mm; width of shell 4.94 - 64.90 mm; height of body whorl 11.20-61.20 mm; length of aperture 8.58 - 49.7 mm; width of aperture 6.50 - 34.31 mm.

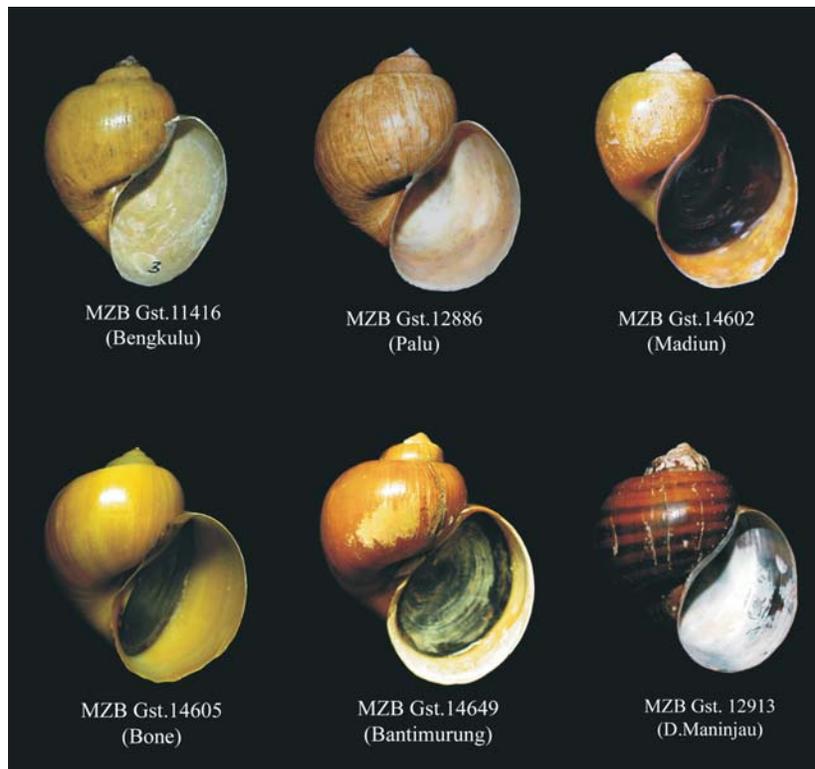


Fig. 2. Shell variation of *Pomacea canaliculata* from different localities.

Pomacea insularum (D'Orbiny, 1839)

Shell (Figs.3) globose, somewhat thick compared to *P. canaliculata*. Dextral coiling. Brown and become darker near the umbilicus. Spire low and commonly eroded. Whorls 5, and rapidly increasing in size, the body whorl more globose. Umbilicus perforate. Suture with shallow channel. Apertural shape elongate cylindrical and the columellar lip not thickened.

Measurements: Height of shell 66.16-85.00 mm; width of shell 63.32-79.6 mm; height of body whorl 64.60 -77.55 mm; length of aperture 46.05-59.25 mm; width of aperture 33.24-44.45 mm.



Figure 3. Shell variation of *Pomacea insularum* from Lake Loa Kang.

ACKNOWLEDGEMENTS

We would like to express our thanks to the anonymous reviewers who gave the comments and corrections on the first draft of this manuscript. This work was supported by DIPA of Research Center for Biology - LIPI (2009).

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