

# An Outline on Expansion and Utilization of the Golden Apple Snail's (*Pomacea canaliculata*) in Indonesia

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## ABSTRACT

The golden snail is a severe nuisance of agricultural crops in Southeast Asia and has been documented to represent a serious danger to wetlands worldwide. Golden snails were attacking West Java's rice crops in as many as 16 districts in 1999, up from just 12 in 1995. The area that the golden snail invaded rose 5 to 170 times in just three years. The golden snail can be prepared for human food once it has been captured and collected, but precautions must be taken in case any parasites are still on the snail. The management of the golden snail population in nature must take into account at least two factors: the golden snail's potential as a protein-rich source for animal feed, fish, crab, or shrimp; or its processing into delectable and high-protein foods that generate income for the community. The golden snail is a voracious rice pest. It is known that parts of the golden snail were utilized as raw ingredients for feed, a variety of regional processed foods, and medications. This review paper attempts to detail the golden snail's distribution record in Indonesia as well as how it is used as an ingredient for a variety of goods that can satisfy human requirements.

**Keyword:** apple snail, expansion, pest, utilization, Indonesia

## 1. INTRODUCTION

The golden apple snail's history itself as paddy invasive species within Indonesia is almost identical to that of other nations. The golden apple snail, or locally identified as the golden snail, was brought to Yogyakarta as aquarium biota in 1981, but it wasn't until the years 1985 to 1987 that this creature gained popularity throughout Indonesia [1]. As a commercial and human food source, the golden snail was introduced to Taiwan in the 1980s from its native South America. From there, the golden snail became extensively distributed in Asia as a new protein-rich food source and a source of extra cash for the underprivileged. These creatures pose a serious threat to wetlands globally and are important dangerous pest of croplands in Southeast Asia (particularly rice), perhaps causing habitat alteration and competing with native species [2],[3].

The golden snail's native habitat is near Argentina and the Amazon River, but it was introduced to Asia, particularly the Philippines, Taiwan, Vietnam, Cambodia, Thailand, Laos, Indonesia, Malaysia, and Singapore. Other introduction sites include Hawaii, Guam, Papua New Guinea, the Dominican Republic, and United States. The golden snail inhabits clear, shallow water that is up to three meters deep and has a mud substrate covered with an abundance of aquatic plants. Likes locations with slow water flow, poor drainage, and slow drying times. The proliferation of eggs or young snails that are unintentionally introduced into agricultural goods or purposefully placed into wetlands that have never been contaminated with the intention of being gathered as a food source may be

the cause of the proliferation of golden snails. The snails being discharged from the aquarium or aquaculture facility is the most possible mechanism [2]. This review paper aims to describe the distribution map of the golden snail in Indonesia and also its use as a raw material for various products that can meet human needs

## 2. THE EXPANSION OF THE GOLDEN SNAIL IN INDONESIA

The golden snail was first discovered in Indonesia in 1987 in Java, Sumatra, Sulawesi and West Irian. There were no previous reports of golden snails in the rice fields of Indramayu and Subang. Golden snails in that area are only found in small ponds around the housing. In 1995, only 12 districts in West Java had their rice fields attacked by golden snails and in 1999 this increased to 16 districts. In just a period of 3 years the area attacked by the golden snail increased 5 to 170 times. Its spread is increasingly widespread not only on land with poor irrigation but also on land with good irrigation arrangements.

A study results showed that in actual conditions in the field as many as 12 golden snails/2 m<sup>2</sup> caused 10.78% damage, about 15% crop failure and still caused damage up to 50 days after planting. Then in Magelang during the dry season, the golden snail is found only in irrigation areas and not only in areas exposed to rainwater. In this area the snails become active as soon as the first rain drops fall in the rainy season and immediately lay eggs [4].

In Indonesia, especially in South Lampung Regency, it has been reported that until June 1992, golden snail attacks had reached 4,500 hectares with an average population of between 2-23 individuals per square meter. According to [5], since golden snails were cultivated in 1987 and monitoring of these snails was carried out around 1990. It was recorded that as many as 8 provinces were contaminated with golden snails in that year. The areas affected by the golden snail attack are North Sumatra, Jambi, Lampung, DKI Jakarta, West Java, Central Java, DI Yogyakarta, and East Java. Lately, its spread has become wider, even to Kalimantan, Sulawesi and other areas. The golden snail is very disturbing to agricultural land thus it is called a superior pest, because it eats all plants, especially young paddy plants and their seeds [1].

## 3. GOLDEN APPLE SNAIL UTILIZATION

After the golden snail is caught and collected, the golden snail can be used for human consumption, but care must be taken against the possibility of parasites still attached to the snail. Apart for meeting various humans needs, snails can also be used as fish feed after first being crushed and mashed [2]. In managing the golden snail population in nature, there are at least two things that need attention, namely the golden snail as a voracious rice pest, and the golden snail as a potential source of protein, animal feed, fish, crab, shrimp or processed into delicious and high protein food, which serves as a source of income for the community. The golden snail has a high protein content, so it is not surprising that in the Philippines, this snail was developed as consumption for humans and livestock [1].

### 3.1 Feed

The proportion of edible golden snail meat is only about 18 percent of the total weight of live golden snails. Golden snail meat which has a protein content of around 54 percent (dry weight) can be given directly to fish or can be processed first into concentrate as is done in the processing of fish meal products. In his experiments on shrimp (*Penaeus monodon*), [6] compared the essential amino acids of shrimp meat with those of golden snail meat, which turned out to have an essential amino acid index (EAAI) of around 0.84. The effectiveness of feed in aquaculture depends on how well its amino acid profile matches that of the fish it is fed to [1].

For the needs of sources of animal feed, fish feed, food ingredients, medicines and for other economic activities, it is very possible to procure golden snails in large quantities and continuously. This is because almost all the biological requirements to keep this snail as a farmed organism has been met. Golden snails can live in a variety of public waters, have rapid growth, fast reproduction and relatively easy maintenance, including in aquaculture ponds [1].

Minced golden snail meat has long been used as a cheap source of protein and calcium for the development of ducks. It is known that in the area of South Sumatra, giving a golden snail concoction of 10% can provide a good growth rate for ducks during the egg-laying period. Meanwhile, in Pasaman, using the golden snail as feed for ducks is known to increase their egg yield by up to 80%. Apart from ducks, the golden snail can also be processed for its meat and shell parts to form flour which is then used as animal feed for broiler chickens, ruminants, quails and domestic chickens.

The golden snail as a source of feed for fish and other aquatic organisms has now begun to be widely used by fish cultivators, especially in catfish cultivation. In addition, the golden snail is also used as feed in the cultivation of tilapia, carp, *Anguila* eel, snakehead fish, tiger shrimp, lobster and crab [7].

### 3.2 The Function of the Golden Snail in Paddy Planting

Some organic farmers in Japan, Korea and the Philippines do not eradicate golden snails but use them to eat young grass in rice fields and save money on buying herbicides. The advantage of using the golden snail as an intermediary for weeding rice plants far exceeds the use of ducks and goldfish for weeding rice. If we are going to use the golden snail for weeding rice, it is necessary to pay attention to the level of land elevation to control the movement of the golden snail. Shallow water depths must always be maintained to control the damage caused by the golden snail eating process. The seeds used must be sturdy and at the 3-leaf stage (21 days). In this period the rice plants will not be damaged because they already have hard stalks and the golden snail will prefer to eat younger seeds. The rice planting process involving the golden snail is not suitable to apply on paddy grown in direct-seeding where the grass grows at the same time. It also cannot be done in highlands where the golden snail is underground and areas prone to flooding where water depth is difficult to control [8].

### 3.3 Golden Apple Snail Eggs Product

Research conducted by [9] regarding the golden snail aims to utilize golden snail eggs to be used as an additional ingredient in sticky rice stick snacks. Besides being economically valuable, collecting golden snail eggs is a very effective way to eradicate golden snails because it will break their life cycle. Hence, farmers do not need to waste money buying expensive and environmentally damaging molluscicides. The results of this study indicate that golden snail eggs are feasible and safe to replace chicken eggs in making sticky rice sticks. This is because sticky rice sticks with the basic ingredients of golden snail eggs are able to produce a delicious savory taste and crunchy texture. In addition, the sticky rice sticks are able to obscure the basic characteristics of the golden snail eggs which are fishy and not very flavorsome. Making sticky rice sticks with the basic ingredients of golden snail is safe for public consumption and highly nutritious. Apart from being consumed directly, golden snail can also be processed in other forms such as crackers, golden snail chips, golden snail *bakwan*, golden snail curry, steamed seasoned golden snail, golden snail *rendang*, golden snail spicy sauce, golden snail satay and so on. All of the golden snail processing activities aim to add flavor or extend its shelf life [10].

### 3.4 Food Product

According to [5], apart from being a source of animal feed, the golden snail also has bright prospects to be used as a source of protein for humans. It's just that for human consumption, the golden snail must be properly processed beforehand. The golden snail contains quite high animal protein, this is evident from biological or chemical analysis of the snail meat. Golden snails in some areas have also been processed into beef jerky, by adding some herbs or spices that are quite popular. A study on the utilization of golden snail as an alternative ingredient for making soy sauce showed that the product yielded has a high protein value.

According to [11], the protein content in golden snail meat is estimated to be around 11.64% with a fat content of 0.54% of its wet weight. In some areas, golden snail is processed into various types of food such as satay, steamed, snail spicy sauce to snail fermented sauce. People also believe golden snail can be used to treat liver disease, but there is no scientific evidence regarding this efficacy [12]. In addition to public consumption, especially residents in rural areas, golden snail also has the potential to be an export commodity, so that it can increase the nation's income from foreign exchange [13].

Because the golden snail has a fairly high protein content and agreeable taste, it can be used as a popular food along with the local snail (*Pila* sp.) which was already known as a food ingredient in several regions in Indonesia. Even the golden snail is known to have become a popular menu item in several star hotels [14].

### 3.5 Medicinal Purpose

Aside from being food source for human consumption, golden snail can also function as a medicinal ingredient. Apart from being used as a source of protein which is quite cheap and affordable, various forms of processed golden snails have long been believed by the public that golden snails can be used to treat jaundice or liver disease [1].

The golden snail is an animal that can be used to control the type of snail *Bulinus* sp. and *Biophalaria* sp. which is the intermediate host of the trematode parasite. This parasite can cause swimmers to contract itching and schistosomiasis, which are diseases that affect more than 200 million tropical people. The presence of the golden

snail in nature can prevent the general public from getting the disease. Golden snail is also known to be beneficial for kidney health [12],[15].

#### 4. CONCLUSION

In Java, Sumatra, Sulawesi, and West Irian in Indonesia, the golden snail was originally uncovered in 1987. Golden snails had not previously been reported in the paddy fields of Indramayu and Subang. According to the findings, up to 12 golden snails per square meter of soil caused 10.78% damage, 15% crop failure, and continued to cause harm at least 50 days after seedlings. Snails can be crushed and mashed before being utilized as fish food, in addition to serving a variety of human needs. It is not shocking that the golden snail was created for ingestion by humans and livestock due to its high protein content. It is extremely possible to obtain golden snails in big quantities and continually for the demands of source materials of livestock feed, fish feed, food ingredients, medications, and for other commercial operations. This means that almost every biological requirement for keeping this snail as a cultivated species has been accomplished.

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