

ABSTRACT

Golden apple snails are invasive alien species that originated from South America and then were widespread around the world, including Thailand. They have also affected agricultural areas and disturbed organisms in the Mae Kha Canal area. This study aims to investigate the diversity of the genus *Pomacea* and their distribution in Mae Kha Canal, Chiang Mai Province, and to compare *Pomacea* species based on shell morphology and HAT-RAPD fingerprinting analysis. A total of 100 snail samples were collected between November and December 2024. They were classified into 2 species of golden apple snails as *Pomacea canaliculata* and *Pomacea* sp. The upstream area had the highest diversity, then downstream and midstream area, respectively (Shannon-Wiener Index; 0.26, 0.16 and 0.12, respectively). The physico-chemical parameters of water quality didn't affect the distribution of both snail species ($p < 0.05$). DNA fingerprinting analysis using the HAT-RAPD technique based on primers OPA02, OPA03, and OPA07 showed the significant different between both snail species ($p < 0.05$). The findings highlight the need to prevent future intentional imports and call for an assessment of the risk presented by golden apple snails in sensitive locations. The discrimination of the ecological impacts of different species will aid in the development of setting-specific management techniques in the future.

INTRODUCTION

The golden apple snail genus *Pomacea* (family Ampullariidae, order Architaenioglossa) is a freshwater snail listed among the world's top 100 worst invasive species and is considered an agricultural pest worldwide (Robert and Kenneth, 2004). They can be found in Mae Kha Canal which is one of Chiang Mai's most important waterways and finally gets a beauty treatment and becomes leisure spot in town. In Thailand, there are three species of golden apple snails: *Pomacea canaliculata*, *Pomacea insularum*, and *Pomacea* sp. (Keawjam and Upatham, 1990). However, each species is quite similar and difficult to distinguish. High annealing temperature-randomly amplified polymorphic DNA (HAT-RAPD) is a useful procedure to differentiate between closely related and morphologically indistinct species of the golden apple snails. There are currently no reports on the diversity of the invasive species in Mae Kha Canal. So, the goals of this research are to evaluate the diversity and physico-chemical properties of the genus *Pomacea* in Mae Kha Canal, Chiang Mai Province by using shell morphology and HAT-RAPD fingerprinting analysis.

RESULTS

A total of 100 snail samples were collected from Mae Kha Canal in Chiang Mai Province. They were classified into two species: *Pomacea canaliculata* and *Pomacea* sp. The upstream area was the most diverse, followed by the downstream and midstream areas (Shannon-Wiener Index; 0.26, 0.16 and 0.12, respectively). The investigations revealed that the distribution of snails was unaffected by physico-chemical factors of water quality (Figure 1), and the size of the shell had no effect on the distribution pattern of both species (Figure 2).

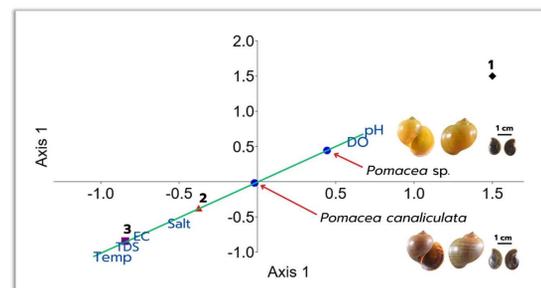


Figure 1 The graph depicts the physico-chemical parameters reposed for golden apple snails using the Canonical correspondence analysis (CCA) approach.

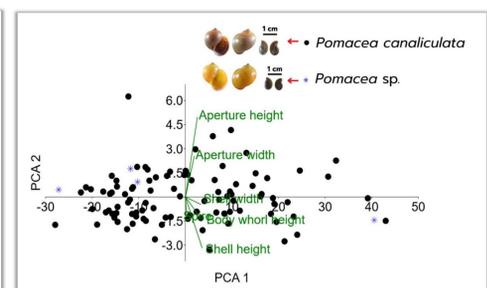
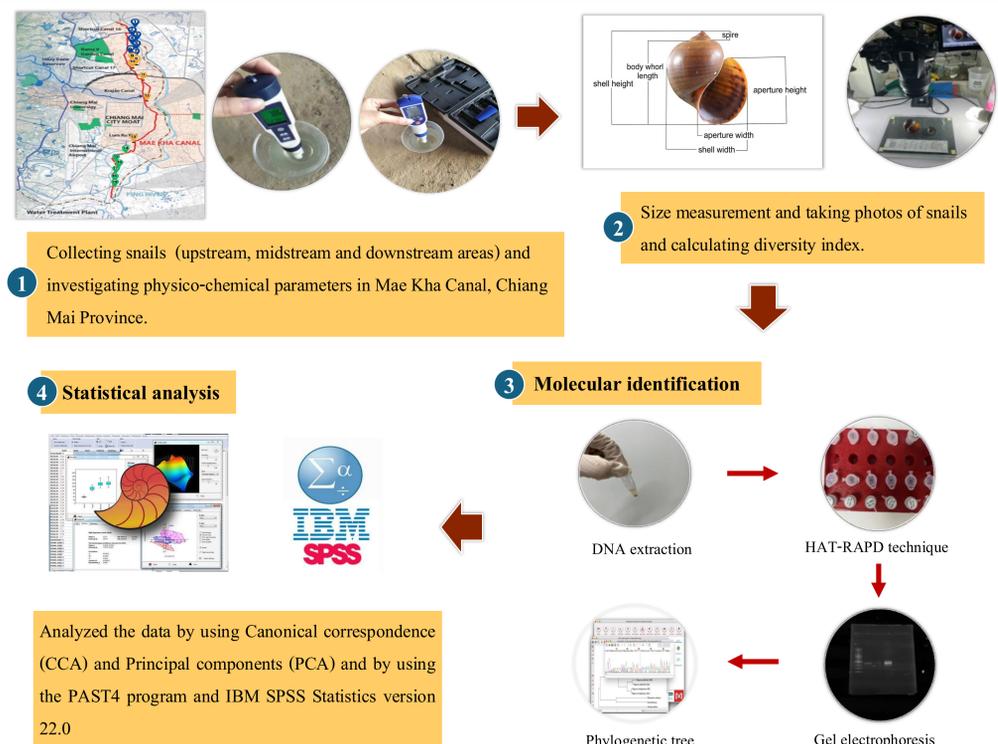


Figure 2 The graph depicts the distribution of those two species and the effect of shell size using the Principal components analysis (PCA) approach.

MATERIALS AND METHODS



DNA fingerprinting study using the HAT-RAPD technique can be used to differentiate both snail species, and a phylogenetic tree based on the UPGMA method reveals the relationship and confirmed the difference between the two species (Figure 3).

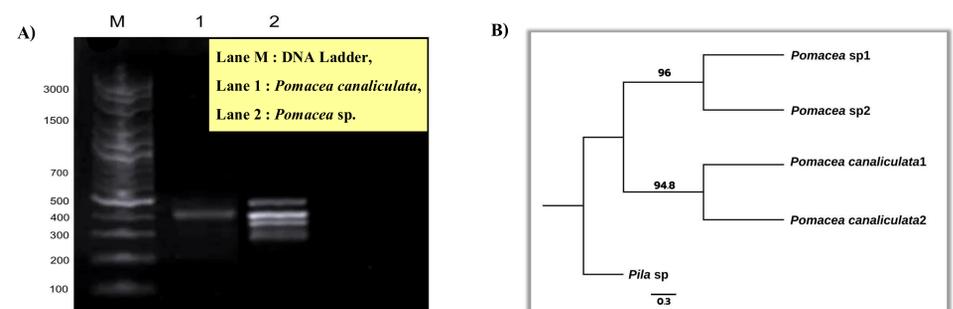


Figure 3 An overview of visualization and an analysis of molecular data of *Pomacea* from Mae Kha Canal (A) HAT-RAPD based on primer OPA03, (B) Phylogenetics tree based on UPGMA method.

CONCLUSION

A study on the diversity of the genus *Pomacea* in Mae Kha Canal, Chiang Mai Province, discovered two species of golden apple snails: *Pomacea canaliculata* and *Pomacea* sp. The upstream area was the most diverse (Shannon-Wiener Index; 0.26). The distribution of golden apple snail species was unaffected by water quality factors, including snail size ($p < 0.05$). Furthermore, the HAT-RAPD approach and UPGMA tree were utilized to verify the snail identification.

ACKNOWLEDGEMENT

This study was made possible by the support of Parasitology Research Laboratory. I wish to express my sincere thanks to Asst. Prof. Dr. Nattawadee Nantarat for her help and advice throughout this work.

REFERENCES

- Keawjam, R. S. and Upatham, E. S. 1990. Shell morphology, reproductive anatomy and genetic patterns of three species of apple snails of the genus *Pomacea* in Thailand. *J. Med. Appl. Malacol.*; 2, 45-57.
- Robert, H.C. and Kenneth, A.H. 2004. Invasive Ampullariidae snails : taxonomic confusion and some preliminary resolution based on DNA sequences. *APEC symp. on the manag. of the GAS.*, 6-11.