Short communication

The Invasive of Freshwater Prawn *Macrobrachium lanchesteri* (De Man, 1911) from Watershed in Palangkaraya University, Kalimantan, Indonesia

Anita Maulina*, Angelina Inocencia, Ebrry Dwi Putra, Inriyati Satriani and Linda Lusiana

Department of Biology, Faculty of Mathematic and Natural Science, Palangkaraya University, Jl. Yos Sudarso Palangka Raya, Central Kalimantan 73111, Indonesia

**Keywords:** *Macrobrachium lanchesteri*, Invasive species, Palangka Raya Watershed

**Abstract**

Freshwater prawn species *Macrobrachium lanchesteri* (De Man, 1911) in Kalimantan for the first time was reported to be found only in East Kalimantan and there have been no reports of this species being found in Central Kalimantan. This study aims to reveal the presence of invasive freshwater prawn and habitat characteristics found in the watershed of Palangka Raya University. This study was conducted in October–November 2019 covering five stations. Specimens were collected using a purposive sampling method. Environmental parameter measurements were made including types of substrate, water velocity, tree cover, water depth as well as width. The identification of specimens from the watershed of Palangka Raya University based on morphological characteristics shown that the species very similar to the alien freshwater prawn, *M. lanchesteri*. Based on the results of research, this report has revealed the presence of this invasive species in Central Kalimantan, Indonesia.

**INTRODUCTION**

Freshwater shrimp is one of the tropical invertebrate that has an important role in the structure of nutrients cycle. According to Covich and McDowell (1996), freshwater shrimp can preserve nutrients and can move nutrients from the river back to the surrounding forest, increase the nutrient cycle and play a role to preserving nutrients locally. Habitat of the shrimp covers the entire waters from rivers, swamps and lake. In the Southeast Asia region, there are three families of freshwater shrimp, namely Atyidae, Palaemonidae and Alpheidae. In Indonesia, shrimps generally belong to the family Palaemonidae and Atyidae (Holthuis, 1980; Chan, 1998). According to Grave *et al.* (2008); Wowor *et al.* (2009), the Palaemonidae family is dominated by the genus *Macrobrachium* and is a genus with a high degree of diversity of freshwater crustaceans with about 240 species. Freshwater prawns are a major source of protein that often globally cultured in many countries .

Based on the research by Syafrudin (2016), two of the shrimps found in the Kahayan watershed, Palangka Raya City were Litopenaeus vannamei and *Macrobrachium rosenbergii*. Wowor *et al.*, (2009) explained that *M. lanchesteri* only found in East Kalimantan. There is no reported for freshwater shrimp (*Macrobrachium lanchesteri*) in the rivers of Central Kalimantan. This study was aimed to reported and described morphological characters of *M. lanchesteri* from watershed in Palangka Raya University, Central Kalimantan, Indonesia.
MATERIAL AND METHODS

Sampling was conducted at five stations in the watershed area of Palangka Raya University and identification specimens was carried out in Department of Biology, Faculty of Mathematics and Natural Sciences, Palangka Raya University. The research map can be seen in figure 1.

In the station I, the substrate was mud with a slow-water current. Water depth was 58 cm, and the width was 1.23 m. There were many “Kiambang” plants (Salvinia molesta). The water turbidity was high because this location was often used as a fishing ground by the local people. The characteristics of station II were muddy substrate with slow water currents and high turbidity levels. Water depth was 54 cm and width was 4.61 m.

Station III has a muddy substrate and a slow-water current also. Water depth was 38 cm, and width was 4.61 m. This station was also high turbidity levels and often used as a fishing ground. Station IV has muddy substrate with a slow-current. Water depth was 70 cm and a width was 8.6 m. Similar to station III, the water turbidity was high caused by stone fragments. Station V, the river substrate was mud with a slow current river, with depth was 55 cm and width was 9.9 m. Like other stations, this area has high turbidity levels due to many stone fragments and often used as a fishing ground. However, a total of 59 individuals of freshwater prawns only found in this station.

The method of this study was purposive sampling. The specimens were collected using a hand net or caught by hand. The specimens were put into a bottle and preserved in 70% ethanol. For identification purposes, specimens were taken into the University of Palangka Raya, Central Kalimantan, Indonesia. For identification purposes, specimens were taken into the Department of Biology, University of Palangka Raya, Central Kalimantan, Indonesia. The species were determined based on morphological characteristics, taxonomy and body measurements following Wowor et al. (2004). The characteristic of the habitat at each station was documented in figure 2. The environmental factor measurement was carried out at the beginning of sampling. Physical factors that observed visually are substrate type, habitat, and canopy cover, while the water depth and width were measured using a meter. Water velocity was divided into two categories as follows: <2 m/s means fast-flowing, while > 2 m/s means slow flowing.

RESULT AND DISCUSSION

This study have done at 5 stations. Totally, 59 individuals has been collected from one station (Station V). Based on the identification result, morphologically, our specimens fit well with the description of *Macrobrachium lanchesteri* reported
by Wowor et al., (2004). Rostrum teeth of this species were not evenly distributed and there were parts that not serrated and had a fracture at the end of the rostrum (Figure 3B), the carpus of M. lanchesteri were longer than the chela (Figure 3C). *Macrobrachium lanchesteri* is a river shrimp that usually found in non-flowing waters and open waters, such as ponds, mining ponds, ditches, rice fields, and drainage. This species can be a competitor for many native species in obtaining food sources. This species can survive in the new environment with water temperature extremely high (Wowor, 2010) and multiply rapidly so that their population will be increased. The prawn has a unique characteristic with a clear white body without a pattern. According to Tjahjo and Purwaningtias (2004), explained that the feed of shrimp are generally plants and algae, while insects and mollusks as a supplement food.

*Macrobrachium lanchesteri* is an invasive species from southern Thailand (Wowor et al., 2009). The introduction of this species was caused by fishery activities that introduce the cultural fisheries (Purnamasari, 2017). According to Lanchester (1901); De Man, (1911), *M. lanchesteri* is an endemic species and was first discovered in Southern and central Thailand. *M. lanchesteri* are distributed in Thailand, Malaysia, Myanmar, Singapore, Sumatra, Borneo and Java (Ng, 1995).

Each habitat has a different ecological character. The habitat affects the number and character of the shrimps (Supriadi, 2012). *M. lanchesteri* was found in Palangka Raya University with slow flowing river, river depth was 38-70 cm and there were settlements and open area. This was confirmed by Johnson (1961), stated that *M. lanchesteri* was found in slow flowing.

![Sampling location of freshwater shrimp in the watershed area of Palangka Raya University](image)

**Fig. 2.** Sampling location of freshwater shrimp in the watershed area of Palangka Raya University (A) Station I, (B) Station II, (C) Station III, (D) Station IV, (E) Station V.

**Table 1.** Environmental Parameters Observed from Study Sites

| Station | Substrate | Flow   | Habitat          | Tree Cover | River Depth | River Width | Σ Shrimp Samples |
|---------|-----------|--------|------------------|------------|-------------|-------------|-----------------|
| 1       | Mud       | Slow   | Open area        | 0-20 %     | 58 cm       | 1.23 m      | 0               |
| 2       | Mud       | Slow   | Urban area       | 0-20 %     | 54 cm       | 4.61 m      | 0               |
| 3       | Mud       | Slow   | Urban area       | 0-20 %     | 38 cm       | 4.61 m      | 0               |
| 4       | Mud       | Slow   | Urban area       | 0 %        | 70 cm       | 8.6 m       | 0               |
| 5       | Mud       | Slow   | Urban area       | 0-20 %     | 55 cm       | 9.9 m       | 59              |

*Note: Fast flowing = < 2 m/s; Slow flowing = 2 m/s*
Among the five stations, *M. lanchesteri* was only found at station V because this species was more resistant and suited to stagnant water conditions and open waters with muddy substrates. Environmental conditions and nutrients at this station support the growth of *M. lanchesteri*. This is consistent with the research of Taufik (2011), *M. lanchesteri* is found in slow flowing water with a muddy substrate. This is also confirmed by Johnson (1961) that *M. lanchesteri* is usually found in slow flowing waters in open water.

CONCLUSION

The type of the freshwater shrimp is *Macrobrachium lanchesteri* with habitat characteristics in slow river flow with a mud substrate, a river depth of 55 cm and a river width of 9.9 m. The river is not clear because there are many broken rocks which are used as fishing grounds for the local community.

ACKNOWLEDGEMENTS

We would like to thanks especially to Adventus Panda and Julian Tambunan in correcting this article, Andri Maulidi and Yohanes Edy Gunawan that helped in species identification. For constructive comments and suggestions, we thank the editor and anonymous reviewers.

REFERENCES

Chan, TY. 1998. Shrimps and Prawns, Lobster. In: Carpenter KE and Niem VH (eds), FAO Identification Guide for Fisheries Purpose, The Living Marine Resources of the Western Central Pacific Vol 2. FAO, Rome.

Covich, AP., McDowell, WH. 1996. The Stream Community. The Food Web of A Tropical Rain Forest. University of Chicago, USA.

De Man, JG. 1991. On the west-african species of the subgenus *Eupalaemon* ortm. Notes from the Leyden Museum. 33: 261-264.

Grave, S. De, Cai, Y., and Anker, A. 2008 Global diversity of shrimps (Crustacea : Decapoda : Caridea) in freshwater. *Hydrobiologia*. 595: 287–293. https://doi.org/10.1007/s10750-007-9024-2

Holthuis, LB., 1980. Shrimps and prawns of the word: an annotated catalogue of species of interest to fisheries. *FAO Fisheries Synopsis*. 125(1): 271

Johnson, DS. 1961. A Synopsis of the decapoda caridea and stenopodidea of singapore , with notes on their distribution and a key to the genera of caridea occurring in malayan waters. *Bulletin of the National Museum*. 30: 44–79.

Lanchester, WF. 1901. On the crustacea collected during the skeat expedition to the malay peninsula. *Proceedings of the Zoological Society of London*. 2: 534-574.

Ng, PKL. 1995. (Crustacea : Decapoda) of Bako National Park, Sarawak, Malaysia, with descriptions of one new genus and three new species. *The Raffles Bulletin of Zoologi*. 43: 181–205.

Purnamasari, L. 2017. Jenis udang air tawar di salah satu sungai di indonesia. *BioConcetta*. 3(2): 36-40.

Supriadi, A. 2012. Keanekaragaman Jenis Udang Air Tawar di Sungai-sungai yang Berasal dari
Gunugn Salak. Sikripsi. Fakultas Matematika dan Ilmu Pengetahuan Alam, Institut Pertanian Bogor, Bogor.

Syafrudin. 2016. Identifikasi jenis udang (crustacea) di daerah aliran sungai (das) kahayan kota palangkaraya provinsi kalimantan tengah skripsi. Skripsi. Institut Agama Islam Negeri Palangka Raya, Kalimantan.

Taufik. 2011. Keanekaragaman Udang Air Tawar Di Danau Kerinci Provinsi Jambi. Tesis. Sekolah Pascasarjana, Institut Pertanian Bogor, Bogor.

Tjahjo, DWH, and Purnamaningtyas, SE. 2004. Pemanfaatan makanan oleh udang galah (Macrobrachium rosenbergii) dan interaksinya dengan jenis ikan di waduk darma. JPPI Sumber Daya Dan Penangkapan. 10(6):31–39.

Wowor, D. 2010. Studi Biota Perairan Dan Herpetofauna Di Daerah Aliran Sungai (DAS) Ciliwung Dan Cisadane: Kajian Hilangnya Keanekaragaman Hayati. LIPI, Bogor.

Wowor D, Cai Y, Ng PKL. 2004. Crustacea: Decapoda: Caridea. In: Yule CM, Sen YH, editor. Freshwater Invertebrates of the Malaysian Region. Kuala Lumpur (MY): Academy of Science Malaysia Press. pp 337-356.

Wowor D, Muhtu V, Meier R, Balke M, Cai Y and Ng PKL. 2009. Evolution of life history traits in Asian freshwater prawns of the genus Macrobrachium (Crustacea: Decapoda: Palaemonidae) based on multilocus molecular phylogenetic analysis. Molecular Phylogenetics and Evolution. 52: 340-350.