Conservation Bioprospecting: A New Approach to Conserve the World's Longest Snake, *Python reticulatus* Schneider, 1801

Sulaiman Ginting[1,2], Hadi S. Alikodra[3], Delvian[4*] and Erni Jumilawaty[5]
[1]*Master Program of Natural Resources and Environment Management, Postgraduate School, Universitas Sumatera Utara, Medan, Indonesia*
[2]*Department of Agro-ecotechnology, Islamic University of North Sumatera, Indonesia*
[3]*Department of Forest Conservation and Ecotourism, Bogor Agricultural Institute, Indonesia*
[4]*Faculty of Forestry, Universitas Sumatera Utara, Medan, Indonesia*
[5]*Faculty of Math and Science, Universitas Sumatera Utara, Medan, Indonesia*

Keywords: Bioprospecting, Conservation, *P. reticulatus*, Bio-rodenticide.

Abstract: The heavily wild caught of the world's longest snake, *Python reticulatus* for global leather industry caused significant threat to the sustainable population of the snake in Indonesia. The reticulated python is also known as definitive host of parasitic protozoan *S. singaporensis*, a biological control agent against rats. The aim of this study was to develop a new concept on conservation bioprospecting for the reticulated python. We collected and analyzed series of biological parameters of *P. reticulatus* including their reproduction and capacity in producing *S. singaporensis* from commercial captivity firm in North Sumatera. The results revealed that the reticulated python could live and reproduce well in captivity. Furthermore, the captive bred pythons produce high numbers of *S. singaporensis* that can be used for commercial bio-rodenticide. It is suggested that bioprospecting approach can give an incentive that significantly contribute to the sustainable conservation program of the threatened reticulated pythons.

1 INTRODUCTION

The wild harvest of the world's longest snake *Python reticulatus* has been ongoing for more than eight decades in Indonesia to fulfill the demand from global leather industries. Concerns have been raised about the sustainable population of the python in the country due to continuous of the wild harvest (Kasterine *et al.,* 2012). The reticulated python is also known as the definitive host for parasitic protozoan, *Sarcocystis singaporensis* which is known as biological control agent against rats (Jakel *et al.,* 1999). The use of captive bred reticulated pythons in producing the bio-rodenticide is in line with *ex situ* conservation of the pythons. The aim of this study was to develop a new concept on *P. reticulatus* conservation strategy with emphasize on bioprospecting approach through bio-rodenticide production.

2 MATERIALS AND METHODS

The study was conducted at commercial captivity firm of *P. reticulatus* in North Sumatera form October 2015 to June 2017. To achieve the aim of this study we conducted series of experiments i.e. (1) Reproduction of *P. reticulatus* in captivity, (2) Production capacity of *P. reticulatus* in producing bio- rodenticide.

2.1 Reproduction of *P. reticulatus* in Captivity

2.1.1 Effect of Body Size on Fecundity

Thirty females of reticulated python were obtained randomly from data bank developed by the commercial captivity firm where this study was conducted. The method on body size measurement of the retics was done as described by Shine *et al.* (1999). Numbers of eggs produced by every individual snake were gained from data bank and

Ginting, S., S. Alikodra, H., Delvian, . and Jumilawaty, E.
Conservation Bioprospecting: A New Approach to Conserve the World's Longest Snake, Python reticulatus Schneider, 1801.
DOI: 10.5220/0009903800002480
In *Proceedings of the International Conference on Natural Resources and Sustainable Development (ICNRSD 2018)*, pages 408-411
ISBN: 978-989-758-543-2

analyzed to investigate the effect of body size of the reticulated pythons to their fecundity.

2.1.2 Incubation and Fertility

We evaluated two incubation methods to investigate the fertility of eggs produced from captive bred pythons. Forty seven egg clutches were used as sample in this study. Thirteen clutches out of the 47 egg clutches were incubated by using females of the pythons, while the other 34 egg clutches were incubated by using modified incubator as suggested by Maxwell (2005). Numbers of hatchling eggs were recorded and analysed.

2.2 Production Capacity of *P. reticulatus* in Producing Bio-rodenticide

Numbers of pythons with minimum size of 150 cm were selected and pooled in three groups, i.e. Small (150-250 cm), Medium (250-350 cm) and Big (> 350 cm). Each group consisted of ten pythons. All pythons were infected artificially with *S. singaporensis* for mass production purpose. All the parasite produced by the pythons were collected and counted to be mixed with bait. Number of parasite used for each bait was 200.000 sporocyst. Methods on bio-rodenticide production i.e. artificial infection, fecal cleaning, parasite purification and other laboratory works were carried out as suggested by Ginting dan Jakel (2005).

3 RESULT AND DISCUSSION

3.1 Reproduction of *P. reticulatus* in Captivity

3.1.1 Effect of Body Size on Fecundity

Figure 1 shows number of eggs produced by *P. reticulatus* with various body sizes start from 260 - 580 cm. The lowest number of eggs produced was occurred from the smallest python (260 cm) with 17 eggs. While the highest number of eggs was produced by the python with size of 550 cm with 66 eggs.

There is a consistent trend that the number of eggs produced is increasing with the increasing of body size. It is because the young eggs need more space to develop inside the body of pythons (Shine, *et.al.,* 1999). The bigger the pythons the more eggs produced. Hence it is suggested to use big pyhtons for breeding program in order to get high number of neonates.

3.1.2 Incubation and Fertility

The hatchling rates of *P. reticulatus* eggs after incubated by the females and incubator are shown in Table 1. It revealed that eggs produced by the captive bred pythons were in good condition and fertile, indicating that the pythons live well in captivity. Hatchling rates of the eggs both by the females and incubator were relatively high (> 85%).

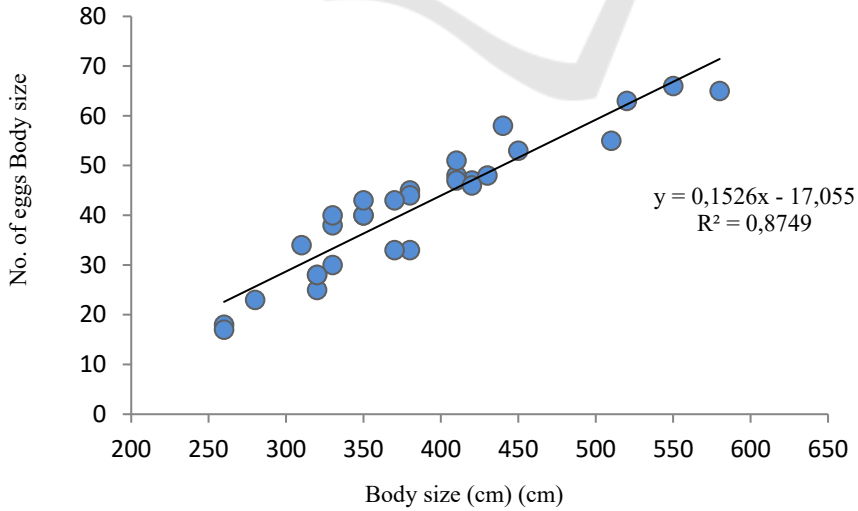

Figure 1: Number of eggs produced by various body sizes of reticulated pythons in captivity.

Table 1: Hatchling rate (%) of *P. reticulatus* eggs after incubated by the females and incubator.

	N	Hatchling rate (%)	Min-Max (%)
P. reticulatus	13	93,6	81,5 – 100
Incubator	34	85,1	82,5 – 98,8

Most of python species (Pythonidae) produce eggs in every two years in nature because of their long incubation period which takes about 3 months. In response to that, Maxwell (2005) successfully demonstrated the use of incubator in breeding program of the green tree python *Morellia viridis* in captivity. The use of incubator allows the females to produce eggs annually in captivity. Therefore, the use of incubator also can be considered as one of components in producing high number of pythons in captivity.

3.2 Production Capacity of *P. reticulatus* in Producing Bio-Rodenticide.

Figure 2 shows numbers of bio-rodenticide *S. singaporensis* produced by various sizes of pythons in a year. Small pythons produced 15,784 baits per year and increased gradually up to 21,565 baits when they reached medium size. However, number of bait produced reduced significantly when they reached the big size (2,955 baits only). Total baits produced by single python during its captivity in the period of 4 years were 40,300 baits.

From bio-rodenticide industry point of view, efficiency is one of the most important factors that need to be considered. In pythons breeding, the cost for keeping big snakes is much higher compared to the small and medium sizes pythons (Natusch and Lyons, 2014). Therefore it is suggested not to keep the big pythons as they only produce low number of bio-rodenticide.

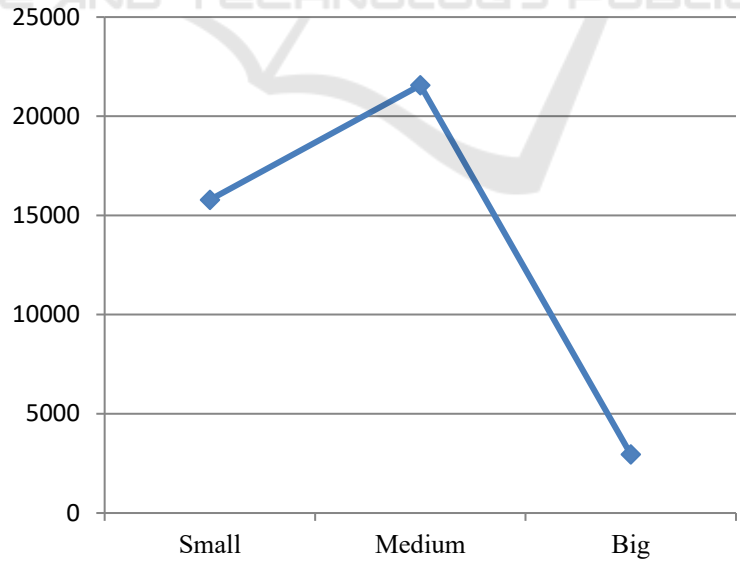

Figure 2. Number of bio-rodenticide produced by *P. reticulatus* with various body sizes per year.

3.3 Conservation Bioprospecting for *P. reticulatus*

Conservation bioprospecting is a new approach in wild life conservation.

The present study successfully developed a concept on conservation bioprospecting for *P. reticulatus* as shown in Figure 3.

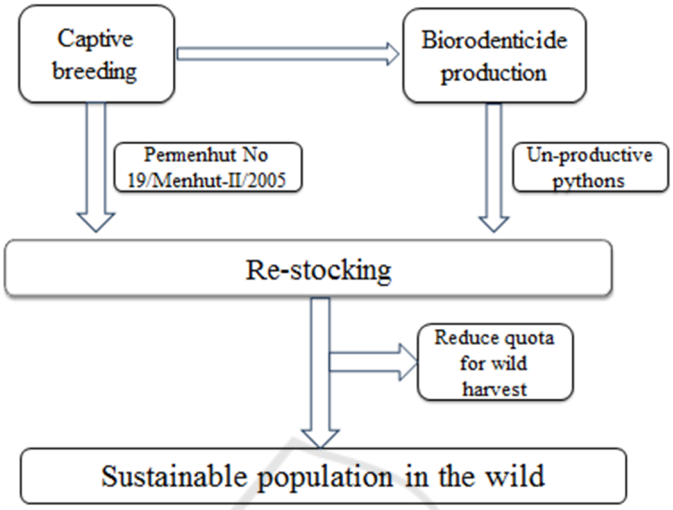

Figure 3: Conservation bioprospecting concept for sustainable conservation program for *P. reticulatus*

In order to get high number of parasites which are free from unwanted microorganisms, high numbers of captive bred pythons are highly desired. However, as the big pythons are not productive anymore they can be released to the wild or use them to fulfill demand from leather industry. With this scenario the quota for wild harvest of pythons can be reduced.

Furthermore, according to Indonesian regulation (Permenhut No 19/Menhut-II/2005) it is mandatory to release 10% of captive bred animals to the wild as part of re-stocking approach. By releasing numbers of pythons in the wild and reducing quota for wild harvest, it will assure their population in the wild will sustain as expected.

4 CONCLUSIONS

P. reticulatus live and reproduce well in captivity. *P. reticulatus* produce high number of parasitic protozan *S. singaporensis* that can be used for commercial bio-rodenticide. Conservation bioprospecting is a new approach that can give an incentive to the sustainable conservation program of *P. reticulatus.*

REFERENCES

Ginting, S., Jakel, T., 2005. Penemuan *Sarcocystis singaporensis,*protozoa parasit pengendali hama tikus di Sumatera Utara, Indonesia. *Jurnal Penelitian Pertanian:* 24 (1): 57-61.

Jakel, T., Khoprasert, Y., Endepols, S., Archer-Baumann, C., Suasa-ard, K., Promkerd, P., Kliemt, D., Boonsong, P., Hongnark, S., 1999. Biological control of rodents using *Sarcocystis singaporensis*. *International Journal for Parasitology* 29: 1321-1330.

Kasterine, A., Arbeid, R., Caillabet, O., Natusch, D., 2012. *The Trade in South-East Asian Python Skins.* International Trade Centre (ITC), Geneva, 56 pp.

Maxwell, G., 2005. The More Complete Chondro. *ECO Herpetological Publishing,* 317 pp.

Natusch, D.J.D., Lyons, J.A., 2014. Assessment of pyhtons breeding farms supplying the international hingh-end leather industry. A report under the Python Conservation Partnership programme of research. *Occasional Paper of the IUCN Species Survival Commission No 50. Gland, Switzerland: IUCN,* 56pp.

Shine, R., Ambriyanto, Harlow, P.S., Mumpuni., 1999a. Reticulated pythons in Sumatra: biology, harvesting and sustainability. *Biological Conservation* 87: 349-357.