

***In Vitro* Effectiveness of Forest Betel Leaf (*Piper sarmentosum* Roxb.) Extract against *Haemonchus contortus* Larvae**

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Haemonchosis is a parasitic disease that affects ruminants and humans. This study aims to determine whether its extract can kill *H. contortus*. The betel leaf extract was prepared: 25, 50, 75, and 100%. The extract was administered to L3 *H. contortus*, and 6-h observations were made. The results showed that the betel leaf extract could kill L3 *H. contortus* within 3 h of treatment.

Keywords: forest betel leaf, *Haemonchus contortus*, *Piper sarmentosum* Roxb

Haemonchosis is a parasitic disease that affects ruminant animals and humans (Zarlenga *et al.* 2016). To reduce the reliance on antibiotics and anthelmintics, traditional medicines may be an alternative option – particularly from plants – including those found on the island of Kalimantan such as the forest betel leaf (*Piper sarmentosum* Roxb.). This research aims to determine whether forest betel leaf extract *P. sarmentosum* Roxb. can immobilize L3 *H. contortus*.

The research was conducted at the Biomedical Laboratory of the Faculty of Medicine at the University of Palangka Raya. The betel leaf from Tumbang Kunyi Village, Central Kalimantan, Indonesia (0.482450°N, 114.086286°E). The leaves were identified at the Bali “Eka Karya” Botanical Garden. Feces were collected from a goat farm on 2.200999 °N and 113.84747472 °E. *H. contortus* eggs were present, and the feces (30 g) and mixing vermiculite (30 g) were treated for 7–9 d. The extracts (5 mL) of *P. sarmentosum* leaves were poured into a Petri dish, and five fresh and active larvae of *H. contortus* were added. The experiment was divided into four groups consisting of

100, 75, 50, and 25% extracts. Next, the treatments were observed until there was no movement in L3 within 1–6 h. This research passed the ethical requirements with due diligence number 29/UN24.9/LL/2022 at the Faculty of Medicine of the University of Palangka Raya.

The mouth of the *H. contortus* larva is located at the anterior end of the esophagus, which is cylindrical and narrow. The tip of the larvae is rounded, and the tail sheath is sharply tapered toward the posterior end (Yang *et al.* 2017).

After testing *P. sarmentosum* leaf extract on *H. contortus* larvae, there was a change in color to dark pale throughout the larva's body. At a concentration of 25%, *P. sarmentosum* Roxb extracts showed the best ability to kill L3 *H. contortus*.

In this study, the higher the concentration, the more larvae were reduced within the first hour of observation. In this study, at a concentration of 75%, the number of deaths in the first hour was not different compared to the number of deaths at 25% (2.5 g) of extract. The ability of *P. sarmentosum* Roxb. extract to induce the death of

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Figure 1. [a] *H. contortus* egg [1] eggshell and [2] embryonal segment. [b] L3 larvae of *H. contortus* [1] mouth, [2] esophagus, [3] tail, and [4] tail sheath. [c] References of L3 larvae of *H. contortus* (Mahmoud *et al.* 2017).

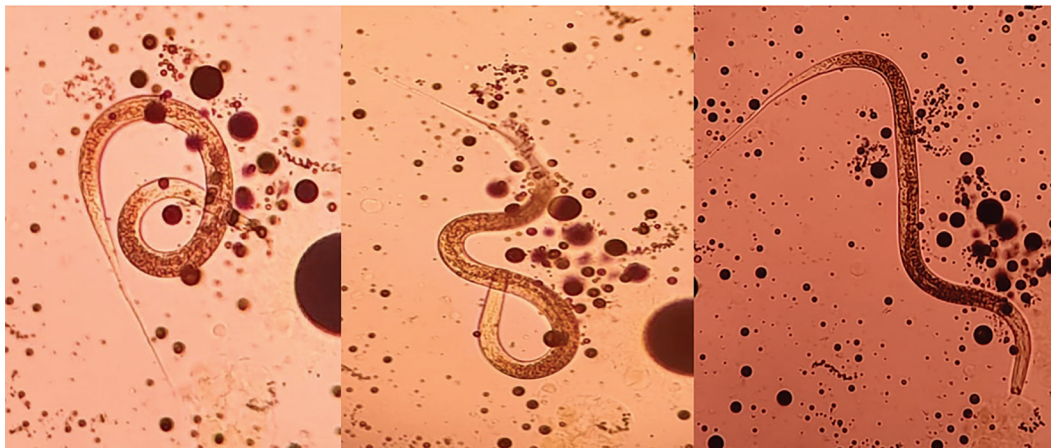


Figure 2. Result of testing of *P. sarmentosum* leaves extract on mortality of infective *H. contortus* larvae. There was a difference in the color of the organs after treatment at [a] 1–2 h, [b] 3–4 h, and [c] 5–6 h.

Table 1. The test results of *H. contortus* larvae.

Treatment (%)	Test	Number of worm larvae deaths						Worm larvae did not die
		Time						
		1	2	3	4	5	6	
100	1	3	1	1	0	0	0	0
	2	4	1	0	0	0	0	0
	3	5	0	0	0	0	0	0
Total		12	2	1	0	0	0	0
75	1	4	0	1	0	0	0	0
	2	3	2	0	0	0	0	0
	3	4	1	0	0	0	0	0
Total		11	3	1	0	0	0	0
50	1	3	2	0	0	0	0	0
	2	3	1	1	0	0	0	0
	2	3	1	1	0	0	0	0
Total		9	4	1	0	0	0	0
25	1	2	0	2	0	0	0	1
	2	3	1	1	0	0	0	0
	3	2	1	2	0	0	0	0
Total		7	2	5	0	0	0	1

L3 *H. contortus* worms is due to compounds such as tannins, saponins, and flavonoids (Qin *et al.* 2010; Fitrine *et al.* 2022; Sakti *et al.* 2018). The extract of betel leaf *P. sarmentosum* Roxb. can reduce the infective larvae of *H. contortus*. Among the various concentrations tested, the concentration of 25% showed the best ability to kill L3 *H. contortus*.

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