EFFECT OF *RIMPANG TEMU GIRING* (*Curcuma Heyneana Val. & V. Zijp.*) AND *RIMPANG TEMU HITAM* (*Curcuma aeruginosa Roxb.*) BOILED WATER ON THE MORTALITY OF *Fasciola hepatica* WORM IN VITRO

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ABSTRAK

Fascioliasis merupakan salah satu penyakit zoonosis yang menginfeksi ternak herbivora yang disebabkan oleh Fasciola hepatica. Survei beberapa pasar tradisional dan supermarket di Semarang tahun 2003 diperoleh 51,4% hati sapi terinfeksi F. hepatica dan tahun 2007 fascioliasis pada ternak di Indonesia mencapai 90%. Kuranglebih 2,5 juta manusia di dunia sudah terinfeksi oleh F. hepatica. Rimpang temu giring (Curcuma heyneana Val & V. Zijp.) dan rimpang temu hitam (Curcuma aeruginosa Roxb.) merupakan tanaman yang berkhasiat sebagai anthelmintik. Penelitian ini bertujuan untuk mengetahui pengaruh air rebusan rimpang temu giring dan rimpang temu hitam terhadap mortalitas cacing Fasciola hepatica dan kosentrasi minimal air rebusan rimpang temu giring (Curcuma heyneana Val & V. Zijp.) dan rimpang temu hitam (Curcuma aeruginosa Roxb.) terhadap mortalitas cacing F. hepatica. Sampel penelitian adalah 140 cacing F. hepatica dari hati sapi di Rumah Potong Hewan Pegirian Surabaya. F. hepatica dimasukkan ke dalam air rebusan rimpang temu giring dan rimpang temu hitam dengan konsentrasi 100%, 80%, 60%, 40%, 20% dan 10% dengan melihat waktu mortalitas F. hepatica. Hasilnya menunjukkan mortalitas F. hepatica pada konsentrasi 10% rimpang temu hitam dalam waktu 150 menit dan mortalitas F. hepatica pada konsentrasi 10% rimpang temu giring dalam waktu 165 menit. Berdasarkan uji One Way Anova, didapatkan nilai p value 0,000 < 0,05, yang menunjukkan terbukti bahwa air rebusan rimpang temu giring maupun rimpang temu hitam berpengaruh terhadap mortalitas cacing Fasciola hepatica secara in vitro.

Kata kunci:*Rimpang temu giring (Curcuma heyneana Val & V. Zijp.), rimpang temu hitam (Curcuma aeruginosa Roxb.), mortalitas Fasciola hepatica*

ABSTRACT

Fascioliasis is a zoonotic disease that infects herbivorous animals caused by Fasciola hepatica. Survey of some traditional markets and supermarkets in Semarang in 2003 obtained 51.4% of infected cattle liver F. hepatica and 2007 fascioliasis in cattle in Indonesia reached 90%. About 2.5 million people worldwide have been infected by F. hepatica. temu giring rhizome (Curcuma heyneana Val & V. Zijp.) And temu hitam rhizome (Curcuma aeruginosa Roxb.) Is a plant that is efficacious as an anthelmintic. This study aims to determine the effect of boiling water rhizome rhizome temu giring and black against Fasciola hepatica worm mortality and minimal concentration of the cooking water temu giring rhizome (Curcuma heyneana Val & V. Zijp.) And temu hitam rhizome (Curcuma aeruginosa Roxb.) On mortality worms F. hepatica. The sample was 140 worms F. hepatica from cattle liver Slaughterhouse Pegirian in Surabaya. F. hepatica incorporated into the cooking water rhizome rhizome Intersection temu giring and black with a concentration of 100%, 80%, 60%, 40%, 20% and 10% mortality by looking at time F. hepatica. The results show mortality F. hepatica at a concentration of 10% rhizome of temu hitam within 150 minutes, and mortality F. hepatica at a concentration of 10% rhizome temu giring within 165 minutes. Based on One Way Anova test, obtained p value 0.000 < 0.05, which indicates that the water decoction proved sleigh and rhizome rhizome Intersection Intersection black worms affect the mortality of Fasciola hepatica in vitro.

Keywords: *rimpang temu giring (Curcuma heyneana Val & V. Zijp.), rimpang temu hitam (Curcuma aeruginosa Roxb.), mortalitas Fasciola hepatica*

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INTRODUCTION

Fascioliasis is a parasitic zoonotic disease that infects herbivores (cows, goats, buffalo, sheep) and is caused by *Fasciola hepatica*. These worms are in the bile ducts causing liver damage. Prevalence of fascioliasis in ruminant livestock in Indonesia ranges between 60% - 90% (Kurniasih 2007). In 2007 Indonesia the prevalence of fascioliasis in cattle is as high as 90%. However, this species can also be transmitted to humans, approximately 2.5 million people worldwide are infected whereas human cases in Indonesia has yet

to be reported (Kurniasih 2007). Fascioliasis can take place in acute or chronic. Acute Fascioliasis more is commonly seen in sheep and goats. Chronic Fascioliasis is often seen in the definitive host, including humans.

Incidence of fascioliasis in humans is closely related to the habit of eating raw vegetables or drinking contaminated raw water containing metacercaria larvae contained within the cyst form. If liver undercooked infected with *Fasciola hepatica* worm eaten, then the worms were also ingested, causing severe pharyngitis and edema of the larynx (Pusarawati 1990). This worm infection in humans causes non-specific symptoms such as malaise, intermittent fever, jaundice, mild anemia, eosinophilia, and the haunting pain. They lead to ectopic infections, particularly in the lung and subcutaneous tissue formed cysts (Kurniasih 2007).

Based Putratama study (2009) showed that the results of a survey of 30 samples of cow feces found seven types of worm eggs, one of which is Fasciola 13.33%. The survey results in animal markets and slaughterhouses in Indonesia indicate that 90% of cattle from infected livestock such as worms *F. hepatica* (Syailin 2009). *Fasciola hepatica* infection in beef liver sold in traditional markets and supermarkets in Semarang showed that of the 35 liver samples, obtained 51.4% (Al Amin 2001).

The growth of parasite resistance to treatment is a threat to the eradication of parasitic diseases in humans (Magdalena&Hadidjaja2005). Therefore, look for alternative treatments that have little side effects, low cost, easy way of treatment, and easily available in the community (Koesdarto 2000). One of the plants is efficacious as anthelmintic *temu giring* rhizome (*Curcuma heyneana Val. & V. Zijp.*) And *temu hitam* rhizome (*Curcuma aeruginosa Roxb.*) (Dalimartha 2004, Santoso 2008). Rhizome *temu giring* curcumin-containing compounds that can give a yellow color, 0.8 to 3% essential oils, starch, resins, fats, tannins, saponins, and flavonoids. Saponins and flavonoids as a potent anti-inflammatory and asirinya oil can kill the worms *Fasciola hepatica* (Santoso 2008). Fitriyanti research results (2009) showed Fasciola gigantica worm mortality occurred at a concentration of 2% freshly *temu giring* rhizome (*Curcuma heyneana Val. & V. Zijp.*).

Rhizome *temu hitam* (*Curcuma aeruginosa Roxb.*) Contains essential oils, tannins, kurkumol, kurkumenol, isokurkumenol, kurzerenon, kurdion, kurkumalakton, germakron, alpha-Elemene, beta-elemene, g-elemene, linderazulekurkumin, demethyoxykurkumin, bisde-methyoxykurkumin (Dalimartha 2004). The active substance is antihelmintik sesquiterpenes in the essential oil of *temu hitam* which can depress the central nervous symptom causing seizures followed by death worm (Tamara 2008).

The purpose of this study was to determine the effect of boiling water *temu giring* rhizome (*Curcuma heyneana Val. & V. Zijp.*) And *temu hitam* rhizome (*Curcuma aeruginosa Roxb.*) Against *Fasciola hepatica* worm mortality in vitro and determine the minimum concentration of the cooking water rhizome *temu giring* (*Curcuma heyneana Val & V. Zijp.*) and *temu hitam* rhizome (*Curcuma aeruginosa Roxb.*) on mortality worms *F. hepatica*. The benefit of this study is to provide information about the efficacy and complement *temu giring* rhizome (*Curcuma heyneana Val. & V. Zijp.*) and *temu hitam* rhizome (*Curcuma aeruginosa Roxb.*) as an anthelmintic.

MATERIALS AND METHODS

This type of research is experimental laboratory. The sample for this study was a worm *Fasciola hepatica* obtained from Slaughterhouse Pegirian Surabaya. In this study using data collected observation of *Fasciola hepatica* worm observed after administration of some of the cooking water concentration *temu giring* rhizome (*Curcuma heyneana Val & V. Zijp.*) and analyzed using one way ANOVA.

For the manufacture of cooking water rhizome *temu giring*, dribbles Intersection rhizome fresh peeled, washed and sliced. Considering the *temu giring* rhizome slices as much as 100 grams. Incorporating 100 ml of distilled water to the erlenmeyer. Heating it to boiling water, entering *temu giring* rhizome slices in boiling water to cover the erlenmeyer with cotton and aluminum foil and wait for 4-5 minutes. After the stew rhizome *temu giring* cold, filtered so getting 100% concentration of the cooking water. Then make cooking water rhizome *temu giring* with some concentration. Decoction of the rhizome *temu giring* water concentration of 100% made 80% concentration, the concentration of 60%, the concentration of 40%, 20% concentration, and the concentration of 10% (Mahendra 2006).

For the manufacture of cooking water rhizome Intersection black, *temu hitam* rhizome fresh peeled, washed and sliced. Considering the *temu hitam* rhizome slices as much as 100 grams. Incorporating 100 ml of distilled water to the erlenmeyer. It was heated to boiling water. Entering *temu giring* rhizome slices in boiling water to cover the erlenmeyer with cotton and aluminum foil and wait for 4-5 minutes. After the stew rhizome *temu giring* cold, filtered so getting 100% concentration of the cooking water. Then make a

rhizome boiled water with some concentration of *temu hitam*. Rhizome decoction of *temu hitam* of concentration 100% made 80% concentration, the concentration of 60%, the concentration of 40%, 20% concentration, and the concentration of 10% (Mahendra 2006).

To observe mortality *Fasciola hepatica* worms, prepared 13 petri dish for each rhizome decoction of rhizome *temu giring* and black. Entering *temu giring* rhizome boiled water concentration of 100%, 80%, 60%, 40%, 20%, 10% respectively in 6 petri dish and incorporate *temu hitam* rhizome boiled water concentration of 100%, 80%, 60%, 40%, 20%, 10% respectively in 6 petri dish. One petri dish other used as a control containing buffer concentration saline. Then it was put in an incubator at a temperature of 37^{o}C for 15 minutes. Entering 10 pieces of worms *Fasciola hepatica* into each petri dish on each rhizome *temu giring* cooking water concentration of 100%, 80%, 60%, 40%, 20%, 10%. Entering 10 pieces of worms *Fasciola hepatica* to each petri dish on each rhizome of *temu hitam* the cooking water concentration of 100%, 80%, 60%, 40%, 20%, 10%. 10 pieces of worms *Fasciola hepatica* into petri dish used as a negative control. All petri dish were incubated at 37^{o}C. Observations were made every 15 minutes, by touching the worms with tweezers. Observations were made by looking at the time of *Fasciola hepatica* worm mortality in each bath. If it is not moving then it is declared dead worms (Widjayanti 2008).

RESULTS

After doing research the influence of the cooking water *temu giring* rhizome (*Curcuma heyneana Val & V. Zijp.*) and *temu hitam* rhizome (*Curcuma aeruginosa Roxb.*) against Fasciola worm mortality hepatica we obtained results as in Table 1. In this study was used as the control worms *Fasciola hepatica* life in buffered saline solution. *Fasciola hepatica* worms was found to live longer than when the worm began immersed in buffered saline solution, incubated at 37 °C until all the dead worms in each bath. From the observations obtained survival time *Fasciola hepatica* worms in a solution buffered saline with 2 replication time is 14 hours (840 minutes). So the influence of experimental observation time cooking water rhizome *temu giring* (*Curcuma heyneana Val. & V. Zijp.*) and rhizomes of *temu hitam* (*Curcuma aeruginosa Roxb.*) against *Fasciola hepatica* worm mortality in vitro performed with a maximum period of observation for 14 hours.

Table 1. Concentration and mortaility time of *rimpang temu giring* and *rimpang temu hitam*

No	Concentration of *rimpang temu giring* (*Curcuma heyneana* Val & V. Zijp.)	Mortality Time of *Fasciola hepatica* (menit)	Concentration of *rimpang temu hitam* (*Curcuma aeruginosa Roxb.*)	Mortality Time of *Fasciola hepatica* (menit)
1	100 %	30	100%	30
2	80%	45	80%	45
3	60%	60	60%	55
4	40%	90	40%	90
5	20%	135	20%	120
6	10%	165	10%	150
7	Control	860	Control	860

The survey results revealed that both the cooking water rhizome rhizome. Intersection *temu giring* and black at 100% concentration is the maximum concentration of the cooking water can be deadly worms *Fasciola hepatica* in the same time is 30 minutes. While the concentration of 80%, 60%, 40%, 20%, and 10%, to turn off all the worms of *Fasciola hepatica* requires a longer time than the concentration of 100%.

DISCUSSION

Mortality worms *Fasciola hepatica* in boiling water rhizome *temu giring* due to volatile oil content of the rhizome *temu giring* that are anthelmintik. This accords with the statement Santoso (2008) that the essential oil in the rhizome *temu giring* have anthelmintic power. Fitriyanti (2009) proved that there *temu giring* influence rhizome juice (*Curcuma heyneana Val. & V. Zijp.*) on mortality liver fluke (*Fasciola gigantica L.*).

From the results of the study also found a greater concentration of *temu hitam* rhizome boiled water, then the shorter the time it takes to turn off (mortality) all hepatica.Hal Fasciola worms caused the rhizome essential oil of *temu hitam* that has anthelmintic. Both rhizome rhizome Intersection *temu giring* and black have the same active substance content of sesquiterpenes in the essential oil. Anthelmintic potential of the cooking water and rhizome rhizome *temu giring temu hitam* possible because contained in the essential oil can depress (pressing) and central nervous induce muscle fasciculations that the lack of coordination that cause tremors. Symptoms of tremor is due to the neurotoxic effects of sesquiterpenes. Sesquiterpenes inhibited smooth muscle contraction through covalent modification of proteins required

Unidentified contractileapparatus of smooth muscle. Sesquiterpenes also reduce the influx of Ca2 + into the smooth muscle cells, causing smooth muscle paralysis worms *Fasciola hepatica* (Tamara 2008).

At the time table of *Fasciola hepatica* worm mortality at a concentration of 60%, 20% and 10% water decoction of the rhizome *temu giring* longer than 5-10 minutes in a boiling water rhizome of *temu hitam*. It is the possibility of water boiling sesquiterpenes content rhizome *temu giring* lower than boiling water rhizome of *temu hitam*. At a concentration of 10% water decoction of the rhizome *temu giring* and water boiled rhizomes of *temu hitam* a minimum concentration can cause mortality of *Fasciola hepatica* worms. Concentration of 10% was obtained boiled water of rhizome *temu giring* the time of death (mortality) of *Fasciola hepatica* worm is 165 minutes longer than the *temu hitam*rhizoma stew that is 150 minutes. Low content of sesquiterpenes in a concentration of 10% water decoction of rhizomes *temu giring* cause sesquiterpenes not work optimally in depressing and inducing central nervous muscle fasciculations so to cause death (mortality) of *Fasciola hepatica* worm takes longer than the cooking water concentration rhizome The intersection was therefore, significant. By cooking water rhizome rhizome Intersection *temu giring* and black against *Fasciola hepatica* worm mortality.

CONCLUSION

The conclusion that can be derived from this study is the effect of boiling water there *temu giring* rhizome (*Curcuma heyneana Val. & V. Zijp.*) and *temu hitam* rhizome (*Curcuma aeruginosa Roxb.*) against *Fasciola hepatica* worm mortality in vitro. Concentration of 10% boiled water *temu giring* rhizome (*Curcuma heyneana Val & V. Zijp.*) And the concentration of 10% water decoction of *temu hitam* rhizome (*Curcuma aeruginosa Roxb.*) Is the minimum concentration against *Fasciola hepatica* worm mortality. Further research is needed to detect anthelmintic sesquiterpene have power to the sleigh and rhizome rhizome Intersection Intersection black using the extraction method. In addition it is necessary for the surveillance and monitoring of heart worm infected cattle *Fasciola hepatica*.

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