Ovicidal Effects of Pineapple Peel Juice (Ananas comosus L.) as a Control of Ascaridians in Chicken (Gallus Domesticus) In Vitro

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Abstract

The aim of this research was to know whether pineapple peel juice can be used as an oxicidal of in vitro A. galli. This study used eggs of A. galli worms obtained by collecting adult A. galli worms from the small intestines of fresh local chickens purchased from traditional markets in Surabaya. The research design used was a completely randomized design (CRD) with four treatments, the concentration of pineapple peel juice was 0% (Control), 5%, 10%, and 20%. Each treatment consisted of six replications, with observations on days 5, 10, 15, and 20. Developed eggs identified with the presence of larvae within egg and the movement of larvae. The data obtained analyzed with the ANOVA Statistical Test with the SPSS device and then followed by the Duncan test. The results of statistical analysis showed that pineapple peel juice had a significant effect on the development of A. galli worm eggs In Vitro. The number of damaged A. galli eggs increased as they were given higher pineapple juice concentration. This proves that pineapple peel juice has higher anthelmintic effect with increasing concentration given. Pineapple peel juice 20% is the best juice concentration.

Keywords: Ascaridiasis, Ovicidal effects, Ascaridia galli.

Introduction

Pineapple is widely cultivated as garden plants and plantation cultivation in Indonesia since it was brought by the Spanish in the 15th century which originated from Brazil (Prihatman, 2000). The fruit contains useful substances, such as vitamins, carotenoids, flavonoids, bromelan enzymes etc (Salasa, 2017). Unfortunately, the fruit is not well positively appreciated, with most people only take the fruit’s flesh in the consumption while the peel is discarded as a waste. One of the substances, Bromelan enzymes, is a proteolytic enzyme which able to hydrolyze other proteins and act as an anthelmintic, to destroy the worm egg wall and kill the larvae (Christy, 2012; Wiyati, 2018). However, there is no research on pineapple peel as oxicidal.

Ascaridiasis is an infection that attacks poultry and cause intestinal damage, decrease egg production and quality, and infect poultry if the ineffective eggs are ingested with contaminated food or water (Sonda et al., 2018; Zalizar and Satrija, 2009; Zalizar et al., 2007). The infection caused by Ascaridia galli worms.

The use of Anthelmintics is to treat and prevent infection with A.galli worms by killing larvae (as larvicidal), adult worms (vermicidal), and inhibiting the development of worm eggs (ovicidal) as the mechanism of action in controlling helminth infection (Ardana et al., 2012). However, the substance is mostly used from synthetic chemical, such as Albendazole, which is expensive and could cause resistance and adverse side effects such as diarrhea on the livestock health (Ardana, 2007; Walter, 2008). Therefore, medicinal plant, such as pineapple, become one of the alternatives as the substitute of the chemicals that contains anthelmintic (Astri and Sukohar, 2019). However, these studies mentioned it only effectively impacted in adult worms, with no oxicidal effect of the herb have been reported. Therefore, an in vitro study of the oxicidal effect of pineapple peel conducted to control Ascaridiasis chickens.

In a conclusion, this study aimed to determine whether pineapple peel juice can be used as an oxicidal of in vitro A. galli. Further benefits expected to provide scientific reference in increasing the quality to prevent the ascaridiasis
infection in chickens and reduce the dependency of chemical substance in daily use.

**Materials and Methods**

In order to test the effectiveness of pineapple peel against *Ascaridia galli* eggs in vitro, this study used a Completely Randomized Design (CRD) with four treatments and six repetitions for each treatment.

Determination of the number of samples based on Federer:

\[(t-1) (n-1) \geq 15\]

\[t = \text{number of treatment}\]

\[n = \text{number of repetition,}\]

Based on the formula, the sample in this research were obtained 4 samples distributed into 24 petri dishes, which focus on the development of *Ascaridia galli* worm eggs influenced by the concentration of pineapple juice. The ovicidal effect of pineapple peel juice can be seen from the number of broken worm eggs counted in each observation.

**Research Procedure**

The eggs were collected from adult worms isolated from the intestines obtained from sellers in Surabaya traditional markets. The worms were put in a petri dish containing PBS solution. The eggs are removed from the female worm by dissection through the vulva. The treatment was given after being divided into 24 petri dishes of 50 worm eggs each. The method of counting 50 eggs was previously carried out in preliminary research experiments 3-4 times by counting the number of eggs from 10 mL of egg suspension in a glass object and counted under a microscope.

Pineapple peel was obtained from a honey pineapple seller. Pineapple peel was washed and then processed into fresh juice (Hossain et al., 2015). For the production of fresh juice, the fresh peels were cut into small pieces and aquades was added at 1:1 ratio in a kitchen blender. Then juice were made by blending the peels for 2-3 minutes and stored in a refrigerator at 4°C to maintain the quality of active ingredients of juice.

Four treatments were made using pineapple peel juice concentrations of 0% (Control), 5%, 10%, and 20%. Each treatment with six repetitions contained 50 worm eggs. Each treatment with six repetitions contained 50 worm eggs. Pineapple juice solvent using PBS. Put pineapple juice with each concentration to a volume of 10 mL and add 1 mL of worm eggs into a Petri dish. The petri dish placed in a large tray and kept moist. Place it at room temperature for 20 days and observe the development of larvae in eggs on day 5, 10, 15, and 20 (Hossain et al., 2015). The percentage of inhibition of hatchability of worm eggs calculated using the formula: the number of undeveloped worm eggs divided by the total number of eggs before treatment multiplied by 100% (Hossain et al., 2015).

**Data Analysis**

The data obtained analyzed with the ANOVA Statistical Test with the SPSS device. The effectiveness between treatments compared by Duncan’s multiple distance test.

**Result and Discussion**

The research results over *Ascaridia galli* worm eggs were divided into 4 experiments of Pineapple peel juice Submersion with 0% 5% 10% and 20% concentrations. Based on the result, there is an average presentation of the highest breakage worm age in the 20% concentration. According to it, an average presentation of *A. galli* worm eggs that died all over the experiments are presented in Table 1.

<table>
<thead>
<tr>
<th>Concentration</th>
<th>Mean ± SD</th>
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<tbody>
<tr>
<td>0% (Control)</td>
<td>21.33 8.36 a</td>
</tr>
<tr>
<td>5%</td>
<td>42.33 7.94 b</td>
</tr>
<tr>
<td>10%</td>
<td>63.00 6.78 c</td>
</tr>
<tr>
<td>20%</td>
<td>71.67 3.44 d</td>
</tr>
</tbody>
</table>

**Table 1. An Average Effectivity of Pineapple Peel Juice in Hindering the Development of *A. galli* Eggs.**

Reviewed from an efficacy point of view, pineapple peel juice with a concentration level of 20% has the optimum capability in hindering *A. galli* worm egg development as per (72%), the concentration of 10% can hinder the development of worm eggs as per (63%). On the other hand, the concentration of 5% can hinder the development of worm eggs as per (42%), which is less effective in hindering the *A. galli* worm eggs compared to the first and second concentrations.

Observations done on the 5th day show that each treatment group, Po (control group), P1 (5%), P2 (10%), and P3 (20%), yields different effectiveness in hindering *A. galli* worm eggs development. Observations show that the Po and P2 groups are experiencing the early morula phase. Po, P1 and P2 appear to develop normally.
while the eggs in P3 start to suffer from damage and perish.

Figure 1. Microscopic view of *A. gali* worm eggs on day 5 at 100x magnification. A. Developed *A. gali* worm eggs in PBS solution (control) B. Developed *A. gali* worm eggs in submersion of pineapple peel juice 5%. C. Developed and Undeveloped *A. gali* worm eggs in submersion of pineapple peel juice 10%. D. Undeveloped *A. gali* worm eggs in submersion of pineapple peel juice 20%.

Observations done on the 10th day show that each treatment group, Po (control group), P1 (5%), P2 (10%), and P3 (20%), also yields different effectiveness in hindering *A. gali* worm eggs development. Observations show that the eggs in the Po group are developing in the late morula and vermiform phases. In the P1, P2, and P3 group, some eggs are suffering from damage and perish.

Figure 2. Microscopic view of *A. gali* worm eggs on day 10 at 100x magnification. A. Developed *A. gali* worm eggs in PBS solution (control) B. Undeveloped *A. gali* worm eggs in submersion of pineapple peel juice 5%. C. Undeveloped *A. gali* worm egg in submersion of pineapple peel juice 10%. D. Undeveloped *A. gali* worm eggs in submersion of pineapple peel juice 20%.

Figure 3. Microscopic view of *A. gali* worm eggs on 15th day at 100x magnification. A. Developed *A. gali* worm eggs in PBS solution (control) B. Undeveloped *A. gali* worm eggs in submersion of pineapple peel juice 5%. C. Undeveloped *A. gali* worm egg in submersion of pineapple peel juice 10%. D. Undeveloped *A. gali* worm eggs in submersion of pineapple peel juice 20%.

Observations done on the 20th day show that each treatment group, Po (control group), P1 (5%), P2 (10%), and P3 (20%), also yields different effectiveness in hindering *A. gali* worm eggs development. Observations show that most eggs in the Po and P1 group are developing into larva, while more eggs in the P2 and P3 group are suffering from damage and perish.

Figure 4. Microscopic view of *A. gali* worm eggs on day 20 at 100x magnification. A. *A. gali* Larvae in PBS solution (control) B. *A. gali* larvae in submersion of pineapple peel juice 5%. C. Developed and Undeveloped *A. gali* worm eggs in submersion of pineapple peel juice 20%.

worn eggs in submersion of pineapple peel juice 20%.

Observations done on the 15th day show that each treatment group, Po (control group), P1 (5%), P2 (10%), and P3 (20%), also yields different effectiveness in hindering *A. gali* worm eggs development. Observations show that the eggs in the Po group are developing into larva motile (L3). In the Po, P1, P2, and P3 group, more eggs are suffering from damage and perish.
in submersion of pineapple peel juice 10%. D. Undeveloped A. galli worm egg in submersion of pineapple peel juice 20%.

From the observations done on the eggs, the most common damages to the A. galli worm eggs are changes in the egg to a dark black colour and damaged outer walls. The eggs contain no cells and have thin walls. On the next day, the egg walls appear to splay and disappear or dissolve, as if they have breaches and leaks. It suspected that the cause of the cells’ deaths is the damaged cell membrane, induced by pineapple peel juice soaking.

**Conclusion and Suggestion**

**Conclusion**

Based on the research, it concluded that pineapple (Ananas comosus L.) peel juice has ovicidal effects on Ascaridia galli worms in vitro.

**Suggestion**

Based on the results of this study, further research needed on the ovicidal effect of pineapple peel juice on the environment (soil) which aims to control the spread of ascaridiasis.

**References**


