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Kiambang Extract Effectiveness Test (*Salvinia molesta* D.Mitch.) as Bioherbicide in Controlling Pre-growth of Peanut Weed (*Cyperus rotundus* L.)

*Toni Sutrisno, Hapsoh, Herman
Universitas Riau, Jl. Pattimura No. 9, Gobah, Cinta Raja, Kec. Sail, Kota Pekanbaru, Riau 28127
e-mail: toni_sutrisno@gmail.com

ABSTRACT

Kiambang extract (Salvinia molesta D.Mitch.) is an alternative to control Teki Weed (Cyperus rotundus L.), The aim of the study was to test the effectiveness of kiambang extract as a bioherbicide and to obtain the best concentration in controlling pregrowth of puzzle weed (Cyperus rotundus L.) . The research was carried out at the Experimental Garden Nursery, Riau University, Jalan Bina Widya km 12.5, Simpang Baru Village, Tampan District and at the Natural Materials and Minerals Laboratory, Faculty of Engineering, Riau University. This research was conducted experimentally using one factor Completely Randomized Design (CRD). The treatment for the pre-growth test used 5 treatments of kiambang extract concentration, namely: 0%, 20%, 40%, 60% and 80% repeated 4 times. The data obtained were analyzed using analysis of variance (ANOVA) at the 5% level, then further tested using Duncan's Multi Range Test (DMRT) at the 5% level with SPSS 23. The results showed that kiambang extract was considered effective as a pre-emergent bioherbicide to control nut weeds. . the best concentration of kiambang extract in inhibiting the shoots of nut weed tubers was the treatment with a concentration of 80%.
keywords : *Cyperus rotundus*, *pregrown, bioherbicide, Salvinia molesta*

1. INTRODUCTION

Puzzle weed (Cyperus rotundus L.) is one of the important weeds in agriculture because it is quite difficult to control. Cyperus rotundus is a perennial herbaceous plant that grows a lot in agricultural land as a weed. This plant is very easy to find in Indonesia because of the tropical climate. Stem tubers are a defense mechanism that exists in Cyperus rotundus, because tubers can survive in the soil for 3-4 years, even remaining viable for up to 10 years under ideal conditions (Coleman et al., 2018).

Weed control generally uses chemicals (herbicides) because it is considered more effective and efficient than manual weeding. Herbicides can be divided into synthetic herbicides and organic herbicides (bioherbicides). Excessive use of herbicides over a long period of time will reduce organic soil levels, cause environmental pollution and weed resistance to certain herbicides (Syakir et al., 2008).

Weed control techniques that have begun to be widely developed are the use of organic herbicides from allelochemical compounds contained in plant organs. These allelochemical compounds can inhibit the growth and development of other plants with more environmentally friendly properties compared to synthetic herbicides (Syakir et al., 2008).

Allelochemicals are secondary metabolites produced by plants, algae, bacteria and fungi. Allelochemical compounds in plants can be found in all parts of the plant, but the largest storage sites for these compounds are usually located in the roots and leaves. Allelochemical compounds can be found in the environment in several ways, namely through evaporation, leaching, removed through roots, and decomposition of plant residues in the soil (Senjaya and Surakusumah, 2007). Secondary metabolites in plants containing allelochemical compounds can be in the form of phenolic compounds, flavonoids, alkaloids, terpenoids, and cyanogenic glycosides, which are generally hydrophilic (Reigosa et al., 2006).

One of the plants that can be used as a bioherbicide is kiambang (Salvinia molesta D. Mitch.). According to Nithya et al. (2016) kiambang extracted using 75% ethanol contains phenol 98.4 mg Gallic Acid Equivalent/g; flavonoids 10.89 mg Quercetin Equivalent/g; alkaloids 90.8 mg/g; tannins 12.5 mg Tannin Acid Equivalent/g; and saponins 42 mg/g. There are many phenolic compounds in the kiambang extract. According to Solichatun (2000), phenols can accelerate plant growth including in terms of nutrient absorption, reduce the rate of absorption of ions by plants, inhibit plant root cell division, inhibit photosynthetic activity, especially stomata closure, affect respiration, inhibit protein synthesis, reduce membrane permeability. and inhibits enzyme activity.

Allelochemical compounds found in kiambang are thought to be used as an alternative method of weed control that is more environmentally friendly. This study aimed to examine the effectiveness of kiambang extract as a pre-emergence bioherbicide in controlling nut weeds and controlling the best concentration of kiambang extract in inhibiting the sprouting of nut weed tubers.

2. MATERIALS AND METHODS

The research was carried out at the Experimental Garden Nursery, Riau University, Jalan Bina Widya km 12.5, Simpang Baru Village, Tampan District and at the Natural Materials and Minerals Laboratory, Faculty of Engineering, Riau University.

The tools used in this research include: Blender, Vacuum Rotary Evaporator, digital scale, vacuum measuring pump, vacuum flask, Buchner funnel, filter paper, refrigerator, glass, polybag, petri dish, measuring cup, spatula, dropper, germinator , goblets, 5 ml and 500 ml spayer bottles, sari paper, Chlorophyll meter and Portable Photosynthesis System LI-6400XT.

The materials used in this study include: Kiambang (Salvinia molesta D.Mitch.), 96% ethanol, aquades, soil and compost as a planting medium, nutmeg tubers (Cyperus rotundus L.).

This research is an experimental type of research that is testing several concentrations of bioherbicides from kiambang extract on one variety of nut (Cyperus rotundus L).The experimental design used was a one-factor Completely Randomized Design (CRD). Riau. This research was conducted experimentally using one factor Completely Randomized Design (CRD). The treatment for the pre-

growth test used 5 treatments of kiambang extract concentration, namely: 0%, 20%, 40%, 60% and 80% repeated 4 times. Each post-growth test was repeated 4 times, 20 experimental units were obtained. Observation parameters for the pre-growth test consisted of tuber shoot growth (%) and tuber shoot growth time (days).

3. RESULTS AND DISCUSSION

Test the effectiveness of kiambang extract as a pre-emergence bioherbicide in the control of teki weeds

Growing time of riddle tuber shoots (days)

Results Based on variance, it was shown that the application of kiambang (Salvinia molesta D.Mitch.) extract had a significant effect on the growth time of the shoots of teki (Cyperus rotundus L.) bulbs. The results of the DMRT follow-up test at 5% level can be seen in Table 4.1.

Table 1. Growing time teki tuber shoots 10 days after application of kiambang extract

Extract concentration Kiambang	Growing Time Bulbs Shoots (days)
0 (%)	5.6 b
20 (%)	6.2 b
40 (%)	6.9
60 (%)	7.1 a
80 (%)	7.6

Description : Numbers followed by the same letter in the same column show no significant difference in the 5% DMRT test.

The results of the observations in Table 1 show that the growth time of the shoots of nutmeg bulbs that were applied with a concentration of 20% kiambang extract was not significantly different from 0% (without treatment), namely 5.6 days and 6.2 days, this was significantly different from the application of kiambang extract starting from concentrations of 40%, 60%, and 80% which can delay the growth time of the shoots of teki tubers to 6.9 days, 7.1 days and 7.6 days after application of kiambang extract. This is related to the amount of concentration of kiambang extract given, the more concentration of kiambang extract given, the longer the time to grow the shoots of teki tuber. This is supported by the opinion of Nursal (2006) which states that the higher the concentration of the extract given, the higher the effect.

Slow growth timesedge tuber shoots showed that the addition of kiambang extract could reduce the strength of the nutmeg tuber. It is thought that the inhibition of the growth of the nutmeg tuber may occur due to the insertion of allelopathic compounds into the umbilical cord so that it interferes with the phytohormonal system in the tubers, such as inhibiting the activity of the hormones gibberalin (GA) and indoleacetic acid (IAA). Allelopathic compounds that can be known to inhibit growth are chemical compounds belonging to the aliphatic group of aromatic compounds, phenols, saponins, tannins and acetic acid. This is supported by Astuti et al.

(2017) which states that phenol compounds that bind to the gibberellin hormone will cause the gibberellin hormone to become inactive. According to Yuliani (2000) allelopathic compounds can inhibit the induction of growth hormones such as gibberellin acid (GA) and indolacetic acid (IAA).

Growing power of puzzle tubers (%)

Based on the results of the variance (Appendix 5), it was shown that the application of kiambang extract had a significant effect on the growth power of teki (Cyperus rotundus L.) tubers. The results of the DMRT follow-up test at 5% level can be seen in Table 4.2.

Table 2. Growing power teki tuber shoots 10 days after application of kiambang extract

Extract concentration Kiambang	Growing Power Bulbs Puzzle(%)
0 (%)	95.00
20 (%)	75.00 b
40 (%)	62.50 b
60 (%)	57.50 b
80 (%)	25,000 c

Description : Numbers followed by the same letter in the same column show no significant difference in the 5% DMRT test.

Table 2 shows that the administration of kiambang extract with concentrations of 20%, 40% and 60% decreased the growth power of nutmeg tubers significantly with a concentration of 0% (without treatment), namely 75.00%, 62.50% and 57.50%. The high value of the growth power of puzzle tubers in the 0% treatment of 95.00% showed that the viability of the nutmeg tubers was high. This opinion is supported by Coleman et al. (2018) which states that tubers are the main method of reproduction and dispersal of Cyperus rotundus.

The application of kiambang extract with a concentration of 80% can reduce the growth power of the lower nut that is 250.00% significantly different from all other treatments. This indicates that the higher the concentration of kiambang extract given, the lower the growth power of the nutmeg tubers. One of the factors that inhibit the growth of nutmeg tubers is the disruption of the enzyme activity of the nutmeg tubers due to allelochemical compounds in the kiambang extract. According to Nihayati et al. (2016) allelochemical compounds of kiambang extract are thought to damage the germination of catalytic enzymes related to carbohydrates in tubers, causing very little energy and slow growth (Kristanto, 2006). According to Yulifrianti et al. (2015) if the -amylase enzyme is not formed, the embryo does not have an energy source for its growth, causing the plumule and radicle not to grow.

Factor Another factor that can inhibit the growth of teki tubers is a disturbance in the process of cell mitosis and a decrease in the permeability of cell membranes by flavonoid compounds, as a result, the cell membrane cannot select the solutions that come out through the cell membrane (Yuliani et al., 2017), causing disturbances in the cell membrane. imbibition process (Zhao et al., 2010). This causes oxidative stress to the umbilicus, causing damage and disruption of activity that can result in damage and disruption of the signal system of the nutmeg bulb. Inhibition of growth can also

occur because the cell becomes inelastic and disrupts ion transfer in the cell membrane (Isda et al 2013).

4. CONCLUSION

Based on the research that has been carried out, it can be concluded that:

1. Kiambang extract was considered effective as a pre-emergence and post-emergence bioherbicide to control nut weeds (Cyperus rotundus L.).
2. The best concentration of kiambang extract (Salvinia molesta D.Mitch.) in inhibiting shoots of nut weed (Cyperus rotundus L.) was the treatment with a concentration of 80%.

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