POTENTIAL OF JIRINGA AS ORGANIC HERBICIDE

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ABSTRAK

Jiringa is one potential plants to be developed as organic herbicide since its toxic compounds. Some researches found that extract of this plant contained fenolic, flavonoid and carbolic acid. Thus, it is able to inhibit weed growth. This research was conducted to evaluate the ability of jiringa seed pod extract as organic herbicide. Five levels of extract concentration had been done: 100%, 75%, 50%, 25% and 0% and control. Each treatment sprayed on one month old weeds that grown on trays of 30 x45 cm. The results showed that number of weed killed by jiringa extract can be found at 7 days atfer treatment (DAT) and reduced by days of 14 and 21. Thus, we know that the mode of action of jiringa extract is contact herbicide. At 7 DAT, extract concentration 50% and above were able to control weeds more than 88%. However at 14 DAT, only extract concentration 75% and above were able to do that. Unfortunately, at 21 DAT, no treatment was able to control weed well (above 80% weed death). In addition, extract concentration of 75% and 100% reduced weed biomas to 50% and 76% respectively. This research supported previous researches which concluded that jiringa extract was able to control weed growth.

Keywords: jiringa, extract, organic herbicide, weed

INTRODUCTION

Jiringa (*Pithecollobium jiringa)* is one of Southeast Asia native plants grow under tropical climate. Many people in Sumatra used to eat its seed while others use parts of the plant to get benefits including health (Amanda, 2010, Elysa, 2011). In addition, some farmers apply seed pod to control weeds. As happen in Beringin Raya Village in Bengkulu Province, farmers put the seed pod on paddy field right after the soil tillage. They believe this method could reduce weed growth.

According to Nurjannah (2013) seed pod of jiringa has compounds benefit for weed control such as fenolic, flavonoid and carbolic acid. These compounds known as allelochemical, a chemical that can inhibit the growth of plant.

Based on our survey in traditional markets in Bengkulu town, there were about 300 kg of seed pods produced as wastes. Despite, these wastes increase problems of cleaning in the town, they can be used as raw material to be converted to organic herbicide. Some scientific experiments have been conducted to discover the ability of allelopathy derived from jiringa in different weed species. Anwar, et al. (2011) found that extract of jiringa's seed pod inhibited the germination of *Echinocloa crussgalli.*

Although, the seed pod commonly applied by farmers as a way to control weed and a lab-scale research had been done to prove the potential of jiringa in weed control,

a research to control weed by applying jiringa extract are not recorded. Thus, a research to solve this issued is necessary to be conducted.

METHODOLOGY

To reach the objective, this project consists of following steps: Firstly, the jiringa seed pods were collected from traditional market. In this research, only mature seed pods were selected. Secondly is making of seed pod extract. To get 100% extract, 250 gram of seed pod were blending with 250 ml of water. After that the blend was centrifuged in 5000 rpm for 5 minutes. In this research we did test for 8 different extract concentrations that were: S0: 0% of seed pod extract (control), S1: 100%, S2: 75%, S3: 50% and S4: 25%. Statistical data were analyzed by Complete randomized design with 3 replications.

Thirdly, to test the efficacy of those extracts, weeds were grown in trays of 30 x 45 cm. Soil mixed with farmyard manure were put in trays then leave the for about one month while watering always be done regularly. After one month, weeds grew for about 20 cm height and ready to be sprayed with prepared extracts. Next, 50 ml of extracts from each treatment were put in hand sprayer and applied on weeds for each tray. Finally, examination of weed toxicity were done on 7, 14 and 21 days after treatment (DAT) and weed biomass.

RESULTS AND DISCUSSIONS

Weed toxicity

The data of weed toxicity are presented in tables below:

Tabel 1. Weed toxicity on 7 DAT.

Treatments	7 DAT (%)
100% extract	95,43a
75% extract	95,33a
50% extract	88,90b
25% extract	64,47c
Control 0%	0,00d

Tabel 2. Weed toxicity on 14 DAT.

Treatments	14 DAT (%)
100% extract	88,90a
75% extract	82,23b
50% extract	75,53c
25% extract	55,53d
Control 0%	0,00e

Tabel 3. Weed toxicity on 21 DAT.

Treatments	21 DAT (%)
100% extract	68,90a
75% extract	68,90a
50% extract	55,53b
25% extract	44,43c
Control 0%	0,00d

From data above, it is clear that seedpod of jiringa has toxicity effect on weed. Increasing of extract concentration linearly improve weed toxicity. During assesment days, the highest concentration resulted the best weed killing effect gotten from 100% extract concentration and reduced by lowering the extract concentration. We can note here that, the effective concentration to kill weed only when it is above 50% which killed more than 88,90%. Lower concentration can not kill weed but only resulted in 64,47% toxicity level.

However, the ability of jiringa extract to kill weed started to reduce at 14 DAT. Concentration of 100% and 75% seem still effective enough to kill weed with toxic level

more than 80% but at lower concentration, the weed killing ability are not effective anymore. Moreover,this trend getting worse at 21 DAT. At this final assesment day, all extract concentration failed to give best weed killing ability.

This finding indicated us that the ability of jiringa extract to kill weed is only effective in the beginning days of extract application. Thus, we guess that the mode of action of this jiringa extract is contact but not systemic. Meaning that the extract only affects the part of weed plant that directly sprayed but not influence the the parts which were not sprayed for examples stem, ear of leaf, and roots. The survive parts have ability to live and regrowth as we can see at 14 and 21 DAT. To improve the efficacy results need to increase the rate until it can 100% kill weed.

In our country, the commercial herbicides with contact mode of action are very popular for example paraquat which is very famous to kill weed in instant time. Developing this jiringa extract as herbicide will be very promising as liked by farmers.

Weed biomass

The data of weed toxicity are presented in table 2 below:

Tabel 4. Weed biomass on 21 DAT.

Treatments	Weed biomass (g)
100% extract	24,70d
75% extract	40,27c
50% extract	44,93c
25% extract	52,27b
Control 0%	98,53a

From data above, it is known that the weightest weed biomass is resulted from control treatment while treatment of 100% extract produced the lightest weed biomass. Application at 50% extract and above reduced more than 50% of weed biomass. This data indicated that application of jiringa extract only effective when the concentration of extract is more than 50% while low concentration can not control weed effectively.

The lower the weed biomass means the efficacy is higher. When weeds are sprayed by jiringa extracts, their growth is inhibited and some or most part of them are poisoned till they died and dried. The dried weed or part of weed has lower biomass compared to healthy weed. That is the reason why lower weed biomass is resulted from poisoned weed.

As mentioned before that jiringa extract contains some inhibitory compounds including fenolic, flavonoid and carbolic acid (Joko, 2010). This research strengthen the previous researches about the ability those compounds to control weed (Aswardi, 2013). However, in this research we did not analyze which compound has main activity as weed killer. The further research is needed to know this question.

CONCLUSIONS AND SUGGESTIONS

We conclude that jiringa seedpod contains weed inhibitory compounds that has ability to poisoned and even killed weed. From data of weed toxicity at 7, 14 and 21 days after treatment, we wrap up that the mode of action of jiringa extract is contact. Jiringa extract was able to reduce weed biomass up to 76% (24,70 g) compare to control (98.53 g).

Further research is needed to analyze which compound is dominant in inhibitory action to weed. If the active compound is known the possibility to increase weed efficacy of jiringa extract can be reached.

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