Asian Journal of Applied Sciences (ISSN: 2321 – 0893)
Volume 03 – Issue 01, February 2015

Introduction Study of Potential of Natural Insecticide Liquid Smoke from Solid Waste Oil Palm to Brown Plant Hopper (Nilaparvata lugens Stall) in South Kalimantan

Samharinto Soedijo*, M. Indar Pramudi, Salamiah and St Aisah

Science Program Plant Pests and Diseases
Faculty of Agriculture, University of Mangkurat Indonesia

Corresponding author's email: samhariyanto [AT] yahoo.com

ABSTRACT---- ***Has conducted research into the use of liquid smoke coming from solid waste such as bunch as an insecticide is applied to the brown planthopper Nilaparvata lugens Stal in the greenhouse. The study was conducted in April-August 2014 Banjarbaru, South Kalimantan, which aims to determine the potential or capability of liquid smoke in killing brown planthopper. Treatments are five levels of concentration of liquid smoke as follows 0.25 ml / 100 ml; 0.5 ml / 100 ml; 0.75 ml / 100 ml, 1 ml / 100 ml, 1.25 ml / 100 solution and the control treatment (without a solution of liquid smoke). The results showed a solution of liquid smoke can kill brown planthopper up 91.67% after applied with liquid smoke solution with a concentration of 1.25 ml / 100 solution.***

Keywords--- Natural Insecticide, liquid smoke and solid waste oil palm bunch

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1. INTRODUCTION

The growth of oil palm plantations in South Kalimantan in the last five years is progressing very rapidly, followed by the construction of its processing plant, even the oil palm has become a mainstay in the world after Indonesia Malaysia [1]. In the processing of palm oil into refined materials into CPO will produce waste in the form of wastewater and solid waste. Solid waste generated is long and slender, empty fruit bunches, fibers and shells. Palm oil mills with a capacity of 100 thousand tons of fresh fruit bunches per year, will produce 23 thousand empty fruit bunches, 12 thousand tons of fiber and 6 thousand tons of shells [1]. Solid waste is not used or recycled into useful materials optimally [2]. Of the four solid waste which has been used only a shell that is used as a power source in broiler tool used in palm oil mills, while other solid waste has not been utilized.

One solid waste utilization of oil palm is the use of liquid smoke produced from waste through pyrolysis. It has been widely known that liquid smoke from a waste organic materials useful as food preservatives, fungicides, insecticides or biocides [3,4,5]. This is due to the liquid smoke, there are several chemical compounds such as phenolic, carbonyl, ketones, furans and lactones [6,7,8,9,10]. There are three main components of liquid smoke is phenol, carbonyl and acid and liquid smoke was able to suppress the growth of fungi that cause a decrease in the quality of food [7,5]. The main components of liquid smoke is methanol and Utilization of acetic acid liquid smoke as pesticides have not been studied, therefore, will be investigated its potential as a pesticide in particular as a natural insecticide. With the known benefits of liquid smoke as insecticides expected to be used as an alternative choice of materials that are environmentally friendly natural insecticide, to reduce the risk to the environment and human health from chemical pesticides [5].

2. MATERIALS AND METHODS

The study was conducted in the Department of Entomology Greenhouse Plant Pests and Diseases, Faculty of Agriculture Unlam in Banjarbaru, since the month of April to August, 2014. The material used consists of paddy, brown planthopper insect instar nymph stage three of the results of propagation, growing medium such as soil. The tools used consists of a set of tools manufacture of liquid smoke, liquid smoke of the bunch is empty, filter, filter paper, hand spray volume of 250 cc, the volume of 25 ml measuring cup, plastic cup size 8 cm diameter top and bottom diameter of 6 cm and height 10 cm , aspirator.

To determine the potential of liquid smoke insecticide derived from solid waste palm oil was examined by applying the liquid smoke to the brown planthopper nymphs (*Nilaparvata lugens*) in the greenhouse with five treatments the concentration level of 0.25 ml; 0.5 ml; 0.75 ml; 1 ml and 1.25 ml in 100 ml of distilled water and the treatment without liquid smoke as a control. All treatment was repeated three times. Applications made to the brown planthopper stadia which are placed in a form of plastic cups that have provided two-week-old rice plants and closed glass oil lamp chimney covered with gauze. Each glass included 20 head brown planthopper nymphs. Liquid smoke used is liquid smoke grade 3 were derived from the results of pyrolysis bunch. Insecticide potential is determined by calculating the mortality of nymphs per day for seven days by using the formula:

$$P = \times 100\%$$

in which,
P = Percentage mortality
A = Number of dead brown planthopper nymphs
B = Number of leafhoppers overall
Besides death also observed changes in body color, behavior and body length.
The design used was a completely randomized design .

3. RESULTS AND DISCUSSION

Brown planthopper nymphs cumulative death for seven days (24-168 hours) observation is directly proportional to the increasing concentration given with the highest mortality percentage reaches 91.67%, while the lowest mortality was in control of 6.67%. Data percentage of death more on observation 24-168 hours in Table 1.

Table 1. Percentage of the death of the brown planthopper after treated with liquid smoke bunch empty

The concentration of liquid smoke (ml / ltr)	Percentage mortality brown planthopper on observation (hours)						
	24	48	72	96	120	144	168
Control	0,00	0,00	0,00	0,00	0,00	5,00	6,67 a
0,25%	40,00	45,00	50,00	51,67	53,33	58,33	70,00 b
0,5%	28,33	55,00	60,00	63,33	66,67	75,00	80,00 b
0,75%	63,33	65,00	68,33	71,67	76,67	78,33	88,33 b
1,00%	38,33	41,67	45,00	51,67	58,33	71,67	88,33 b
1,25%	53,33	58,33	58,33	61,67	61,67	71,67	91,67 b

Remarks:
The same letter in the same column states that were not significantly different effect on different test average with Honesty Significant Different (HSD) or Least Significant Difference (LSD) level of 5%

Visual observation of the brown planthopper and not given treatment (control) to the body color, behavior and body size showed a difference. Body color brown planthopper given treatment looks darker, more sluggish behavior and body length becomes shorter than the control treatment. Brown planthopper nymphs death allegedly caused by the presence of phenolic compounds. Several types of phenols which are usually contained in curing products are guaiacol, and siringol and varies the amount varies greatly between 10-200 mg / kg .[7]. Phenol is a toxic substance that can be used as a disinfectant or antiseptic [2].

The potential of liquid smoke as insecticides [8,15]. In addition to natural pesticides such as wood preservatives, fungicides, repellent, insecticide and herbicide, liquid smoke also can be used as fertilizer and plant growth regulators [5]. Furthermore it is said that the liquid smoke turns are the basic ingredients of pesticides on ancient traditions.

Liquid smoke derived from coconut shells are applied to the seed germination of corn and soybeans produce the best of the three levels of a given concentration (0.5%, 1% and 1.5%) is the concentration level 0, 5% [11]. Liquid smoke grade II from coconut shells are very toxic and effective against brown planthopper and the rice plant. At a concentration of 12.5% liquid smoke concentration decent shell is used because it is not toxic to plants[12]. Application the liquid smoke oil palm empty fruit bunches to control termites on wood Pulai (*Alstonia scholaris*) with a concentration of 30% is the best [13]. This termite death suspected presence of phenolic compounds is also deadly protozoa that exist in the stomach of termites [12]. Derived liquid smoke coconut shell also acts as a potent fumigant for pest material in deposits *Rhyzopertha dominica F* [15].

Pyrolysis technology as a Greener solution to produce energy and chemicals using local resources. Producing liquid smoke and integrated pest management technologies from natural materials can be used as a biological control technological innovation. Furthermore it is said that the shortage of liquid smoke as pesticide use is not explained its mode of action is unclear, but the use of liquid smoke has been conducted since 1930 in Japan [5].

4. CONCLUSIONS AND RECOMMENDATIONS

Liquid smoke from solid waste oil palm turned out to have excellent potential as a natural insecticide for the control of plant pests brown planthopper (*Nilaparvata lugens Stall*), with the ability to turn off up to 91.67%. To be more convincing material in the form of liquid smoke is necessary to study the potential for other plant pests and about the chemical properties associated with the active ingredient contained.

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