The Potential Testing of Medicinal Plants the Bitter and Candletik as Botanical Pesticide

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ABSTRACT

Indonesia is known to have diversity of medicinal plants, from medicinal plants, many chemicals that can be isolated, which has been shown to have biological activity both *in vitro* and *in vivo* and has been proven efficacious as healing is disease. Ingredients of traditional medicinal plants is this are immunostimulating bioactive not only for animals can also be used as a botanical pesticide. One limiting factor in crop production is the attack of pests of plants (OPT). Efforts are usually done to solve this all by using synthetic pesticides, the use of continuous as pest control can cause several problems, among others, the resurgence, resistance to pests and pathogens as well as the explosion of the second. So no harm was sought and developed other raw materials that are safer, botanical pesticides are substitutes safest synthetic pesticides, including bitter and candletik. From the research it turns bitter and candletik is as fungicidal, insecticidal and larvicidal.

Key words: traditional medicinal plants, potentially, pesiticide botanical

INTRODUCTION

Indonesia is known to have diversity of medicinal plants, from medicinal plants, many chemicals that can be isolated, which has been shown to have biological activity both in vitro and in vivo and has been proven efficacious as healing is disease (Jamal, 2000 *in* Balfas, and Willis, 2009). The use of materials plant as a medicinal in the community tends to increase, as it is considered active products made from plants are relatively safer and environmentally friendly than the active ingredient derived from synthetic chemicals. Ingredients of traditional medicinal plants are immunostimulatory bioactive not only for animals can also be used as a pesticide plant. More than 1,500 species of plants that have the opportunity and potential to be developed as a pesticide (Grainge and Ahmed 1988).

One limiting factor in crop production is the attack of pests of plants (OPT). Efforts are usually done to solve this all by using synthetic pesticides, the use of continuous as pest control can cause several problems, among others, the resurgence, resistance and pest and pathogen both, as well as environmental pollution both in the lithosphere, hydrosphere, and atmosphere (Solichah *et al* ., 2004). Since most of these pesticides can not be completely soluble in water, resulting in pesticide residues will increase through the food chain, the ends of the chain may be human, there are several of these compounds are carcinogens. The entry of such materials into the body slowly in a long time, thereby potentially damaging the cells of the body, which tends to cause the formation of cancer cells. So no harm was sought and developed other's raw materials that are safer, botanical pesticides are substitutes synthetic pesticides most secure because it does not leave a residue on the plants, do not pollute the environment, harmless to humans, has a level of effectiveness similar to synthetic insecticides and tend to selectively (Nomura. 1990; Ginting *et al*., 1995 and Susanna *et al.*, 2003).

Some traditional medicinal plants that have been reported to be effective as a botanical pesticide among other things: bitter and candletik described in this article.

MATERIALS AND METHODS

This article is written by compilling some information from different sources on these matters.

RESULTS AND DISCUSSION

Characteristics and Components of Chemical Plant

The Bitter (Andrographis paniculata Ness)

The bitter (*Andrographis paniculata* Ness) is included in the annual plant Acanthaceae tribe is a erect herbaceous plant, with height's between 0.5-1 meters. Growing naturally in lowland areas to a height of ± 1600 above sea level. People use parts of the canopy (leaves and stems) bitter plants as traditional medicine for tonic, fever, dysentery, cholera, diabetes, lung disease, influenza and bronchitis. Bitter herbs harvested from their natural habitat by the public to the source of traditional medicine ingredients (Hanan, 1996; Winarto, 2003). The main active compound of bitter (A. paniculata, Nees) is andrografolid. These compounds include compounds diterpene lactone and andrografolid most commonly found didaun (approximately 2.39%) and least in seeds (Figure 1) (Prapanza, and Marianto2003).

Figure 1. Morphology *A. paniculata*, Ness

The Candletik (*Cassia alata* L)

Candletik (*Cassia alata* L) is one alternative medicinal plants that can be tested for its ability as a pesticide plant. C. alata, L is a herbaceous plant, with height's of 5 meters. Woody stems, round, simpodial, dirty brown. Leaves compound, pinnate even, leaflets numbered 8-24 pairs . Elliptic leaf shape with a blunt tip, flat edges and rounded leaf base. Leaf length from 3.5 to 15 cm, and width from 2.5 to 9 cm. Pertulangan pinnate leaves, petiole short and leaf is green color. The interest is compound interest, shaped bunches's, sharing five petals, stamens is yellow numbered three. Bract short, orange. Crown butterfly-shaped flowers, yellow. The fruit is a pod, can reach a length of 18 cm and a width of ± 2.5 cm. Fruit C. alata L is green when young, but when the old becomes brownish black. Seeds triangular's taper and flat. While still young, these are green and black after old. And a taproot branched, round and black-colored (Figure 2) (Anon 2010, Stenis et al., 1975 and Heyne, 1987). Candletik (C. alata L) is considered as the plant source of botanical pesticide potential, because C. alata contains: Rein aloe -emodina, aloe-emodina rein-diantron, rein, aloe emodina, krisofanat acid, (dihydroxy methyl anthraquinone), tannin, and contain alkaloids, saponins, flavonoids, and anthraquinone. C. alata leaves is also beneficial to health as scabies medicine, herves and malaria drug (Anon, 2010 and Heyne, 1987)

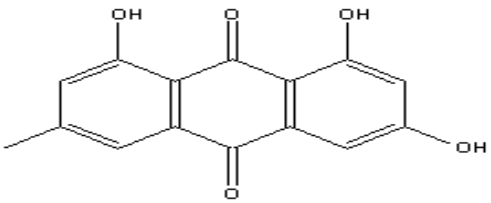

Figure 2. Morphology *C. alata*, L dan Rumus kimia

Potential as Pesticides

The Bitter (Andrographis paniculata Ness)

Testing bitter as botanical insecticides against pests *Epilachna sparsa* known that extracts of bitter 4%, has a pretty good insecticidal properties. The mortality E. sparsa rate in the range between 52.08%, with a mortality rate of successive instars I - IV (52.08, 50.25, 40.25 and 36.67)%, (Table 1).

When compared mortality in instars I and II are higher than third and fourth instars, is due instar I and instar II are more sensitive to insecticides test's, because instar early development of organ physiological's still in the process of formation, so that a state of physiological in contrast to the older instars. Meanwhile, according to Balfas and Willis (2009) the methanol extract of bitter treated against S. litura concentration of 1% can cause mortality by 20% in 4 days after application.

Table 1. Cumulative mortality rate of larvae of *E. sparsa* at various doses of test insecticides.

	Mortality (%)			
Insecticides test (%)	Instar I	Instar II	Instar III	Instar IV
Bitter 2 %	36,21 b	33.30 c	27.21 b	16.51 c
Bitter 4%	52,08 a	50.25 a	40.25 a	36.67 a
Amethyst 2%	20,72 e	19.45 e	13.21 e	12.48 d
Amethyst 4%	24,80 d	22.39 d	17.87 d	15.73 c
Candletik 2%	19,66 f	18.53 f	13.65 e	11.77 d
Candletik 4%	34.57 c	34.57 b	23.97 c	24.90 b
Demitoat 25 EC	52.42 a	50.69 a	40.58 a	36.85 a
Control 0%	14.48 g	13.31 g	10.26 f	8.63 e
CV (%)	9,10	11,73	12,15	12,23

Notes:
a : *Number followed by the same letter in the same column are not significantly different by Duncan test 5%.*
b : *Data are transformed by arc sin √%*
Source : Idris (2014[a])

The above situation shows how all the extracts tested insecticides are toxic or are toxic and disrupt the balance of growth hormone. So there is a failure in the turn of the skin resulting in many deaths occurred on the fifth day which is the turn instar. According Borror *et al.* (1993) and Chapman (1969), the balance of growth hormone (ekdison and juvenile) which is a derivative of protein is very easily disturbed by intrinsic and extrinsic factors, causing death, failure molting, the extension of the cycle, inhibition of eating and other distractions.

According to Ahmad (1992), Gionar (1990) and Ginting *et al.* (1995) which states ingredient botanical insecticides on larvae can block skin turnover process and prevent eating (anti feedan) which resulted in death. Mean while, according to Hadi (2008) and Lucky (1996) in Febrianti *et al.* (2013) bioactive compounds sesquiterpenoid also can damage the nervous system at test insects with the inclusion of these compounds can inhibit the action of the enzyme asetikolinesterase, where this enzyme works to break down acetylcholine into A – acetyl and choline, causing chaos in system conductor impulses to the muscles. As a result spasms muscle , paralysis and ends in death.

Content of saponins and andrografolida of ethanol extract Bitter 2% can be anti-fungal, because it can suppress the growth of the colony diameter and biomass of *C. gloesporoides* (85.17 and 100%) attack the dragon fruit (Idris and Nurmansyah, 2015).

Compounds contained in bitter not only are antifungal but also antibacterial because it can interfere with components of the peptidoglycan in the bacterial cell, so that the layer of the cell wall is not fully formed and cause of death, where the concentration of 50% extract of bitter leaf can inhibit a the growth zone *Escherichia coli* 9.038 mm (Sawitti *et al*., 2013)

The Candletik (*Cassia alata* L)

Candletik extract concentrations 7500 ppm can cause larvae death IV, V, VI and VII *Attacus atlas* that attack plants Ylang ylang (70.63, 68.33, 64.06 and 56.94)% with the percentage inhibition of eating at 47.43 % (larvae) and 74.45% (imago) Idris 2014. b. From research conducted Idris (2014c) the use of extracts of C. alata, L can be used as a controlling as leaf spot disease Cercospora sp, at a concentration of 8% inhibit the growth of Cercospora sp 59.93% with a colony diameter's 38.80 mm until day seven incubation. While in the testing of scale greenhouse at concentration of 12% has been able to slow down the rise of an initial attack as long as 37.96%. suppression percentage of attacks 24.32%. At week 4 after the investment of disease suppression intensity by 60.71% with the rate of progression of the disease every week 0.54%. As well as the increase in plant height at week 7 after planting 29.45%.

C. alata methanol extract containing alkaloids and flavonoids have a fairly good ability to suppress disease progression *Cercospora sp* leaf spot where the concentration of 12% initial attack began to look at 14-16 days after investation (14.32 dai), with a percentage of the initial attack only 4.32 to 5.24% (4.98%), there is a slowdown and suppression of attack (37.96% and 24.32%) compared to non-application. *C. alata* methanol extract containing alkaloids and flavonoids have a fairly good ability to suppress disease progression *Cercospora sp* leaf spot where the concentration of 12% initial attack began to look at 14-16 dai (14.32 dai), with a percentage of the initial attack only 4.32 to 5.24% (4.98%), there is a slowdown and suppression of attack (37.96% and 24.32%) compared to non-application.

The low of intensity of disease at concentration of 12% usage allegedly due to the pressures and obstacles by the active ingredients contained in extracts of *C. alata*, L which interfere with the metabolism of pathogens that affect the speed of development of the pathogen. Along with the increase in concentration of the pathogen growth will decline each week. Meanwhile, according to Abdullahi *et al* (2005) power pathogenicity of a pathogen is influenced by internal factors such as age and physical condition of the pathogen as well as external factors such as climate, environmental conditions and agronomic measures, especially the use of materials that are antifungal and antimicrobial.

CONCLUSION

Medicinal plants Amethyst, Sambiloto, Galinggang elephant, Gambir and Noni can not only be used as traditional medicine but also the potential to be developed as a raw material botanical pesticides with capabilities not inferior to those made from synthetic, and does not damage the environment and consumers. So as to make the added value for farmers.

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