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Effect of mango's mistletoe (*Dendrophthoe pentandra* (L.) miq) leaf extract on the biology of *Spodoptera litura* F.

Dwi Haryanta, Achmadi Susilo and Wahyu Hendrawan Kusuma

[1,2,3]Faculty of Agriculture, University of Wijaya Kusuma, Surabaya, Indonesia

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ABSTRACT

Waste of mistletoe plants resulting from the pruning of urban forest plants in Surabaya is abundant, and has the potential to be used as an organic pesticide. The study aimed to determine the effect of mango's mistletoe water extract on the biology of *Spodoptera litura* F. Experiments with concentration (weight/ volume) treatment of mistletoe leaf extracts with six levels namely concentration of 0.0% (100% water); concentration of 2.5% (25 g of mistletoe in one liter of extract); concentration of 5.0% (50 g mistletoe in one liter of extract); concentration of 7.5% (75 g of mistletoe in one liter of extract); concentration of 10.0% (100 g mistletoe in one liter of extract); and a concentration of 12.5% (125 g of mistletoe in one liter of extract). Experimental variables are larvae mortality, the development of each instar and stage, and the amount of food consumption. The results showed that *Dendrohtoe pentandra* (L.) Miq) mango mistletoe water extract significantly affected on the biology of Spodoptera litura F, namely (1) is toxic, with a concentration of 12.5% can kill up to 95% on the 8th day significantly differ from the concentration treatment at underneath; (2) extending the larval period (larvae), but shortening the pre-pupil and pupa period; (3) reduce appetite (decreased amount of feed consumption); (4) foiling the development of larvae to become the next instar, or the development from larvae to pupae, or from pupa to imago

Key words: *Mango's Mistletoe Leaf Extract, Biology of Spodoptera litura F.*

Introduction

Urban forest plants or green open spaces in the city of Surabaya are attacked by mistletoe. There are several types of mistletoe that attack, but most are *Dendrophthoe pentandra* (L.) from the Loranthaceae familia as is commonly found attacking mango plants (Haryanta *et al*., 2018). Mistletoe has been known as a detrimental plant, plants that are attacked its growth can be inhibited; the branches are deciduous, dry and dead, so that it can reduce the beauty of city parks. At the time of pruning of urban forest plants there will be a lot of waste from plant leaves, including leaves from mistletoes which have not been used optimally. During this time the leaves are transported to a compost house or recycling center to be composted, or in certain places burned

The mistletoe leaf extract has been widely used in the healing of various types of diseases. The *Viscum album* mistletoe leaves contain many ingredients, minerals and vitamins. Many of the ingredients contained are affected by the host where mistletoes live. Mistletoe in the avocado plants contains higher tannins, vitamin B1, vitamin C and calcium than the other two host plants (Ishiwu *et al.*, 2013). The mistletoe extract can improve healing in cancer treatment (Ishiwu *et al.*, 2013; Marvibaigi *et al.*, 2014; Schad *et al.*, 2013; Patrick *et al.*, 2013), and can improve clinical response and patient safety level and chemotherapy process of cancer treatment (Yang *et al.,* 2013; Pelzer and Troger *et al.,* 2016). Flavonoid compounds found in the leaves of *Dendrophthoe pentandra* L. Miq is thought to be able to dissolve calcium kidney stones in vitro (Sasmito *et al.,* 2001). The mistletoe leaf water extract is hypoglycomic and has the potential to be used in the treatment of diabetes militus (Osadolo *et al.,* 2014). Flavonoid compounds found in the water and ethyl acetate fraction of *Dendrophthoe pentandra* L. Miq mistletoes is thought to be able to dissolve calcium kidney stones (Sasmito *et al*., 2001), as well as antibacterial, antioxidant and antidibetes (Moghadamtousi *et al*., 2013; Fitrilia *et al*., 2013). Mistletoe extract of viscum album subspace abietis contains many polyphenols and has potential as an antioxidant (Yulian and Safrijal, 2018; Pietrzak *et al*., 2014).

The mistletoe leaf extract contains terpenoids, carbohydrates, reducing sugars, saponins, glycosides, steroids and resins (Hasanah *et al.,* 2017; Benjamin *et al.,* 2016; Sembiring *et al.,* 2016; Fitrilia *et al.,* 2013). Plant stem extracts containing polyphenols, flavonoids, alkaloids, tannins and sapanosides can be used as plant-based insecticides (Attaullah *et al.,* 2019; Tando, 2018; Diouf *et al.,* 2016). Plant ingredients such as flavonoids, saponins, tannins, steroids, cardiacglycosides, alkaloids, anthraquinones, and terpenoids are toxic to *Drosophila melanogaster* (Riaz *et al.,* 2018). Mistletoe plant extracts of the *Loranthus micranthus* contain antibacterial ingredients with tests on the bacteria of *Escherichia coli*; *Staphylococcus aureus*; *Pseudomonas aeruginosa*; *Proteus vulgari*; *Salmonela typhii* (Benjamin *et al.,* 2016), and effective to be developed as an antimicrobial agent (Fahmi *et al.,* 2018). Plant chemical components such as flavonoid, phenolic, steroid, tannin, and saponin can kill third-instar gray worms of Spodoptera litura (Aini and Tukiran, 2014).

The use of plant extracts as plant-based insecticides or biopesticides has been widely recommended to farmers. Information on biopesticides is generally still limited to plant raw materials and target pests. The technology recommended is still conventional or traditional. There are twelve types of plants recommended by agricultural extension workers in 20 countries, namely garlic (*Allium sativum*), neem (*Azadirachta indica*), chili (*Capsicum* spp.), Weeds (*Chromolaena odorata*), gliriside (*Gliricidia sepium*), *Melia azedarach*, Noni (*Moringa oleifera*), tobacco (*Nicotiana tabacum*), Ocimum free maximum), tephrosia (*Tephrosia vogelii*), marigold tree (*Tithonia diversifolia*), and bitter leaf (*Vernonia amygdalina*) (Dougoud *et al.,* 2019). Neem seed extract concentration of 50% is the most effective, environmentally friendly, inexpensive and effective method of controlling future pests (Lawal *et al.,* 2015). Botanical insecticides continue to attract attention for small farmers and the environment worldwide, considered an alternative to synthetic insecticides. The use of secondary metabolites by extracting plants is a tradition more than 3000 years ago. Intensive research on various commercial products still cannot meet global demand for biopesticides (Pavela, 2016). The use of plant extracts and botanical insecticides are biopesticides that do not pollute the environment, and can be included in integrated pest control (IPM) and organic agriculture programs (Ghosh *et al*., 2016).

The mistletoe plants are almost never attacked by pests, so it is hoped that host plants that are sprayed (treated) with mistletoe extracts will be protected from insect pests as the mistletoes. Need to look for biopesticide ingredients with abundant availability so that they are easily available and inexpensive. This study aims to examine the ability of the mistletoe leaf extract in controlling the insect population of *Spodoptera litura* F. The results of the study can be the information or a reference for the utilization of waste management in urban forest plants, including many abundant mistletoes in the city of Surabaya as an organic pesticide in urban farming practices.

Materials and Methods

Research on the effect of mango mistletoe leaf extract (*Dendrophthoe pentandra* (L.) Miq)) on the Biology of *Spodoptera litura* F insect., conducted in the laboratory of the Faculty of Agriculture, University of Wijaya Kusuma Surabaya. The mistletoe is taken from mango plants that grow on the edge of a residential road in the South Surabaya area, while Spodoptera eggs are obtained from rice fields in Karangploso, Malang Regency.

Experiment with treatment of concentration (weight/volume) of extracts of mistletoe leaves with six levels, namely concentration 0.0 (100% water); : concentration of 2.5% (25 g of mistletoe in one liter of extract); concentration of 5.0% (50 g mistletoes in one liter of extract); concentration of 7.5% (75 g of mistletoes in one liter of extract); concentration of 10.0% (100 g mistletoes in one liter of extract); and a

Fig. 1a. Mango plants are attacked by Mistletoe

Fig. 1b. The mistletoe leaves are ready to be extracted

concentration of 12.5% (125 g of mistletoe in one liter of extract). The experiment was repeated four times. The experimental unit was ten spodoptera larvae which were kept in plastic jars of 20 cm diameter and 10 cm height as in Figure 2a. Larva feed uses sunflower leaves that have been planted 7 weeks before the experiment begins.

Preparation of the Spodoptera litura Test Insect. Eggs or larvas are obtained from the field of legumes and then kept in plastic jars with a diameter of 16 cm and a height of 17 cm covered with gauze. The larvas are fed with sunflower leaves or jatropha leaves every day until the larvas enter the precupa stage. At the bottom of the jar is given a layer of fine sand as thick as 5-8 cm as a media form. After the larvas enter the sand, the remnants of the feed are cleaned, then in the jar given the cotton which dipped in honey then hung and pieces of manila paper as a place to lay eggs. Imago arising from pupae will suck honey as an additional nutrient, mate and lay eggs on manila paper. The eggs taken then placed in another jar fed with sunflower leaves until they hatch and are used as stocks of test insect as shown in Fig. 2b.

Preparation of mistletoe leaf extract. Leaf extraction of *Dendrophthoe falcata* L can be carried out with four solvents namely water, ethanol, chloroform and petroleum ether (Tando, 2018). In this experiment the production of mistletoe leaf extracts using water solvent. Fresh and healthy mistletoe leaves are washed then air dried. The leaf that has been clean then cut into small sizes and extracted using a homogenizer or blender for 15 minutes. The solution is then filtered with a cloth and the liquid is an extract that will be used for experiments. To be more effective into the extract liquid need to be added 2 g of soap per liter of liquid. Concentration (as a treatment) uses a weight ratio of leaves and water as a solvent, for example to get a concentration of 5%, then as much as 50 g of mistletoe leaves are extracted into 1000 cc of crude extract solution (before filtering).

Fig. 2a. Trial unit, The plastic box with sunflower leaves that is ready infested larvas

Fig. 2b. The 2nd-3th instar *Spodoptera litura* larvas as experimental material

The experiment was started by dipping the sunflower leaves (leaf size adjusted to easily enter the jar) into the mistletoe leaf extract with the appropriate concentration of treatment. The dried leaves were placed in a jar, then infested the first instar spodoptera larvas with 2-day-oldtotaling 10 heads for each experimental unit (each jar). The jar is covered with gauze as in Figure 2a .

Experimental variables were the number of dead larvas, the amount of feed consumption, namely the area of sunflower leaves lost by larvae, instar changes in larva stages marked by skin changes, changes in larva stages into pupa stages and imago stages (adults). Observations were made every day, except the variable of length of the larva was observed once in the pre pupa stage.

Results

Mortality of *Spodoptera litura* F. larvae

Experiments using the first instar larvas with two-day-old, which are small, soft and still very sensitive. Death of a larva occurs starting on the first day after treatment and occurs in all treatments. More deaths at the beginning of the trial were due to the adjustment period of the larva and the impact of moving it from the hatchery to the trial site. Death data until the 4thday tend to increase and among the treatments still showed no significant difference. Observations starting from the 5^{th} day of the treatment concentration of 10% and 12.5% experienced a greater increase than the other treatments, and on the observation of the 8th day treatment of the concentration of 12.5% the larvas remain 3 from 40 initial numbers, meaning 92,50% of larvas are dead. Movement of larva mortality data from 1'st day to 8'th day for all treatments is presented in Table 1.

The process of larva death at the beginning of the experiment (up to the 4^{th}-5^{th} day) occurred suddenly, which in the previous, the movements were still the normal on the observation the next day was dead. The cause of death at the beginning of the trial may have been due to the impact of the feed thatbeing replaced daily or by the effects of the treatment of poisonous mistletoe leaf extract. The process of death on observation the 6^{th} day until the end of the trial of death begins with slow movements and larva sizes tend to be smaller. The cause of larva death may be the effect of the treatment of mistletoe leaf extracts affecting the decline in appetite and the effect of chemicals in the mistletoe leaf extract on the physiological processes in the larva's body.

Total feed's consumption of Spodoptera litura F larvas

Spodoptera litura larvas eat sunflower leaves in the epidermis and mesophyll leaves, leaving leaves bones. Data on the amount of larva feed consumption is obtained by calculating the area of the leaf

Table 1. The mean percentage of larvaMortality of Spodoptera litura by the treatment of the giving of various concentrations of mango mistletoe leaf extract

Treatment	Mortality of Spodoptera litura on day....							
	1	2	3	4	5	6	7	8
K_0	17.50	32.50	52.50	52.50	52.50 bc	52.50 bc	52.50 c	67.50 bc
K_1	27.50	30.00	37.50	42.50	42.50 c	45.00 c	45.00 c	45.00 c
K_2	45.00	52.50	60.00	60.00	62.50 abc	62.50 bc	62.50 bc	62.50 bc
K_3	27.50	42.50	52.50	60.00	60.00 bc	62.50 bc	62.50 bc	62.50 bc
K_4	20.00	35.00	52.50	67.50	72.50 ab	72.50 ab	75.00 ab	77.50 ab
K_5	27.50	35.00	67.50	77.50	85.00 a	92.50 a	92.50 a	92.50 a
LSD 5%	NS	NS	NS	NS	23.23	21.80	21.87	18.11

Information :The average value in the same column followed by the same letter is not significantly different based on the LSD test 5%

K_0 : concentration of 0.0% (100% water)
K_1: concentration of 7.5% (75 g of mistletoe in one liter of extract)
K_2: concentration of 7.5% (75 g of mistletoe in one liter of extract)
K_3: concentration of 7.5% (75 g of mistletoe in one liter of extract)
K_4: concentration of 7.5% (75 g of mistletoe in one liter of extract)
K_5: concentration of 7.5% (75 g of mistletoe in one liter of extract)

with a hole or leaf mesophyll layer that is lost and only the bones of the leaf. The amount of feed consumption on the first day was at most on the 0% concentration treatment, namely control treatment (not given mistletoe leaf extract). The next day's feed consumption data fluctuated and among the treatments were not significantly different. Observation of feed consumption data from the 4th day to the end of observation day that is the 16th day remained fluctuating but consistently larva at a concentration of 12.5% consumed the least amount of feed consumption compared to other treatments. Data on feed consumption up to the 22nd day for each treatment are presented in Table 2a, 2b and 2c.

Insect Development of *Spodoptera litura* F from 1st instar larva to imago

The level of larva starts at the 1st instar, but because the study begins with the 1stinstar at 2 days old, the measurement started at the 2ndinstar. The duration of the 2ndinstar and the 3rd instar development did not differ significantly among the treatments, while the 4th instar and the 5th instar as well as the total stages of larvas differed significantly among the treatments. The treatment of the mistletoe extract concentration of 12.5% was longer than the other treatments, but the pre -pupa and pupa stages were shorter. Overall insect development from instar one to adulthood for the treatment of concentrations of

Table 2a. The amount of leaves that have been consumed by *Spodoptera litura* larva's with the treatment of the giving of various concentrations of mango mistletoe leaf extract (mm^2/larvae) on observations from the 1'st day to the 8'th day

Treatment	Amount of feed consumption on day...							
	1	2	3	4	5	6	7	8
K_0	4.06 a	5.93	7.66 c	13.56	17.36	18.78	19.19 b	55.29 a
K_1	2.75 b	8.93	11.11 bc	15.35	15.13	16.65	44.75 a	37.42 ab
K_2	2.97 b	12.17	16.05 ab	16.12	14.23	19.66	24.23 b	33.97 abc
K_3	2.45 b	11.80	18.52 ab	14.80	16.10	15.75	20.30 b	36.19 ab
K_4	2.95 b	11.35	11.01 bc	13.48	16.04	18.96	15.88 b	20.42 cd
K_5	2.16 b	9.80	23.50 a	10.59	8.96	9.38	12.75 b	7.38 d
LSD 5%	0.89	NS	8.91	NS	NS	NS	20.0	25.12

Table 2b. The amount of leaves that have been consumed by *Spodoptera litura* larva's with the treatment of the giving of various concentrations of mango mistletoe leaf extract (mm^2/larvae) on observations from the 9th day to the 16th day

Treatment	Amount of feed consumption on day...							
	9	10	11	12	13	14	15	16
K_0	38.99	55.29	38.99	28.96	31.46	113.00 a	89.88	98.75
K_1	33.75	37.42	35.07	31.75	31.75	42.65 b	57.09	81.13
K_2	44.08	33.97	44.08	38.35	38.35	50.13 b	61.15	90.27
K_3	34.53	36.19	39.14	27.90	27.90	50.65 b	85.33	79.20
K_4	25.33	29.17	34.38	40.13	40.13	29.25 b	69.63	85.54
K_5	17.50	7.38	17.50	15.75	15.75	21.38 b	39.00	28.25
LSD 5%	NS	NS	NS	NS	NS	35.61	NS	NS

Information: The average value in the same column followed by the same letter is not significantly different based on the LSD test 5%

K_0 : concentration of 0.0% (100% water)

K_1 : concentration of 7.5% (75 g of mistletoe in one liter of extract)

K_2 : concentration of 7.5% (75 g of mistletoe in one liter of extract)

K_3: concentration of 7.5% (75 g of mistletoe in one liter of extract)

K_4: concentration of 7.5% (75 g of mistletoe in one liter of extract)

K_5: concentration of 7.5% (75 g of mistletoe in one liter of extract)

12.5% tends to be longer. Data on average development for each instar or each stage of insect spodoptera litura for each treatment presented in Table 3.

Spodoptera litura larvae which are treated with a concentration of mistletoe leaf extract fail to develop into the next phase. The failure also occurred in the control treatment that is 0% concentration. The results of the analysis of variance showed that the highest treatment concentration of 10.00% and 12.5% experienced a failure, namely for the treatment of the 10% concentration that succeeded in becoming 3rd instar only 15%, while for the treatment of the concentration of 12.5% which succeeded in becoming the 3rd instar only 5%, even those that became imago did not exist (0%). Data on the success of the *Spodoptera litura* insect in its development from instar to next instar, from larva to prepupa,

Table 2c. The amount of leaves that have been consumed by *Spodoptera litura* larva's with the treatment of the giving of various concentrations of mango mistletoe leaf extract (mm^2/larvae) on observations from the 17th day to the 22nd day

Treatment	Amount of feed consumption on day...					
	17	18	19	20	21	22
K_0	94.69 a	73.50 a	44.31	37.40	16.90	4.70
K_1	73.32 a	56.17 a	71.38	49.21	40.65	4.00
K_2	76.60 a	47.33 a	32.23	25.31	12.56	5.13
K_3	62.25 a	60.00 a	57.31	53.06	31.13	23.13
K_4	80.33 a	69.00 a	58.75	36.92	31.13	27.75
K_5	16.13 b	15.50 b	14.38	10.13	7.88	6.88
LSD	32.37	30.09	NS	NS	NS	NS

Information :The average value in the same column followed by the same letter is not significantly different based on the LSD test 5%
K_0 : concentration of 0.0% (100% water)
K_1 : concentration of 7.5% (75 g of mistletoe in one liter of extract)
K_2 : concentration of 7.5% (75 g of mistletoe in one liter of extract)
K_3: concentration of 7.5% (75 g of mistletoe in one liter of extract)
K_4: concentration of 7.5% (75 g of mistletoe in one liter of extract)
K_5: concentration of 7.5% (75 g of mistletoe in one liter of extract)

Table 3. The duration of development of *Spodoptera litura* of each instar, the period of larva stage, pre-pupa, and pupae with the treatment of the giving of various concentrations of mango'smistletoe leaf extract

Treatment	The duration of development of each instar or each stage (day)						
	2nd instar	3rd instar	4th instar	5th instar	larvae	prepupa	pupa
K_0	3.25 b	8.50	4.00 cd	3.75 bc	22.50 b	2.50 bc	8.75 a
K_1	4.00 a	6.50	5.50 b	4.25 bc	22.75 b	2.50 bc	8.00 a
K_2	3.75 b	7.00	5.00 bc	3.25 bc	21.00 b	2.25 bc	9.00 a
K_3	4.25 ab	6.75	4.50 bd	2.50 c	22.50 b	4.50 a	8.50 a
K_4	5.00 a	6.50	3.50 d	4.75 b	23.50 b	3.75 ab	4.50 b
K_5	3.50 b	8.00	6.50 a	9.00 a	28.00 a	1.00 c	2.00 c
LSD 5%	1.06	NS	1.21	2.04	3.0	2.17	2.34

Information: The average value in the same column followed by the same letter is not significantly different based on the LSD test 5%
K_0 : concentration of 0.0% (100% water)
K_1 : concentration of 7.5% (75 g of mistletoe in one liter of extract)
K_2 : concentration of 7.5% (75 g of mistletoe in one liter of extract)
K_3: concentration of 7.5% (75 g of mistletoe in one liter of extract)
K_4: concentration of 7.5% (75 g of mistletoe in one liter of extract)
K_5: concentration of 7.5% (75 g of mistletoe in one liter of extract)

pupa and Imago with the treatment of the giving of various concentrations of mango mistletoe leaf extract presented in Table 4.

Discussion

Death of larva *Spodoptera litura* occurs from the first day after the treatment. Starting on day 5, the greatest mortality rates were on the treatment with concentrations of 10.00% and 12.50%, although up to the 10th day the mortality rate of 100% do not exist yet. The mistletoe leaf extract at a concentration of 500 ppm and 100 ppm is toxic to the *Artemia Salina Leach* larvae. The chemicals contained in plant extracts (including mistletoes) consisting of flavonoids, steroids, saponins, glycosides, tannins, alkaloids, terpenoids and anthraquinone can cause death of house flies through the decrease in activity of the enzyme of acetyl kholin esterase (ACE), acyl carier protein (ACP), AKP, a-Carboxyl, and b-Carboxyl (Attaullah *et al.,* 2019). Chemical compounds in plants including flavonoids, steroids, saponins, glycosides, tannins, alkaloids, terpenoids and anthraquino can be used as natural pesticides, can reduce pest attacks but do not directly kill target pest organisms quickly (Tando, 2018). According to the results of research (Fahmi and Hamonangan, 2018) mistletoe leaf extract is effective to be developed as an antimicrobial agent. The chemical components of flavonoids, phenolics, steroids, tannins, and saponins can kill the third-instar *Spodoptera litura* gray larvas with LC50 values of 98.6339 mg/L. (Aini and Tukiran, 2014). Plant stem extracts containing polyphenols, flavonoids, alkaloids, tannins and sapanosides can be used as plant-based insecticides against test insect of *Callosobruchus maculatus* and *Sitophilus zeamais* (Diouf *et al*., 2016). Leaf and stem extracts of mistletoes (*Viscum album*) taken from the host plants of *Azadirachta indica, Acacia albida* and *Psidium guajava* contain tannins, alkaloids, saponins, glycosides, flavonoids, phenols, a combination of anthraquinones and reduction sugars, can cause mortality in test animals namely albino rats (John *et al*., 2018). Extracts of several weed plants are toxic to the *Drosophila melanogaster* fly. Ingredients contained in the extract are flavonoids, saponins, tannins, steroids, cardiacglycosides, alkaloids, anthraquinones, and terpenoids that can drivethe decrease in function of the enzymes of AChE, AcP AkP, 5-Carboxyl, and 5-Carboxyl. Compounds that are direct insecticide is phenol compound, can be used in plant pest management (Riaz *et al*., 2018). The mistletoe leaf extract of *Dendrohtoe pentandra* (L.) Miq) contains flavonoids which are poisonous to the larvas with LC50 values of 13.95 µg/mL. This shows that the mistletoe leaf extract is poisonous to the larva and has the potential to be developed as an insecticide in pest control

Table 4. Percentage of the success of the *Spodoptera litura* insect in the development from instar to next instar, from larva to prepupa, pupa and Imago with the treatment of the giving of various concentrations of mango'smistletoe leaf extract

Treatment	Percentace of instar or stage						
	2nd instar	3th instar	4th instar	5th instar	pre pupa	pupa	imago
K_0	37.50	30.00	30.00	30.00	30.00	30.00	15.00
K_1	62.50	50.00 a	45.00	27.50	27.50	27.50	17.50
K_2	37.50	32.50 a	32.50	30.00	30.00	27.50	17.50
K_3	47.50	37.50 a	37.50	25.00	20.00	27.50	15.00
K_4	47.50	15.00	15.00	15.00	10.00	10.00	7.50
K_5	30.00	5.00	5.00	2.50	2.50	2.50	0.00
BNT	TN	17.68	16.61	13.33	11.35	14.75	8.75

Information: The average value in the same column followed by the same letter is not significantly different based on the LSD test 5%

K_0 : concentration of 0.0% (100% water)

K_1 : concentration of 7.5% (75 g of mistletoe in one liter of extract)

K_2 : concentration of 7.5% (75 g of mistletoe in one liter of extract)

K_3: concentration of 7.5% (75 g of mistletoe in one liter of extract)

K_4: concentration of 7.5% (75 g of mistletoe in one liter of extract)

K_5: concentration of 7.5% (75 g of mistletoe in one liter of extract)

(Hardiyanti *et al*., 2018).

Feed consumption data from observation of the 4th day to end of observation the 16th day remained fluctuating but consistently larva at a concentration of 12.5% consumed the least amount of feed consumption compared to other treatments. In general, larva feed consumption decreases during the process of skin replacement (changing instars), and maximum feed consumption in larvas of 3^{th}-5^{th} instar. Pharmacological screening results showed that the ethanol extract of mango mistletoe leaves had an effect on the central nervous system by reducing the effect of retablisment and hanging on male mice, as well as providing a catalytic effect on female mice (Nurfaat and Indriyati, 2016).

The mistletoe leaf extract influences on the duration of developmentof the spodoptera litura larva stadia. The treatment of the mistletoe extract concentration of 12.5%at the larvae stadia stage was longer than the other treatments. In accordance with opinion (Attaullah *et al.,* 2019) chemicals material contained in plant extracts namely Flavonoids, steroids, saponins, cardiac glycosides, tannins, alkaloids, terpenoids and anthraquinone can prolong the stages of larvae and pupae of house fly through the decrease in activity of the enzyme acetyl kholin esterase (ACE), acyl protein carrier (ACP), AKP, a-Carboxyl, and b-Carboxy.

Conclusion

The extract of *Dendrohtoe pentandra* (L.) Miq) significantly affected on the biology of *Spodoptera litura* F, which is (1) poisonous, with a concentration of 12.5% can be lethal to 95% on the 8th day significantly differ from the concentration treatment below; (2) extending the larval period (larvas), but shortening the prapupa and pupa periods; (3) reduce appetite (decreased amount of feed consumption); (4) foiling the development of larvae to become the next instar, or the development from larva to pupae, or from pupa to imago

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