Identification of Secondary Metabolite Compounds in Kirinyuh (Chloromelaena odorata) Leaf as Organic Pesticides for Wide Leafy Vegetables

Rachmat S. Santoso
Department of Chemistry, Faculty of Mathematics and Natural Sciences, Universitas Negeri Manado, 95418, Indonesia.
rachmat.santoso@unima.ac.id

Abstract. This study was conducted to determine the potential of the leaves Kirinyuh (Chloromelaena Odorata) as pesticides and phytohormones on vegetable-leaved mustard greens (Barissica juncea). Concentration of ethanol extract of leaves Kirinyuh (Chloromelaena odorata) is 5, 10, and 15 %, and 0% as control. This study uses the full tool design (RAL) of data in regression and Anova analysis followed by BNT 5%. Kirinyuh leaf extract (Chloromelaena odorata) has the activity of pesticides on soil worm (Agrotis Ipsilon) and growth hormone on mustard plants. Various concentrations of ethanol extract given a different effect on the death rate toward ground caterpillar (Agrotis Ipsilon). For the analysis of variants that influence leaf extract concentration Kirinyuh (Chloromelaena odorata) with ethanol to death worm ground (Agrotis Ipsilon) showed that very influential or significant to mortality rates with the smallest Significant Difference Test (BNT) 1 % (0.01) = 0.89 and 5% (0.05) = 0.59, while different rotational states significant differences (significant) between each treatment in which a concentration of 10 and 5% respectively differently 2.533 (a) as well as the concentration of 15 and 10% ie 4.083 (b) as well as 15 and 5% ie 5.050 (c). Chromatogram GCMS analysis of leaf extract of Kirinyuh yielded 2 peak compounds with prediction of Octadekatriknoik acid compounds and compounds with the main framework of Hexadekanoic Acid. This compounds as compounds organic pesticides.

1. Introduction
The most important phenolic is flavonoids, it is bitter and effective as a barrier to eating. Phenolic is a non-nitrogen compound containing one or more hydraulic groups attached to the benzene core. Tannin is a powerful polymer phenolic compound that absorbs proteins and is a feeding inhibitor.

From the nutritional point of view and the availability of food is mostly eaten by insects because the leaves and stems contain low levels of nutrients in which the digestive tract is short and does not have a storage / food because the food is widely available.

One of the potentials found in plants for natural insecticides is the Kirinyuh plant (Chloromelaena odorata). This plant is a wild plant that has not been utilized optimally. As the material of plant pest organism (OPT). According to Hadi [1], Kirinyuh leaves contain compounds alkaloids, flavonoids, tannins and slightly terpenoid. These compounds are active ingredients as pest control and potentially as a barrier to eating for insects.

Vegetable plant in the broad leaf is mustard (Brassica Juncea) is a seasonal plant. Sawi, oval leafy plants, smooth, not hairy. His plant has a root root with a lot of root but shallow. The yellow flowers
are the size of a small flower bud with a specific pale yellow color and the mustard contains vitamin A, vitamin B and vitamin C.

The ground caterpillar egg (Agrotis Ipsilon) is in a white round shape with a diameter of 0.50 mm. The caterpillar larvae is grayish greenish and then turns brownish-gray then becomes darkish brown and slightly shiny. On both sides there is also a brown line.

In the dorsal part of the earthworm (Agrotis Ipsilon) there is butyl surrounded by small grains of light brown. The length of the earthworm larvae (Agrotis Ipsilon) an reach 35 mm and the pupil is dark brown with a length of 20 mm and has a spine on the posterior.

The ground caterpillar egg (Agrotis Ipsilon) is usually found on moist soil surface with the number of these eggs reaching 1500 eggs and egg stadia between 2 to 9 days. The ground worm larvae (Agrotis Ipsilon) is active at night and during the day hides under the foliage or soil. For this reason, the observation in this research is done for 4 hours. Stadia larva caterpillar (Agrotis Ipsilon) ie for 28 to 34 days and stadia pupa for 10 to 30 days. This depends on the environmental temperature and life cycle of the soil worms (Agrotis Ipsilon) on average 35-42 days. Young larvae eat leaves and old larvae cut off the base of the plant. Every single larvae can destroy many young plants in one night.

2. Experimental Details

2.1. Material
The raw materials used in this study are coconut shell originating from Minahasa district as source of carbon raw material, HCl, PVA (p.a merck), NaOH (p.a merck), universal indicator, Whatmann no.42 paper, and aquades.

2.2. Tools / Instruments:
The tool used includes a number of commonly used laboratory glassware, mortar agart, 100 mesh sieve (USA standard Testing Sieve), pyrolysis reactor, gravity vonvection model oven, electric furnace Carbolite model 2132 (Max Temperature 1200°C), Balance AND GR-200. Thermometers, clamps, magnets, pellets, hot plate (stir & heat), Electron Microscopy (SEM) and Energy Dispersive Spectroscopy (EDS) Bruker Tests Vega 3SB, Energy Ddispersive Spectroscopy (EDS) JEOL JED-2300, X-Ray Diffraction (XRD) Rigaku Mini Flex II, Fourier Transform Infrared (FTIR) Shimadzu model IR-Prestige-21 and Quantachrome Instruments.

Tests were performed on the ground worm (Agrotis Ipsilon). Leaf Kirinyuh cleaned and washed with running water and dried in a way diangin-aired. Next, the sample is put into an oven with a temperature of 40°C to dry. After drying, kirinyuh leaves blend until it becomes powder.

The powder was weighed and then put into a glass jar and 70% ethanol solvent was added and stirred with stirrer for about 6 hours and allowed to stand for 24 hours (maceration stage). The powder is macerated and then filtered with a Buchner funnel. The obtained filtrate was then evaporated with evaporator to obtain a thickened filtrate which was further evaporated by using a waterbath to obtain a viscous extract.

From the viscous extract, then analyzed by TLC with some ratio of solvent volume. The TLC results are each irradiated under UV light. The biased solvent produces a good separation pattern on the TLC chromatogram to be used as an eluent on the gravity column chromatography so that a good eluent is obtained. Next, the column gravity column chromatography will be packed. Eluat is accommodated in vials and each eluat is analyzed by TLC. Where each eluat having the same Rf value is combined for subsequent evaporation.

This viscous extract is then made into concentrations of 5, 10, and 15%. The treatment was done by leaf dipping method. The leaves of young cabbage that have not dikrop washed and dried in a way aerated. Then the leaves of cabbage soaked in the leaf ethanol extract Kirinyuh with various concentrations of test that is 5, 10, and 15%.

Immersion done for 30 minutes and put into plastic cup as much as 1 piece for 3 times repetition for 7 days. The caterpillar larvae (Agrotis Ipsilon) of 10 tails were put into plastic containers of
cabbage leaves soaked with the Kirinyuh extract. Observations were made during 24 hours of treatment ANOVA.

The magnitude of lethal concentration (LC 50) was determined by probit analysis whereas mortality presentation was analyzed by regression and anava. If there is a real difference, the smallest real difference test (BNT) is 5% and 1%.

3. Result And Discussion

Based on the graph of regression analysis result, it is known that there is a positive correlation between ethanol extract concentration of leaf of Kirinyuh (Chloromelaena Odorata) with mortal mortality (Agrotis Ipsilon)

The difference of influence between the treatment group of Kirinyuh leaf ethanol extract (Chloromelaena Odorata) on the number of soil mortality (Agrotis Ipsilon) was analyzed by Anava Test. Based on the test Anava note that Fcount> Ftabel. This shows that between treatment groups have very significant different ability of Kirinyuh leaf extract (Chloromelaena Odorata) on mortal mortality (Agrotis Ipsilon).

To be able to know the treatment group having significant difference then continued with the Smallest Different Test (LSD) f 5% and 1%. For different notation treatment stated significant differences between each treatment.

The death of caterpillars (Agrotis Ipsilon) is caused by the leaf extract of Kirinyuh (C. Odorata) containing bioactive compounds that have antifeedant insecticidal activity (inhibitor of feeding power) contained in Kirinyuh leaf ethanol extract (Chloromelaena Odorata) are alkaloids, flavonoids, atanins and slightly terpenoids.

In accordance ith the statement [2] and Susana (2003) th

Seskutertpenoid is a bioactive compound that can damage the nervous system in insects where this compound can inhibit the action of enzyme acetylcholineterase, causing mortality in termites [3]. The acetylcholineterase enzyme serves to break acetylcholine into acetyl co-enzymes A and kaolin. The accumulation of acetylcholine will inhibit the action of enzyme acetylcholineterase which causes the seizure of the seizure due to impulse delivery system to the autoto experiencing chaos which resulted in the caterpillar (Agrotis Ipsilon) experiencing paralysis that ended with death.

The alkaloids of the Pyrizidine Alkaloids (PAS) species contained in the Kirinyuh plant (Chloromelaena Odorata) are toxic as an inhibitor of feeding and are insecticides to insects, bullying and inhibiting taste receptors in the larval mouth area [4].

According to Cahyadi (2009), ilkaloid and flavonoid compounds enter the body of larvae (caterpillars) will affect the metabolism of larvae where toxins into the body circulated with blood, which affects the nervous system and can inhibit the amino acid transformation through the caterpillar intestinal membrane (larvae) Agrotis Ipsilon.

The results of this experiment showed that the use of ethanol extract on Calsin vegetables caused a different growth response at a concentration of 5% extract. The higher concentration of different growth responses to leaf growth is slightly wide to moderate, green, look upright and sturdy.

At a concentration of 10% is a better treatment because it produces the number of large leaves / width, the color of the leaves is bright green and the segment is a bit long so it looks more upright and sturdy. With the age of the same seedlings show different plant height growth. This is influenced by genetic factors. Seed mustard moved planting from the nursery to the plant land under stress (stress) which resulted in poor plant growth. Overall the best plant height was sho
d in the treatment of Kirinyuh ethanol extract (Chloromelaena Odorata) at concentrations of 10% and 15%. In addition influenced by genetic factors of varieties are also strongly influenced by environmental factors.

| Table 1. Variant Analysis (ANOVA) Effect of Leaf Leaf Extract Concentration (Chloromelaena Odorata) on Soil Caterpillar Death Rate (Agrotis Ipsilon) | 3 |
Concentration Deuteronomy Amount Average
(%) I II III
5 2.1 2.6 2.9 7.6 2.533
10 4.0 4.0 4.25 12.25 4.083
15 5.0 5.35 4.8 15.15 5.050
Total 35.0

The results of observation and data analysis of the number of ground caterpillar mortality rates in Table 1 showed that the three treatments gave different responses to the mortality of the soil worms. Overall, the mortality rate of soil caterpillars is consistent with the increased concentration of leaf extract of Kirinyuh (Chloromelaena Odorata).

Table 2. ANOVA Table

| SK | db | JK | KT | F_arith | F_tab |
|----|----|----|----|---------|-------|
| Treatment | 2 | 9.671 | 4.836 | 55.586 | 1% 5% |
| Galat | 6 | 0.524 | 0.087 |
| Total | 8 | 10.195 |

- F_arithmetic > F_table 1% (10,92) and 5% (5,14)
- Treatment of leaf extract Kirinyuh (C. Odorata) gives a very significant effect (**) on the mortality rate of soil worms (Agrotis Ipsilon).

Table 3. The Bigest Differential Difference Test (BNT)

| Level of trust | BNT |
|---------------|-----|
| 1 % (0.01)    | 0.89 |
| 5% (0.05)     | 0.59 |

Table 4. The Least Different Difference Test (BNT) Comparison of Concentration Treatment.

| Concentration (%) | Amount | Average | Notation |
|-------------------|--------|---------|----------|
| 5                 | 7.6    | 2.533   | a        |
| 10                | 12.25  | 4.083   | B        |
| 15                | 15.15  | 5.050   | c        |

Information:
Different notations express significant differences (significant) between each treatment.

Chromatogram GCMS analysis of leaf extract of Kirinyuh yielded 2 peak compounds with prediction of Octadekatriknoik acid compounds and compounds with the main framework of Hexadekanoic Acid.

4. Conclusion.
1. Between treatment of 10% and 5% concentrations are significantly different.
2. Between the treatment concentrations of 15% and 10% are each significantly different.
3. Between the treatment concentrations of 15% and 5% are each significantly different.
References

[1] Hadiroseyani, Y; Hafifudin, M; Alifudin, F; Supriyadi Potensi daun Kirinyuh (Chromalaena Odorata) untuk Pengobatan Penyakit Cacar Pada Ikan Gurami (Osphronemus Gouramy) yang disebabkan Aeromonas Hydrophilla S26 Jurnal Akuakultur Indonesia 4 (2) 139-144 (2005)

[2] Yunita, E A; Nanik, H S; Jafron, W H Pengaruh Ekstrak Daun Pandan Wangi untuk Membunuh Larva Nyamuk Aedes Aegypti Jurnal Ekologi Kesehatan 2 (2) (2009)

[3] Hadi, M Pembuatan Kertas Anti Rayap Lingkungan dengan Memanfaatkan Ekstrak Daun Kirinyuh (Eupatorium Odaratum) Bioma 6 (2) (2008)

[4] Santoso, R Penyuluhan Pembuatan Pestisida Kirinyuh (Chromalaena Odonata) untuk Hama Ulat Grayak dan Ulat Tanah pada Tanaman Kubis dan Daun Bawang di desa Paslaten Kota Tomohon Lembaga Pengabdian Masyarakat Universitas Negeri Manado Tondano (2012)

[5] Musnir, B Entomologi Andalan University Press Insist Press Yogyakarta (2006)

[6] Nur, T Hama dan Penyakit Tanaman Kanisius Yogyakarta (2005)

[7] Wiwi, I Fisiologi Hewan Kanisius Yogyakarta

[8] Peracaya Hama dan Penyakit Tanaman Swadaya Yogyakarta (2007)