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*RESEARCH ARTICLE*

# BIO-ECOLOGY OF *H.HAMPEI* IN COFFEE PLANTATION IN SUMBUL AND SIDIKALANG DISTRICTS, NORTHERN OF SUMATERA, INDONESIA.

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## *Abstract*

Coffee berry borer (*Hypothenemus hampei* Ferr.) can be controlled using attractant trap which comes from the leaves and bark of coffee beans. The purpose of this study was to determine Bio-ecology of coffee berry borer (CBB), *Hypothetamus hampei* and ability to extract and rind of coffee as an attractant for imago fruit borer coffee with different levels of concentration. This research was conducted in the district and sub-district Sumbul and Sidikalang from August 2016 to October 2016. The results showed Bio-ecology of *H. hampei* pests that can be observed from the development of the egg, pupa and imago of *H.hampei* in Sidikalang and Sumbul, Dairi. Attractant trap of chlorogenic acid from leaves and bark of the coffee fruit is most effective in controlling the pest CBB in the field of ten repetitions recorded from 7 replicates very significant, consisting of the S3, S4, S6, S7, S8, S9 and S10 (p <0:00 -0.02) in Sumbul and Sidikalang. Developments of *H. hampei* affected by temperature and the availability of the coffee fruit. Factors influencing the development of *H. hampei namely*; continuous supply of fruit from generation to generation; the shade is too dense resulting in high humidity; and fulfilled the host plant consisting of *Tephrosia* sp, *Centrosoma* sp, *Oxicanthus* sp. The use of attractants chlorogenic acid leaves and rind of coffee pest control of CBB (*H.hampei*) is one effort in keeping the coffee commodity Dairi, North Sumatra.



## Introduction:-

Since the 1980s, the coffee export is third commodity in Indonesia reached 300,000 to 350,000 ton per year, after the wood and rubber. Increasing export demand should be offset by an increase in quality improvement. This is necessary because in 1982 the FDA (Food and Drug Administration) United States 600 tons of coffee are refuse because they contain pests and diseases so that further development of Indonesia's coffee exports increasingly determined by quality aspects. Why is there are pests which become contaminants in coffee exports? From observations and tests performed, experts and practitioners support the Indonesian coffee contains several contaminants, namely insects, fungi and pests. Insects contaminants can be carried from the field at harvest and during storage in a warehouse. There are two types of pests that attack coffee and can threaten the quality of coffee exports Indonesia, namely: *Hypothenemus hampei* (coffee berry borer) and *Planococcus citri* and *C.viridis. H. hampeii* is a major pest of coffee that can be attacked since in the field until the on-site storage. Female beetles bore holes in the disc (the end) of coffee that are still green to lay their eggs. The larvae that hatch that will uplift

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and damage fruit and coffee beans so the coffee into crumbs or crushed and worthless. In addition, when the field and in the warehouse, *H. hampei* will survive on coffee beans, especially among farmers who store coffee beans in the absence of drying or drying treatment at all or drying is less than perfect. It was therefore considered necessary and important to know bioecology *H.hampei* in controlling the major pest of coffee in Dairi, particularly in North of Sumatra, Indonesia.

## Research Methods:-

**Place and Time:**

The research was conducted in coffee plantations plantation communities in Sumbul and Sidikalang Districts, Dairi. Followed by chemical analysis at the Laboratory of Chemistry USU and identification of pests in the Laboratory of Plant Pests and Diseases Faculty of Agriculture, North Sumatera University from July 2016 to September 2016.

## Materials and Tools:-

**Materials:-**

The materials used in this study are the leaves and coffee beans of 1 kg each ingredient of varieties of arabica and robusta, arabica coffee plants and robusta, a solution of the compound chlorogenic acid, distilled water, adhesive strips, Whatman filter paper No. 1, gauze , black cloth, plastic bags, detergent, data books and stationery, plastic paper, labels, and other materials that can support the research.

**Tools:-**

The tools used in this study were scales, mortal, erlenmeyer, jars plastic, cabinet dryer, blender, bottle tubes, plastic bottles, refrigerator temperature of 4 0C, rotavapour temperature is 40 0C, measuring cups, cutter, plastic containers, glass magnifying , pin, rope, camera, washbasin, cool box, wire, and tools supporting more research.

**Implementation Research in the Field:-**

The study randomized complete block design (RCBD) non factorial with 5 the best treatment of the observations in the laboratory with five groups so that there are 25 experimental units:
K0: Control (Aquadest)
K1: chlorogenic acid Extract I (plus water 25 ml)
K2: chlorogenic acid Extract II (water plus 50 ml)
K3: Extracts of chlorogenic acid III (water plus 75 ml)
K4: Extracts of chlorogenic acid IV (plus water 100 ml)

Each experimental unit consisted of four coffee planting locations with each location taken at random 5 by 5 treatment plants so that the plants experiment as much 4x5x5 = 100 plants. Data were analyzed using analysis of variance model of linear randomized block design using SPSS version 24.00.

## Results And Discussion:

**Description Bioecology of *H.hampei* in Coffee Plantation in Dairi:-**

According Feny and Endang (2016), *H.hampei* known by the local name coffee berry borer (CBB) has the proportion of most attacks (33%), followed by *P.citri* (13%), *C.viridis* (12%) and other plant pest organisms on coffee planting (Sector Protection, 2014; BBPPT Surabaya, 2014). Bio-eckology of CBB, *H.hampei* (Coleoptera) categorized into imago is black-brown, female body length of about 2 mm, and males about 1.3 mm. Eggs are laid in coffee seeds begin to harden at a temperature of 27°C. Old egg stage ranges from 5-9 days, long larval stage is 10-26 days with pre pupa two days and the pupal stage about 4-9 days. The period of development from egg to adult for 25-35 days. Old female insects live an average of 156 days and a maximum of 103 male insects a day (Sartika, 2012). Factors affecting the development of CBB, *H.hampei* are: continuous supply of fruit from generation to generation; shade is too dense resulting in high humidity; and fulfilled the host plant consisting of *Tephrosia* sp,

**Centrosoma sp, Oxicanthus sp:-**

*H. hampei* development is affected by temperature and the availability of the coffee fruit. *H. hampei* can live at $35^0$C $15^0$C- temperature, the optimum temperature for growth between $30^0$C-$32^0$C eggs and larva, pupa and adult between $27^0$C-$30^0$C. Female insects can menggerek cherries between temperature $20^0$C-$33^0$C, at a temperature of $15^0$C and $35^0$C female insects failed menggerek coffee cherries or coffee berries were able menggerek but do not lay eggs (Jaramilo *et al.*, 2009). Effective control of *H. hampei* is currently located in an area, namely the land sanitation

by spoils (picking whole fruit on the tree after the harvest), reduce soil moisture by the pruning of the coffee plants and shade plants. Breaking the life cycle, covering the action picking fruit, which started the harvest by picking all the ripe fruit was attacked by *H. hampei* and not 15-30 days before the harvest is great. Lelesan namely collecting all the coffee fruit that fell on good soil to fruit or fruit attacked not attacked. Racutan or spoils are picking all the fruit on the tree at the end of the harvest. All material results quotation powder, lelesan and racutan soaked in hot water for about 5 minutes. Before getting into the storehouse, preferably coffee beans in the sun or dried to perfection to avoid *H. hampei* up into the warehouse. Biological control can be done by utilizing some natural enemies *H. hampei* which has been continuously developed is the fungus *Beauveria bassiana* as insect pathogens, predators such as spiders, wasps paper, cecopet, mantises, beetles dome, tiger beetles, ground beetles, dragonfly and several kinds of ladybugs and parasitoid *Stephanoderis cephalonomia* and *Prorops nasuta* (Bethylids), *Phymastichus coffea* (Eulophid), and *Coffeicola heterospilus* braconid all come from Africa.

***H.Hampei* Attack Symptoms Were Observed In Coffee Plantation In Dairi:-**

Research in the field indicates CBB began gnawing green coffee cherries are the factors that determine the success rate of the pests in broaching, especially during the dry matter content of more than 20% (Murphy and Moore, 1990; Vega *et al*, 2009). Further preference CBB attacked coffee plants in red or black fewer, so it is not possible produktivitaskopi increase. Assumed when the coffee reaches the color cooking, coffee has been attacked by insects H.hampei. Then the coffee quality requirements (such as seed size, moisture content, and the percentage of disability) was good and consumer demands for hygiene and health requirements so that coffee exports will be limited if it is attacked by pests of CBB, *H.hampei*. Color black beans, black majority, the black rupture, perforated one seed, and the seed cavities more than one caused by pests and diseases is the value of defect (defect system) that must be corrected in coffee exports (Ceylon, 2012).

Figure 1 shows the attack of CBB, *H. hampei* in Sub Sumbul and Sidikalang District. First, the adult female of CBB create a hole, then into the endosperm. Attacks on young fruits only for the purpose of food for imago which can cause fruit fall and rot where they lay eggs; after hatching, the larvae inside the beans will reduce the yield and quality of coffee valuable products. Insects spent most of his life in coffee beans, so it is very difficult to control. Red coffee fruit is a fruit that is favored by female insects to breed supported by a study conducted by Anna (2001), Afruri (2009) and Aaron *et al* (2014). Directorate of Plant Protection Agency (2002) states that female beetles attacked the cherries from the age of 8 weeks after flowering to harvest.

The characteristics of the adult beetle is black with a front wing and a large pronotum and short spiked. The body length of approximately 2 mm (1.2 mm female; male 1.7 mm). Larvae are white and actively foraging or menggerek fruit/coffee beans. Female beetles were more damaging because it makes the drill hole at the end of the coffee fruit skin is still green (discus) and turned into one of the seeds. Eggs are laid on the coffee fruit seeds have been hardened or on the fruit which has been cooked. Inside the coffee beans are cavity where the eggs laid. In one seed can be placed over an egg. Fecundity females reach 70 grain beetles are placed during the second period of egg-laying. Figure 1 shows the *H. hampei*, a. larvae in the coffee fruit is still fresh; b. Newly hatched larvae will soon eat seeds and damaging part by broaching. In the period until the cocoon, made a rather wide hole auger which would later be occupied by the cocoon. Long life cycle depending on the altitude where coffee plants grow and favorable conditions to survive in the warehouse that is about 20-36 days. Inside the shed just to survive and can not multiply and die while being subjected to drying coffee beans were perfect.

Coffee berry borer, *H. hampei* is not only found in red coffee berries, but can also be detected in the coffee fruit is green toward red. When associated with the life cycle of *H. hampei* then the time it takes for the eggs to become pupae ± 15-35 days while the coffee fruit changes from green to red color lasts for one month. If the eggs are laid on the dark green fruit, then turns into a pupa along with fruit ripening dark green to red. This is consistent with the statement Wiryadiputra (2007) that the incubation period of 5-9 days and long-range eggs larvae 10-26 days before imago. Coffee and Cocoa Research Center Indonesia (2006) states the pupa length stage of *H. hampei* between 4-9 days in the coffee plantations.

Stadia imago present in all ages of the coffee fruit. Attack of *H.hampei* have since young fruit until the fruit is old as Wiryadiputra statement (1996), *H. hampei* pests since fruit during 2 months old, whose seeds are still in a state of soft, ripe fruit until the age of 4 months and a black cook, either still on the tree or who have fallen on the ground. Rubio *et al*. (2008) suggested that the imago *H. hampei* has ruined coffee beans from the coffee beans begin to form the endosperm. Female wasps lay eggs in the coffee fruit has had a hard endosperm. In the fruit that was attacked

had more than one imago in one of the coffee fruit. This is due to start until the egg stage *H. hampei* imago insect remains in the seeds and broaching in the coffee beans. As stated by Kalshoven (1981) that the development from egg to imago takes place only in the hard seeds are ripe age of 3 months, supported by Irulandi *et al.* (2007) states that the coffee berry borer eat and breed only in the coffee beans.

Coffee plantation in Sumbul District

Coffee plantation in Sidikalang District

Attack eggs of CCB, *H. hampei* on Robusta coffee

Attack larva of CCB, *H. hampei* on Robusta coffee

Atack of CBB, *H hampei* on Arabica coffee

Attack of CBB, *H.hampei* on Arabika coffee

**Figure 1:-** Atack of CBB, *H. hampei* in Sumbul dan Sidikalang Districts, Dairi

**Total CBB trapped in the Bottle Contains Attractant of Chlorogenic Acid**
Total PBKo trapped in the bottle trap can be seen in Table 1 below.

**Table 1:-** Number CBB trapped in the bottle attractant traps in Dairi

| Zones-% Atractan-Type cofee- Treatment | S1 | S2 | S3 | S4 | S5 | S6 | S7 | S8 | S9 | S10 | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|
| SiK0A1S1 | 5 | 7 | 6 | 5 | 4 | 8 | 7 | 4 | 5 | 6 | 57 |
| SiK1A2S1 | 4 | 6 | 5 | 10 | 7 | 12 | 10 | 7 | 8 | 6 | 75 |
| SiK2A3S1 | 3 | 5 | 4 | 8 | 9 | 10 | 11 | 5 | 7 | 6 | 68 |
| SiK3A4S1 | 3 | 4 | 5 | 2 | 6 | 3 | 4 | 3 | 2 | 4 | 36 |
| SiK4A5S1 | 4 | 7 | 6 | 5 | 4 | 2 | 3 | 2 | 3 | 3 | 39 |
| SiK0R1S1 | 4 | 6 | 5 | 3 | 4 | 7 | 8 | 4 | 5 | 6 | 52 |
| SiK1R2S1 | 6 | 4 | 3 | 5 | 7 | 8 | 9 | 3 | 5 | 4 | 54 |
| SiK2R3S1 | 7 | 6 | 12 | 10 | 8 | 6 | 7 | 4 | 6 | 3 | 69 |
| SiK3R4S1 | 12 | 9 | 10 | 4 | 5 | 7 | 6 | 4 | 5 | 3 | 65 |
| SiK4R5S1 | 6 | 3 | 5 | 8 | 7 | 4 | 5 | 3 | 2 | 2 | 45 |
| SiK0A1S2 | 7 | 6 | 5 | 12 | 8 | 10 | 12 | 6 | 7 | 5 | 78 |
| SiK1A2S2 | 5 | 6 | 8 | 3 | 4 | 7 | 8 | 6 | 5 | 4 | 56 |
| SiK2A3S2 | 2 | 3 | 4 | 7 | 5 | 6 | 7 | 4 | 3 | 4 | 45 |
| SiK3A4S2 | 6 | 5 | 7 | 4 | 5 | 3 | 4 | 5 | 6 | 4 | 49 |
| SiK4A5S2 | 8 | 9 | 5 | 12 | 14 | 7 | 8 | 4 | 5 | 3 | 75 |
| SiK0R1S2 | 3 | 7 | 6 | 5 | 4 | 3 | 5 | 4 | 3 | 5 | 45 |
| SiK1R2S2 | 5 | 8 | 10 | 12 | 7 | 5 | 6 | 6 | 3 | 4 | 66 |
| SiK2R3S2 | 9 | 14 | 10 | 12 | 6 | 8 | 7 | 5 | 6 | 4 | 81 |
| SiK3R4S2 | 8 | 6 | 12 | 7 | 5 | 4 | 5 | 3 | 4 | 5 | 59 |
| SiK4R5S2 | 10 | 7 | 4 | 6 | 10 | 5 | 6 | 4 | 3 | 5 | 60 |
| SiK0A1S3 | 8 | 9 | 12 | 8 | 6 | 4 | 4 | 3 | 3 | 4 | 61 |
| SiK1A2S3 | 7 | 5 | 8 | 7 | 6 | 5 | 6 | 5 | 4 | 3 | 56 |
| SiK2A3S3 | 6 | 5 | 8 | 9 | 3 | 4 | 5 | 6 | 5 | 4 | 55 |
| SiK3A4S3 | 5 | 7 | 8 | 12 | 10 | 9 | 10 | 7 | 6 | 5 | 79 |
| SiK4A5S3 | 8 | 8 | 10 | 4 | 5 | 6 | 8 | 4 | 3 | 5 | 61 |
| SiK0R1S3 | 6 | 10 | 2 | 5 | 3 | 12 | 14 | 6 | 5 | 4 | 67 |
| SiK1R2S3 | 5 | 9 | 14 | 7 | 10 | 5 | 5 | 4 | 6 | 5 | 70 |
| SiK2R3S3 | 8 | 4 | 10 | 5 | 3 | 7 | 5 | 4 | 5 | 4 | 55 |
| SiK3R4S3 | 9 | 5 | 8 | 12 | 4 | 6 | 7 | 6 | 4 | 5 | 66 |
| SiK4R5S3 | 7 | 8 | 8 | 4 | 7 | 10 | 12 | 8 | 6 | 7 | 77 |
| SiK0A1S4 | 4 | 12 | 4 | 5 | 6 | 4 | 5 | 4 | 3 | 5 | 52 |
| SiK1A2S4 | 3 | 3 | 6 | 5 | 7 | 3 | 4 | 3 | 4 | 2 | 40 |
| SiK2A3S4 | 5 | 8 | 4 | 6 | 6 | 2 | 3 | 5 | 4 | 3 | 46 |
| SiK3A4S4 | 8 | 3 | 5 | 7 | 10 | 3 | 2 | 3 | 5 | 4 | 50 |
| SiK4A5S4 | 6 | 7 | 12 | 4 | 7 | 5 | 6 | 5 | 3 | 4 | 59 |
| SiK0R1S4 | 7 | 6 | 5 | 3 | 10 | 6 | 7 | 6 | 5 | 3 | 58 |
| SiK1R2S4 | 3 | 5 | 9 | 4 | 7 | 6 | 7 | 4 | 5 | 2 | 52 |
| SiK2R3S4 | 6 | 8 | 7 | 4 | 3 | 5 | 6 | 3 | 4 | 4 | 50 |
| SiK3R4S4 | 10 | 6 | 2 | 9 | 3 | 4 | 5 | 3 | 2 | 1 | 45 |
| SiK4R5S4 | 5 | 7 | 3 | 6 | 4 | 2 | 4 | 3 | 2 | 1 | 37 |
| SiK0A1S5 | 8 | 6 | 5 | 4 | 3 | 5 | 7 | 5 | 4 | 2 | 49 |
| SiK1A2S5 | 4 | 6 | 5 | 10 | 7 | 2 | 4 | 3 | 2 | 4 | 47 |
| SiK2A3S5 | 3 | 4 | 6 | 8 | 5 | 7 | 5 | 4 | 2 | 3 | 47 |
| SiK3A4S5 | 12 | 6 | 4 | 9 | 7 | 8 | 7 | 6 | 5 | 3 | 67 |
| SiK4A5S5 | 10 | 9 | 5 | 12 | 7 | 6 | 8 | 6 | 4 | 2 | 69 |
| SiK0R1S5 | 5 | 7 | 6 | 8 | 9 | 10 | 9 | 7 | 6 | 3 | 70 |
| SiK1R2S5 | 9 | 5 | 10 | 6 | 7 | 8 | 10 | 6 | 5 | 4 | 70 |
| SiK2R3S5 | 10 | 3 | 7 | 8 | 5 | 4 | 5 | 3 | 2 | 3 | 50 |

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| SiK3R4S5 | 4 | 12 | 8 | 3 | 6 | 7 | 8 | 6 | 5 | 4 | 63 |
| SiK4R5S5 | 7 | 4 | 2 | 6 | 9 | 5 | 6 | 2 | 3 | 4 | 48 |
| SuK0A1S1 | 12 | 6 | 6 | 10 | 5 | 3 | 4 | 3 | 1 | 3 | 53 |
| SuK1A2S1 | 7 | 3 | 9 | 8 | 4 | 3 | 5 | 2 | 3 | 4 | 48 |
| SuK2A3S1 | 6 | 2 | 5 | 6 | 8 | 4 | 6 | 5 | 2 | 3 | 47 |
| SuK3A4S1 | 7 | 10 | 2 | 5 | 4 | 3 | 5 | 4 | 0 | 3 | 43 |
| SuK4A5S1 | 8 | 7 | 9 | 2 | 3 | 5 | 7 | 5 | 4 | 3 | 53 |
| SuK0R1S1 | 4 | 3 | 8 | 7 | 6 | 12 | 10 | 6 | 5 | 2 | 63 |
| SuK1R2S1 | 8 | 4 | 5 | 7 | 3 | 2 | 4 | 3 | 1 | 2 | 39 |
| SuK2R3S1 | 6 | 7 | 2 | 5 | 4 | 5 | 3 | 1 | 2 | 3 | 38 |
| SuK3R4S1 | 10 | 5 | 8 | 12 | 8 | 7 | 6 | 5 | 3 | 4 | 68 |
| SuK4R5S1 | 10 | 7 | 6 | 4 | 8 | 5 | 6 | 3 | 4 | 2 | 55 |
| SuK0A1S2 | 9 | 1 | 10 | 4 | 7 | 5 | 4 | 2 | 2 | 1 | 45 |
| SuK1A2S2 | 3 | 4 | 4 | 2 | 3 | 3 | 5 | 4 | 3 | 2 | 33 |
| SuK2A3S2 | 2 | 2 | 6 | 5 | 2 | 4 | 6 | 5 | 4 | 3 | 39 |
| SuK3A4S2 | 9 | 3 | 5 | 2 | 7 | 4 | 5 | 4 | 3 | 2 | 44 |
| SuK4A5S2 | 1 | 9 | 6 | 3 | 7 | 5 | 7 | 5 | 4 | 3 | 50 |
| SuK0R1S2 | 2 | 7 | 3 | 4 | 5 | 2 | 4 | 2 | 3 | 1 | 33 |
| SuK1R2S2 | 10 | 7 | 3 | 5 | 8 | 4 | 5 | 4 | 2 | 1 | 49 |
| SuK2R3S2 | 1 | 5 | 2 | 4 | 3 | 6 | 7 | 5 | 3 | 4 | 40 |
| SuK3R4S2 | 4 | 5 | 6 | 7 | 4 | 3 | 4 | 4 | 3 | 1 | 41 |
| SuK4R5S2 | 9 | 2 | 7 | 5 | 4 | 8 | 10 | 6 | 5 | 4 | 60 |
| SuK0A1S3 | 1 | 8 | 6 | 3 | 6 | 2 | 3 | 2 | 1 | 0 | 32 |
| SuK1A2S3 | 4 | 3 | 5 | 7 | 6 | 3 | 4 | 3 | 1 | 2 | 38 |
| SuK2A3S3 | 6 | 5 | 2 | 3 | 4 | 8 | 9 | 8 | 5 | 4 | 54 |
| SuK3A4S3 | 5 | 7 | 3 | 4 | 5 | 8 | 10 | 6 | 4 | 3 | 55 |
| SuK4A5S3 | 8 | 3 | 6 | 4 | 2 | 5 | 6 | 3 | 5 | 2 | 44 |
| SuK0R1S3 | 7 | 5 | 2 | 6 | 3 | 1 | 3 | 1 | 2 | 2 | 32 |
| SuK1R2S3 | 5 | 6 | 4 | 7 | 3 | 2 | 4 | 3 | 1 | 3 | 38 |
| SuK2R3S3 | 8 | 7 | 6 | 5 | 3 | 4 | 6 | 4 | 2 | 5 | 50 |
| SuK3R4S3 | 7 | 6 | 2 | 5 | 4 | 2 | 5 | 3 | 2 | 1 | 37 |
| SuK4R5S3 | 10 | 3 | 7 | 5 | 12 | 3 | 4 | 4 | 3 | 1 | 52 |
| SuK0A1S4 | 4 | 10 | 6 | 5 | 9 | 4 | 5 | 3 | 2 | 0 | 48 |
| SuK1A2S4 | 3 | 5 | 6 | 8 | 7 | 1 | 3 | 1 | 0 | 2 | 36 |
| SuK2A3S4 | 12 | 4 | 6 | 2 | 3 | 2 | 4 | 1 | 2 | 1 | 37 |
| SuK3A4S4 | 7 | 8 | 5 | 6 | 4 | 1 | 3 | 1 | 1 | 1 | 37 |
| SuK4A5S4 | 6 | 2 | 7 | 8 | 3 | 4 | 5 | 2 | 1 | 1 | 39 |
| SuK0R1S4 | 2 | 5 | 1 | 2 | 3 | 3 | 4 | 2 | 1 | 0 | 23 |
| SuK1R2S4 | 4 | 1 | 3 | 5 | 2 | 6 | 7 | 3 | 2 | 1 | 34 |
| SuK2R3S4 | 5 | 6 | 4 | 1 | 3 | 2 | 4 | 3 | 2 | 0 | 30 |
| SuK3R4S4 | 5 | 9 | 3 | 7 | 6 | 4 | 5 | 4 | 1 | 0 | 44 |
| SuK4R5S4 | 5 | 4 | 7 | 3 | 6 | 8 | 9 | 5 | 3 | 2 | 52 |
| SuK0A1S5 | 5 | 2 | 3 | 7 | 4 | 8 | 10 | 6 | 2 | 3 | 50 |
| SuK1A2S5 | 7 | 12 | 5 | 4 | 6 | 2 | 4 | 1 | 2 | 1 | 44 |
| SuK2A3S5 | 7 | 5 | 6 | 8 | 4 | 3 | 5 | 2 | 1 | 1 | 42 |
| SuK3A4S5 | 6 | 8 | 3 | 5 | 4 | 10 | 12 | 6 | 5 | 4 | 63 |
| SuK4A5S5 | 2 | 3 | 5 | 4 | 8 | 7 | 8 | 3 | 4 | 5 | 49 |
| SuK0R1S5 | 7 | 1 | 5 | 6 | 3 | 6 | 7 | 5 | 4 | 6 | 50 |
| SuK1R2S5 | 7 | 4 | 8 | 2 | 7 | 3 | 5 | 3 | 1 | 1 | 41 |
| SuK2R3S5 | 3 | 4 | 5 | 7 | 6 | 2 | 4 | 2 | 1 | 1 | 35 |
| SuK3R4S5 | 2 | 12 | 4 | 8 | 7 | 10 | 12 | 6 | 4 | 2 | 67 |
| SuK4R5S5 | 4 | 10 | 5 | 6 | 8 | 6 | 8 | 3 | 2 | 2 | 54 |

Catatan: Si=Sidikalang, Su=Sumbul; K0=Kontrol, K1=extract of chlorogenic+water 25 ml, K2=extract of chlorogenic+water 50 ml, K3=extract of chlorogenic+water 75 ml, K4=extract of chlorogenic+water 100 ml; A=Arabika, R=Robusta; S=Replicates.

Attractant trap of chlorogenic acid from leaves and bark of the coffee fruit is most effective in controlling the pest PBKo in the field of ten repetitions found seven replicates significantly to repeat with each value of p <0.02 on third replicates (S3) and the tenth replicates (S10 ), while the very real differences recorded in the fourth replicates (S4), the sixth replicates (S6), the seventh replicates (S7), the eighth replicates (S8), and ninth replicates (S9). According to Clifford (1999); CIRAD (2004); Damon (2001); Feny and Endang (2014) that the use of attractant uch as methyl eugenol, traps colors, especially blue or red can control PBKo attack of the coffee plant. Integrated Pest Management and the use of pheromones performed by Laila et al. (2011); Ceylon (2012) and Nugroho (2015).

## Conclusions And Recommendations:-

Coffee is a beverage connoisseur economical for the people of North Sumatra. The Dairi coffee producing centers have major problems detected dominant pest *H.hampei*, CBB. The results showed Bio-ecology of *H. hampei* pests that can be observed from the development of the egg, pupa and imago of *H.hampei* in Sumbul and Sidikalang, Dairi. Attractant trap chlorogenic acid from leaves and bark of the coffee fruit is most effective in controlling the pest of CBB in the field of ten repetitions recorded 7 replicates very significant, consisting of the S3, S4, S6, S7, S8, S9 and S10 (values: p <0:00-0.02). Developments *H. hampei* affected by temperature and the availability of the coffee fruit. Factors influencing the development of *H. hampei* namely; continuous supply of fruit from generation to generation; the shade is too dense resulting in high humidity; and fulfilled the host plant consisting of *Tephrosia* sp, sp *Centrosoma, Oxicanthus* sp. the use of attractants chlorogenic acid leaves and rind of coffee pest control of CBB (*H.hampei*) is one effort in keeping the coffee commodity Dairi, North Sumatra.

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