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Potential of Trenggulun Leaf Essential Oil as an Attractant for Fruit Fly (*Bactrocera sp*) Pests in Cayyene Pepper (*Capsicum frutescens*) Plants

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Abstract

Fruit flies are the main pests of cayenne pepper. One of the environmentally friendly ways to control is with attractants. The research method used is a Group Randomize Desigen (RGD) factorial pattern with two treatment factors. The first factor is the concentration of trenggulun leaf essential oil which consists of four levels, namely K1=concentration of 0,50 ml, K2=concentration of 0,60 ml, K3=concentration of 0,70 ml, K4=concentration of 0,80 ml. The second factor is the application time (W) which consists of three levels, namely W1= application time every 7 days, W2= application time every 10 days, W3= application time every 14 days. This study aims to determine the most effective concentration and application time. The types of fruit flies trapped are female Bactrocera dorsalis, male Bactrocera dorsalis and female Bactrocera umbrosa. The most effective application time is 10 days with a concentration of 0.80 ml of essential oil. The number of female fruit flies trapped is more than male fruit flies because the content of essential oil compounds of trenggulun leaves contains ß ocimen which is an attractant for female fruit flies Bactrocera dorsalis and Bactrocera umbrosa.

Keywords: Attractant, Essential Oil, Fruit Flies, Pests, Trenggulun

1. Introduction

Chili peppers that produce high production are obtained from the results of plant breeding, selection activities are quite important activities, besides that plant breeding is carried out with a molecular approach (Yunandra,et.al.,2019).

Chili peppera are a plant of the solanaceae family which has the latin name Capsicum frutescens. Chili plants originated in America, precisely the Peruvian region and spread to other countries of the American continent, Europe and Asia including Indonesia and other Asian countries (Assagaf, 2017).

Despite its significant economic potential, cayenne pepper cultivation in Indonesia remains largely reliant on harmful practices. The most significant challenge faced in cayenne pepper cultivation is unstable production and excessive use of pesticides and chemical fertilizers according (Avioanto, 2023)

The prospect of cayenne pepper is very promising to meet the needs of domestic consumers and export demand. In 2017-2021, the demand for cayenne pepper increased by 2.65% annually, including the need for seeds, consumption, and industrial raw materials, but the production of cayenne pepper is estimated to decrease by 0.4% per year during 2017-2021. This condition is due to the fact that the land area desreased 0.85% during the same period. The price increase will jump up if the production of chili is lower than the level of consumption so that there will be inflation, especially in certain seasons and this happens almost every year (Sofiarani,et.al., 2020)

Fruits flies are one of the most important pests on some fruits and vegetables and are even a major Plant Disturbing Organism (PEST). Fruit fly attacks can cause qualitative and quantitative losses. Quantitative damage occurs due to a decrease in yield until it cannot be harvested at all. While qualitative damage is related to a decrease in fruit quality due to this pest attack, especially if there is secondary infection by bacteria that causes the fruit to rot. The activity of fruit fly larvae can also damage the flesh of the fruit so that the fruit will rot and fall (Sahetapy,

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et.al., 2019).

Fruit fly is a species of pest that is very widespread, not only in the tropics. This pest also attacks agricultural commodities in subtropical areas. Currently fruit fly pests are a global concern because in export and import activities of fresh fruit commodities carry the risk of entering fruit flies. Fruit flies are pests that cause qualitative and quantitative damage with damage levels reaching 100% and even these pests are able to determine the direction of horticultural export and import policies. from one country to antoher (Kadja, et.al., 2017).

One of the alternatives to control that is environmentally friendly and safe can be easily utilized is the use of secondary metabolite compounds of plants that are attractive/attractant. Insects are attracted to fruits and vegetables because they contain volatile compounds that are smelled by the sense of smell of insects to find suitable hosts. The process of insects to find suitable hosts both as a source of food, a place to lay eggs using chemicals produced by plants (Sari, et.al., 2021).

Baiting techniques can be used by utilizing attractants that can function as lures for insects. Natural attractants are obtained from various types of plants that contain methyl eugenol or eugenol compounds. Eugenol compounds are clear to pale yellow liquids that are volatile and have the same distinctive aroma as the original plant. This eugenol compound can be reduced to several compounds including methyl eugenol which is known as a natural attractant (Simbolon, et.al., 2015). Essential oil are toxic to various insect pests, these compounds have insecticidal, fumigant, antifeedant, attractive and repellent activities. Essential oil are natural ingredients that are easily obtained because they are found in various types of plants, one of which is the trenggulun (Gosal, et.al., 2022).

One of the plants that contain essential oil is trenggulun (Protium javanicum). Trenggulun belongs to the Burseraceae family. This plant is found in Java at an altitude of 500 meters above sea level. In Bali, this plant is known as Trenggulun. Trenggulun is one of the rare plants in Bali. The leaves of Trenggulun have a distinctive sour smell and contain volatile olis (Sukmajaya, et.al., 2012. In research conducted by Salbiah, et.al., 2013 by comparing several essential oils from jeringau leaves, green basil, celery and citronella, the average fruit flies trapped most in green basil leaf essential oil is 26,83% tails. While the essential oil attractant from trenggulun leaves has never been done by other researchers).

2. Material and Methods

This research was conducted in July-December 2024 in Lembuak Village, Narmada District, West Lombok Regency. The coordinates of Lembuak village are 8°35’27.6”S 116°12’18°E. 8°35’32”S 116°11’55”E. Lembuak village is located at an altitude of 3.726 meters above sea level..

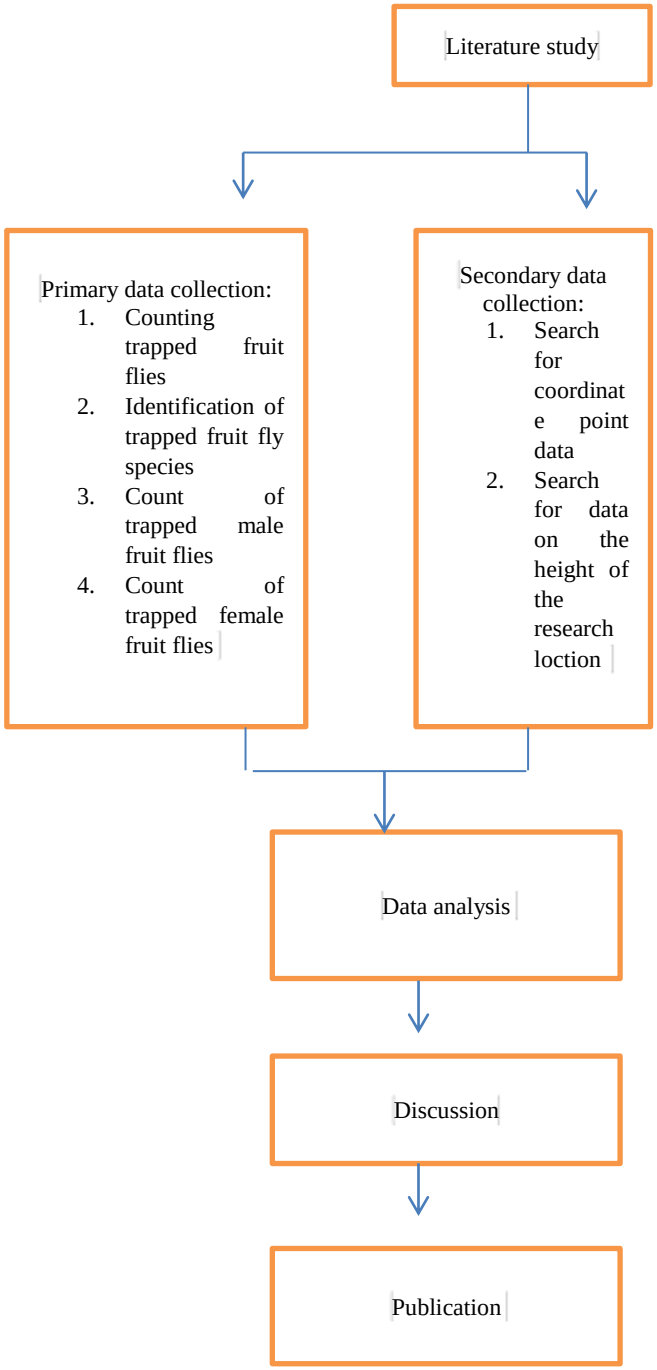

Figure 1. Research flow diagram

The materials used in research are cayenne pepper seedlings, pearl NPK fertilizer, TSP fertilizer, KCl fertilizer, trenggulun leaves. The tools used are hoes, buckets, stationery, cutters, used bottles of 1000 mL capacity, rapia ropes, sterile cotton, scissors.

This study uses a randomized group design (RGD) factorial pattern with 2 treatment factors. The first factor is the Concentration (K) of trenggulun leaf essential oil which consists of 4 levels namely: K1 is concentration of 0.50 ml, K2 is concentration of 0.60 ml, K3 is concentration of 0.70 ml, K4 is concentration of 0.80 ml while the second factor

is application time (W) which consists of 3 levels namely: W1 is application every 7 days, W2 is application every 10 days, W3 is application every 14 days.

Observations to be made include identification of the type of fruit flies trapped, number of fruit flies trapped (tails), number of male fruit flies (tails), number of female fruit flies (tails)

The data obtained were analyzed with the F test, if it shows a real effect, it will be followed by a comparative test of treatment means using the BNJ test at the 5% level. If the coefficient of variation (CV) in the analysis of variance is large, the transformation of observation data is carried out by the method of √x+0,5 analisys with SPSS Version 16.

3. Results and Discussion

3.1. Identification of Trapped Fruit Fly Spesies

Identification of fruit fly spesies (*Bactrocera sp*) has been carried out the species level using the determination guidebook Siwi et.al., 2006. Table 1 shows that there are 2 types of fruit flies trapped by trenggulun leaf essential oil attractants, namely *B. dorsalis* and *B. umbrosa*. According to Setlight,et.al (2019) *B. dorsalis* is a fruit fly species that attacks cayyene pepper while *B. umbrosa* does not attack cayenne pepper but enters the trap because it is attracted to the aroma of methyl eugenol produced from the attractant aroma of essential oil. In research conducted on chili and star fruit plants in Salahutu subdistrict, the fruit fly *Bactrocera dorsalis* has morphological characteristics that are almost the same as Bactrocera carambolae but if examined more deeply the differences with Bactrocera carambolae. The basic difference is that *Bactrocera dorsalis* on the abdomen with clear segments tergit there is a transverse line. The abdomen is more pointed compared to *Bactrocera carambolae* (Sahetapy, et.al.,2019). According to Kodja, et.al., 2023 in the type of *Bactrocera dorsalis* the head has a large black facial spot and the thoracic part has a black scutum, with lateral postsutural vittae parallel in shape and ending after the intar alar seta. The abdomen is brownish yellow there is a thin T-shaped longitudinal line that is black in color. While the type of *Bactrocera umbrosa* is characterized by a small black face spot and oval shape. In the thorax there is a black scutum, with a rather wide yellow band on both lateral sides. The wings have three transverse bands and the entire front and hind legs are brownish yellow.

Table 1. Types of Fruit Flies Trapped

No	Genus	Type (Species)	Scientific Name
1	Bactrocera	dorsalis	*Bactrocera dorsalis* Hendel
2	Bactrocera	umbrosa	*Bactrocera umbrosa* Fabricius

Figure 1. Image of *B. dorsalis* (Research Documentation)

Figure 2. Image of *B. umbrosa* (Research Documentation)

3.2. Number Of Fruit Flies Trapped (Tails)

In the treatment of trenggulun leaf essential oil attractants with several treatments there are significantly different results for each treatment. The results of the analysis with the BNJ test can be seen in the following Table 2.

Table 2. Average Fruit Flies Trapped

Treatment	Average
0,50 ml+7 day	12
0,60 ml+7 days	17
0,70 ml+ 7 days	23
0.80 ml+7 days	43**
0,50 ml+10 days	16
0,60 ml+10 days	22.25
0,70 ml+10 days	28.75
0,80 ml+10 days	52.75**
0,50 ml+14 days	15
0,60 ml+14 days	29.75
0,70 ml+14 days	36
0,80 ml+14 days	44.5**

Description: ** very significantly different at the 5%

In each treatment the number of fruit flies trapped is different in each observation. The greatest number of fruit flies trapped is in the K4W2 treatment, namely at a concentration of 0.80 ml with an application time of 10 days. There is a significant difference between the concentration treatment and application time because the higher the dose of methyl eugenol given, the more fruit

flies that can be trapped. This is because a low dose of attractant has a low active ingredient content so that it will evaporate faster while at a high dose of methyl eugenol has more active ingredient content so that the evaporation time will be longer (Algifani, et.al., 2021).

3.3. Number of Male Fruit Flies Trapped (Tails)

The number of male fruit flies trapped is very small because the content of methyl eugenol in the essential oil of trenggulun leaves is very small so that the male fruit flies trapped are very small, the number of male fruit flies trapped is influenced by the percentage of methyl eugenol or eugenol content (Efendy, et.al.,2010).

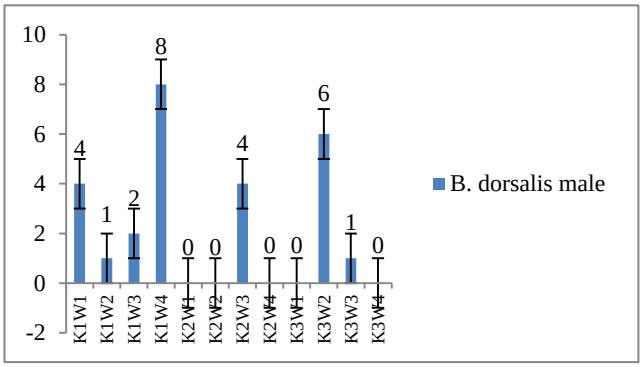

Figure 3. Number of male fruit flies trapped

3.4. Number of Female Fruit Flies Trapped (Tails)

The number of female fruit flies trapped can be seen in Figure 4. In Figure 4 it can be seen that *Bactrocera dorsalis* is more trapped than *Bactrocera umbrosa* because cayenne pepper is the main host of fruit flies of the type *Bactrocera dorsalis*, while the main host of fruit flies of the type *Bactrocera umbrosa* is fruit.

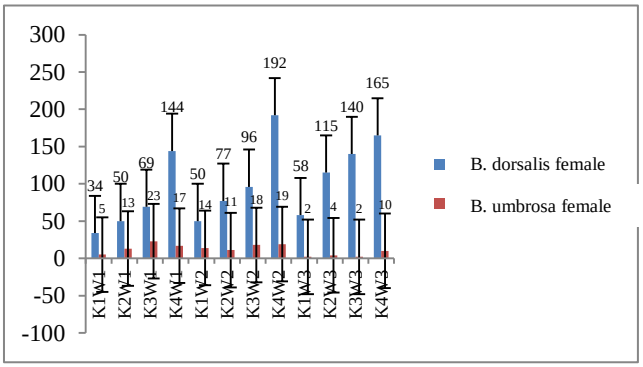

Figure 4. Number of female fruit flies trapped

Female fruit flies come because the content of essential oil of trenggulun leaves there are compounds of monoterpenes and squiterpenes. These ingredients are compounds that can attract insects. According to Sjam, et.al., 2011 this compound is an attractant of fruit flies and can attract female fruit flies, from the results of GC-MS analysis there is a compound β-ocimen which is an atractant on female fruit flies *Bactrocera dorsalis* and *Bactrocera umbrosa*.

4. Conclusion

Essential oil from trenggulun leaves can be used as *Bactrocera dorsalis* and *Bactrocera umbrosa*. The most effective concentration is 0.80 ml. The most effective time is 10 days.

References

Algifani, F., Adelia, H., & Bangun, L. B. (2021). Efektivitas atraktan dalam mengendalikan lalat buah (*Bactrocera* sp.) pada tanaman cabai merah (*Capsicum annuum*). *Prosiding Seminar Nasional Lahan Suboptimal*. Universitas Sriwijaya Palembang.

Assagaf, S. A. R. (2017). Pengaruh sistem jarak tanam dan pemberian EM-4 terhadap pertumbuhan dan produksi tanaman cabai rawit (*Capsicum frutescens*). *Jurnal Ilmiah Agribisnis dan Perikanan, 10*(2), 65–79.

Avianto, Y., Nur, K. S., & Anantia, B. P. (2024). Synergistic effects of photosynthetic bacteria and endophytes: A novel approach to enhance cayenne pepper productivity. *JUATIKA, 6*(#), 699–711.

Efendy, T. A., Rani, R., & Samad, S. (2010). Pengujian beberapa jenis tanaman sebagai sumber atraktan lalat buah (*Bactrocera* sp.) (*Diptera: Tephritidae*) pada tanaman cabai (*Capsicum annuum* L.). *Prosiding Seminar Nasional*. Universitas Sriwijaya Palembang.

Salbiah, D., Sutikno, A., & Rangkuti, A. (2013). Uji beberapa minyak atsiri sebagai atraktan lalat buah pada tanaman cabai merah (*Capsicum annuum*). *Prosiding Seminar Nasional*. Pekanbaru.

Siwi, S. S., Purnama, H., & Suputa, S. (2006). Taksonomi dan bioekologi lalat buah penting di Indonesia (*Diptera: Tephritidae*). Australia: Department of Agriculture, Fisheries and Forestry.

Sjam, S., Surapati, S., Rosmana, A., & Thamrin, S. (2011). Teknologi pengendalian hama dalam sistem budidaya sayuran organik. *Jurnal Fitomedika, 7*(3), 142–144.

Sofiarani, F. N., & Ambarwati, E. (2020). Pertumbuhan dan hasil cabai rawit (*Capsicum frutescens*) pada berbagai komposisi media tanam dalam skala pot. *Jurnal Vegetalika, 9*(1), 292–30.

Sukmajaya, A. P. I. G. P., Puspawati, N. M., & Bawa Putra, A. A. (2012). Analisis kandungan minyak atsiri daun trenggulun (*Protium javanicum*) dengan metode kromatografi gas-spektroskopi massa. *Jurnal Kimia, 6*(2), 155–162.

Yunandra, M., Elza, Z., & Deviona. (2019). Analisis korelasi dan sidik lintas karakter kuantitatif 20 genotipe cabai (*Capsicum annuum*). *JUATIKA, 1*(2), 10–18.