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INCREASING THE EFFECTIVENESS OF SOME TYPES OF ATTRACTANTS THROUGH SEVERAL TYPES OF DISPENSERS AGAINST FRUIT FLY PESTS (Bactrocera spp.) ON GUAVA PLANTS (Psidium guajava L.)

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Abstract

This research was carried out in Sawit Rejo Village, Sunggal District, Deli Serdang Regency, North Sumatra Province, at an altitude of ± 500 m above sea level. The aim of this research was to determine the effectiveness and catchability of several types of attractants and dispenser media on the attraction of fruit fly pests to guava (Psidium guajava L) . This research was carried out in 2 stages. The first stage was a Randomized Block Design with testing of several types of attractants carried out at 9 levels, namely, A1 (Synthetic Methyl Eugenol Attractant 800 g/l), A2 (Pattoouli Oil), A3 (Nutmeg Oil), A4 (Pattoouli Flower Oil) , A5 (Cinnamon Oil), A6 (Ylang Ylang Flower Oil), A7 (Citronella Oil), A8 (Lemon Oil) and A9 (Vutive Root Oil). The second stage was a Factorial Randomized Block Design by testing several types of attractants and dispenser media, with the first factor being the type of attractant with 4 levels, namely A1 (Synthetic Methyl Eugenol Attractant 800 g/l), A2 (Pattoouli Oil), A3 (A1 + Solvent Solution) , A4 (A2 + Solvent Solution). The second factor for media dispensers was carried out at 3 levels, namely K (Cotton Roll Media), B (Wooden Block Media) and P (Plastic Media). The parameters observed were the number of fruit flies trapped in the bottle in the first stage, the number of non-target insects in the first stage, the number of fruit flies trapped in the second stage, the non-target insects in the second stage and. The results of the research showed that treatment in the first stage had a significant effect on the number of fruit flies trapped. Attractant treatment with synthetic methyl eugenol and patchouli oil is the treatment that attracts most fruit flies so they become trapped in the treatment bottles. Meanwhile, in the second stage, the research results showed that treatment A1 (Synthetic Methyl Eugenol Attractant 800 g/l) was the most effective in attracting fruit fly pests , this can be seen from the results of the number of fruit flies trapped in bottles compared to other types of attractants. Meanwhile, the most effective media dispenser is media K (Cotton Roll). This can also be seen from the number of flies trapped in bottles compared to other media. Meanwhile, the treatment interaction between the type of attractant and the dispenser media which had a significant effect was the interaction between A1 (Synthetic Methyl Eugenol Attractant 800 g/l) and the dispenser medium K (Cotton Roll), this can be seen from the results of the number of fruit flies trapped in the bottle compared to other interactions. This second stage of research shows the results of a real influence with a decreasing graph. This is in accordance with research conducted from treatment 1 DSA – 25 DSA, the number of fruit fly catching abilities decreased over time.

Keywords: type of attractant,

INTRODUCTION

Guava (Psidium guajava L.) is a fruit that has many health benefits. Guava also has commercial value in Indonesia and has a wide market share. Indonesia's guava production in 2009, 2010 and 2011 respectively reached 204,551 tons, 211,836 tons and 206,509 tons, while in 2012 guava production in Indonesia decreased to 104,885 tons. The decline was caused by biotic factors, namely pest and disease attacks (Directorate of Horticultural Protection, 2013).

The wide distribution of guava does not guarantee high production due to the high level of pest and disease attacks that attack guava. There was a shortage of guava supply from October 2011 to September 2012 amounting to 14 794.5 kg, this was triggered by the high percentage of

defective products produced due to attacks. plant pest organisms which reached 69% of the total harvest during 2012 (Directorate of Horticultural Protection, 2015).

One of the disorders that causes quite high yield losses in guava plants is fruit fly attacks (Bactrocera spp). The damage caused by fruit fly pests reaches 100% (Didah Faridah, 2011). Until now, several methods have been used to control fruit fly pests, but the use of pesticides is still dominant. Unwise use of pesticides can stimulate the emergence of pest resistance, killing of natural enemies, pollution of the environment and the attachment of toxic residues to fruit caused by the application of pesticides to these plants. It is necessary to look for other alternatives to avoid worsening problems caused by the use of pesticides in controlling fly pests. the fruit on guava plants (Sosromarsono et al., 1988).

The use of insect-attracting substances called attractants is one component of integrated pest control . This method is a very effective, efficient, environmentally friendly control method and does not leave toxic residue on the fruit produced by the plant. Attractants contain active ingredients, including methyl eugenol, which is used as an attractant for fruit flies. Apart from synthetic attractants, there are also attractants that come from plants, namely aromatic plants. Aromatic plants are plants that can emit a scent that attracts fruit flies. Examples are basil plants (Ocinum santum) , nutmeg (Myristica fragans houtt), and others. The use of natural attractants derived from plants continues to be developed to control fruit flies (Siwi et al., 2006).

The problem that is the background to this research is to test the catchability of various plant extracts as attractants against fruit fly pests, then this research also aims to test three media dispensers to find the best media dispenser to be used as a medium for attractants.

METHOD

The research was carried out in Sawit Rejo Village, Sunggal District, Deli Serdang Regency, North Sumatra Province , at an altitude of ± 500 m above sea level. This research was carried out during the guava fruiting season, October 2019 to January 2020.

The material used is a synthetic or manufactured attractant with an active ingredient content of 800 g/l methyl eugenol with a formulation dose of 0.25 ml/trap. Furthermore, nutmeg oil extract attractant with a formulation dose of 0.25 ml/trap, clove oil attractant with a formulation dose of 0.25 ml/trap, patchouli oil attractant with a formulation dose of 0.25 ml/trap, cinnamon oil attractant with a formulation dose of 0, 25 ml/trap, attractant ylang-ylang flower oil with a formulation dose of 0.25 ml/trap, citronella oil with a formulation dose of 0.25 ml/trap, lemon oil with a formulation dose of 0.25 ml/trap, vetiver oil with a dose formulation 0.25 ml/trap. And solvent solution (Acetone).

Solid rolled cotton (Cotton roll) with a length of 3.5 cm with a diameter of 0.8 cm, blocks of wood (block board type wood, pieces of wood that are compressed with a machine and given a veneer coating on both sides so that it becomes a sheet resembling an ordinary board used as raw material for making wardrobes), modified with dimensions, length 1 cm width, 1 cm height, 1 cm) image as stated in attachment four part b, and plastic sachet bag label with length, 4.5 cm and width , 3 cm as a media dispenser or attractant holder, 1.5 liter plastic mineral water bottle that has been modified as stated in attachment three, as a medium for attractants, water barrier in the bottle with a height of 10 cm from the bottom of the bottle surface with a total of 5 holes/bottle, a wire with a length of 40 cm, at a distance of 10 cm from the surface of the bottle cap, detergent water as a medium for soaking fruit flies, and other materials deemed necessary in this research .

This research was divided into two stages, the first stage was to test the effectiveness of several types of attractants in the catchability and resistance of attractants on guava fruit fly pests . At this stage, nine types of attractants were used.

The second stage was to test the effectiveness of the attractant and the effect of several types of dispensers on the catchability of fruit fly pests on guava plants.

The design method used in this research was a non-factorial Randomized Block Design (RAK) , where the test in the first stage was the effectiveness of several types of attractants consisting of 9 levels and 3 replications, namely:

The first stage is Attractant Type (A), where this research uses A1 (synthetic attractant methyl eugenol 800 g/l) as a positive control (+) because the use of an attractant using methyl eugenol is an environmentally friendly control method and has been proven to be effective. Chemicals known as semio chemicals have been proven to influence insect behavior, such as looking for food, laying eggs, sexual intercourse and others (Kardinan, 2007). This research consists of 9 levels, namely:

A 1 = Synthetic attractant testing with the active ingredient synthetic methyl eugenol 800 g/l at a dose of 0.25 ml/trap.
A 2 = Patchouli oil attractant testing at a dose of 0.25 ml/trap.
A 3 = Attractant test for nutmeg oil at a dose of 0.25 ml/trap.
A 4 = Clove flower oil attractant testing at a dose of 0.25 ml /trap.
A 5 = Cinnamon oil attractant test at a dose of 0.25 ml /trap.
A 6 = Testing of ylang ylang flower oil attractant at a dose of 0.25 ml /trap.
A 7 = Testing of Citronella Oil Attractant with a dose of 0.25 ml/trap.
A 8 = Providing lemon oil attractant at a dose of 0.25 ml /trap.
A 9 = Testing of vetiver oil attractant at a dose of 0.25 ml /trap.

Next, the test in the second stage, tested the effectiveness of several types of trap and attractant dispenser media on the ability to catch fruit fly pests on guava plants, where the test in the second stage was a continuation of the test in the first stage by using attractants that could attract fruit fly pests. in the first stage of testing. The attractant that can attract fruit fly pests in the first stage is a synthetic attractant with the active ingredient methyl eugenol 800 g/l (A1) and patchouli oil extract attractant (A2). In the second stage of testing, two attractants were used, with each attractant being given a solvent solution as a new treatment, then modifying the trap dispenser media used, consisting of 3 levels and 3 repetitions, namely :

The second stage in this research used a Factorial Randomized Group Design (RAK) which consisted of two factors:

The first factor is Attractant (A) which consists of four levels.

A 1 = Test of a synthetic attractant with the active ingredient synthetic methyl eugenol 800 g/l at a dose of 0.25 ml /trap.
A 2 = Patchouli oil attractant testing at a dose of 0.25 ml/trap.
A 3 = Testing of a synthetic attractant with the active ingredient synthetic methyl eugenol 800g/l with a dose of 0.25 ml + solvent solution 0.25 ml/trap.
A 4 = Patchouli oil attractant testing with a dose of 0.25 ml + 0.25 ml solvent solution/trap.

The second factor is the attractant media which consists of three levels:

K = Attractant testing with dispenser media using a solid cotton roll (cotton roll) with a length of 3.8 cm and a diameter of 0.8 cm
B = Attractant testing with modified dispenser media using wooden blocks with a length of 1 cm and a width of 1 cm (Restu, 2018).
P = Attractant testing with dispenser media using plastic with length, 4.5 cm wide, 3 cm (Restu, 2018).

RESULTS AND DISCUSSION

1. The number of fruit flies trapped in bottles when testing the effectiveness of several types of attractants in catching power

Average data from monitoring the effectiveness of several types of attractants in catching fruit fly pests on guava plants at 1-11 DAP (days after application) can be seen in appendix 6. Meanwhile, the results of the analysis of variance can be seen in appendix 7. The average data is presented below. the effectiveness of several types of attractants in their catching power against fruit flies in the first stage test 1 - 11 HSA

Table 1. Fruit flies trapped in tests of several types of attractants for their catchability against fruit flies in the first stage of 1-11 DSA

TREATMENT	TEST			TOTAL	AVERAGE
	I	II	III		
A1 (A. Synthetic Methyl Euganol)	12.73	10.91	10.18	33.82	11.27 **a**
A2 (A. Patchouli Oil)	3.82	7.73	5.09	16.64	5.55 **b**
A3 (A. Nutmeg Oil)	0.00	0.00	0.00	0.00	0.00 **c**
A4 (A. Clove Flower Oil)	0.00	0.00	0.00	0.00	0.00 **c**
A5 (A. Cinnamon Oil)	0.00	0.00	0.00	0.00	0.00 **c**
A6 (A. Ylang Ylang Flower Oil)	0.00	0.00	0.00	0.00	0.00 **c**
A7 (A. Citronella Oil)	0.00	0.00	0.00	0.00	0.00 **c**
A8 (A. Lemon Orange Oil)	0.00	0.00	0.00	0.00	0.00 **c**
A9 (A. Vetiver Oil)	0.00	0.00	0.00	0.00	0.00 **c**

Information : Numbers followed by different letters on the same line indicates significantly different, while the numbers followed by the same letter indicate not significantly different according to DMRT at the 5% level

In Table 1 above, it can be seen that the effectiveness of several types of attractants in terms of catching power has a significant effect on fruit flies. A1's treatment is significantly different from A2's. And treatments A1 and A2 are significantly different from treatments A3, A4, A5, A6, A7, A8, A9. Meanwhile, treatments A3, A4, A5, A6, A7, A8, and A9 were not significantly different because there were no fruit flies trapped in the bottles, because the active ingredients used were revelant (repelled) fruit flies from approaching the aroma. In treatment A1 the average number of flies caught was 11.27 flies. Furthermore, in treatment A2, the average number of fruit flies trapped was 5.55 flies.

In general, it can be seen that the interaction between Attractant and the synthetic active ingredient methyl eugenol is a treatment that has a real effect, and is the trap that catches the most fruit flies. According to Yoandestina (2017), methyl eugenol has a fairly long range or radius, reaching hundreds of meters or even thousands of meters depending on the wind direction. Catchability varies, depending on location, weather, commodities and fruit conditions in the field. (Yoandestina, 2017).

2. Number of non-target insects trapped in bottles when testing the effectiveness of several types of attractants

From the results of research that has been carried out, there were no non-target insects trapped in bottles when testing the effectiveness of several types of attractants. It can be concluded that the aroma of the attractant does not attract insects other than the target insect, namely fruit flies.

3. Number of fruit flies trapped, in testing the effectiveness of several types of attractants and several types of dispenser media

Data on the number of fruit flies trapped in bottles as a result of tests on the effectiveness of attractant types and dispenser media types along with analysis of their variance can be seen in attachments 8 – 11.

Based on the results of statistical analysis, it shows that the treatment of several attractants has a significant effect on the catching power of trapped fruit fly pests, and the type of media dispenser treatment also has a significant effect on the catching power of trapped fruit fly pests, as well as the interaction between the treatment of several types of attractants and media. The dispenser used had a significant effect on the catchability of fruit fly pests trapped in bottles during the second phase of research activities (1 - 25 HSA).

Table 2. Average number of fruit flies (tails) trapped for 1 – 25 DAP.

Attractant (A)	Media Dispensers		
	Wood beam	Cotton	Plastic
A1	31.23 **a**	80.64 **a**	16.45 **a**
	B	**A**	**C**
A2	32.87 **a**	44.03 **b**	7.24 **b**
	B	**A**	**C**
A3	1.99 **b**	12.99 **c**	0.00 **c**
	B	**A**	**C**
A4	2.27 **b**	7.89 **d**	0.00 **c**
	B	**A**	**C**

Information : Numbers followed by the same letter are not significantly different according to Duncan's test at the 5% significance level. Lowercase letters are read vertically (column) and capital letters are read horizontally (row)

From table 2 above, it can be seen that the highest number of fruit fly catches was in treatment A1, namely with a combination of cotton media with a total catch of 80.64 (heads). Meanwhile, the lowest number of catches was obtained on A1 with a combination of plastic media, namely 16.45 (head). In treatment A2, the highest number of fruit fly catches was obtained in the combination of cotton media with a total of 44.03 catches (heads). Meanwhile, the lowest number of catches was obtained at A2 with a combination of plastic media, namely 7.24 (head). In treatment A3, the highest number of fruit fly catches was obtained in the combination of cotton media with a total of 12.99 catches (heads). Meanwhile, the lowest number of catches was obtained at A2 with a combination of plastic media, namely 0 (tails). In treatment A4, the highest number of fruit fly catches was obtained in the combination of cotton media with a total of 7.89 catches (heads). Meanwhile, the lowest number of catches was obtained on A4 with a combination of plastic media, namely 0 (tail).

In table 2 it can also be seen from the wood block media that the largest catch was obtained in the combination with treatment A2, namely 32.87 (heads), which was significantly different from the combination of treatments A3 and A4 but not different from the combination of treatment A1 according to analysis of variance. On the cotton media, it can also be seen that the highest catch was obtained in the combination with treatment A1, namely 80.64 (tails), which was significantly different from the combinations A2, A3 and A4 according to analysis of variance. On plastic media it can also be seen that the highest number of fruit fly catches was obtained in the A1 treatment combination, namely 16.45 (heads), which was significantly different from the A2, A3 and A4 combinations according to analysis of variance.

In table 2 it can also be seen that the interaction between the attractant treatment and several dispenser media was significantly different in the number of fruit fly catches, where the best combination was obtained in treatment A1 with a combination of cotton media, namely 80.64 (heads) while the lowest number of catches was obtained in the combination A3, A4 with plastic media.

This is in accordance with the statement (Epsky, 1995). That the use of an attractant with the active ingredient methyl eugenol is an environmentally friendly control method and has been proven effective, because the substance methyl eugenol has a distinctive fragrant aroma which is volatile and is liked by fruit flies in particular. (Kardinan, 2007) said that methyl eugenol can influence the behavior of fruit fly insects, such as searching for food, laying eggs, sexual intercourse and so on and can even become kairomones or stimulate the fruit fly insect's sensory organs.

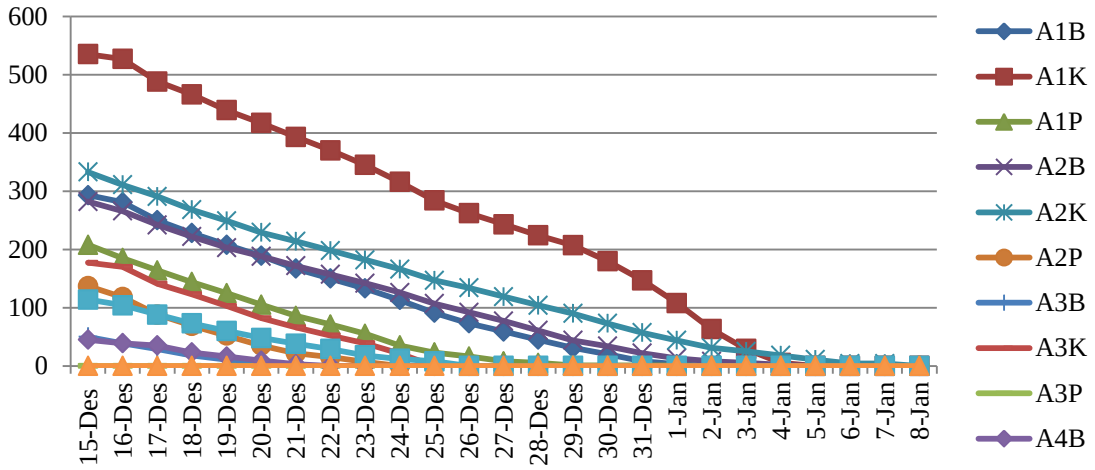

Figure 5. Trends in the effectiveness of several treatment combinations on the catchability of fruit fly pests from 1 – 28 DAP.

From the graph above, it can be seen that every day each treatment experienced a decrease in the catchability of fruit fly pests. Treatment A1 using cotton media had the highest catch every day, while treatment A2 using plastic media had the lowest catch every day.

4. Number of non-target insects trapped in bottles when testing the effectiveness of several types of attractants and several types of dispenser media

Based on research that has been carried out, the following is a summary of the number of non-target insects trapped in bottles in testing the effectiveness of several types of attractants and several types of dispenser media.

Table 4. Summary of the number of non-target insects trapped in bottles in testing the effectiveness of several types of attractants and several types of dispenser media

Date	Treatment	Test	Types of Insects	Number of Insects
1 HSA	A2B	1	*Coccinellidae*	2
2 HSAs	A2B	1	*Coccinellidae*	2
3 HSAs	A2B	2	*Onthopagus*	1
3 HSAs	A3K	2	*Coccinelidae*	3
4 HSAs	A2K	2	*Psyllidae*	4
1 HSA	A2K	3	*Coccinellidae*	2
1 HSA	A3K	3	*Onthophagus*	2
Total				18

From Table 4 above, it can be seen that the total number of non-target insects trapped was 18 species of insects from the Order, Coleoptera, Family, Coccinellidae, Species, Coccinellidae (which are predatory insects) . Order, coleoptera, Family, scarabaeidae, Species, Onthopagus (dung beetles). Order, Hemiptera, Family, Psylloidea, Psyllidae Species (fleas) .

Coccinellidae (predatory insects) or what are often called ladybirds are predatory insects that prey on pests such as aphids. Meanwhile, Psyllidae (fleas) are pests of guava plants.

This total is very small when compared to the target insect, namely fruit flies. This is because fruit flies are the main pests of guava plants. Apart from that, the treatment used is an ingredient that can attract fruit flies (methyl eugenol).

CLOSING

Conclusion

From the research that has been carried out, it can be concluded that:

1. From the first stage of research, the attractant that can attract fruit fly pests is a synthetic attractant with the active ingredient methyl eugenol 800 g/l and patchouli oil attractant at a dose of 0.25 ml /trap.
2. From the second stage of research, the treatment interaction that attracted the most fruit flies was the treatment of the synthetic attractant material methyl eugenol 800 g/l (A1) with cotton dispenser media (K).
3. Apart from the target insect Bactrocera spp, there are several types of non-target insects that are trapped, including Coccinellidae, Onthopagus, Psyllidar .
4. From the second stage of research, the most effective attractant in catching fruit flies was the synthetic attractant methyl eugenol 800 g/l (A1).
5. media dispenser in catching male and female fruit flies is the cotton media dispenser (K).

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