Application Lemongrass Extract (*Cymbopogon citratus* Dc) Against Mortality Death of Termites (*Macrotermes gilvus* Hagen) With Several Application Techniques

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ABSTRACT

Lemongrass is a plant that contains citronellal, geraniol, and other compounds which are known to increase termite mortality. This research aims to determine the most effective concentration of lemongrass extract on termite mortality using several application techniques. The method used in this research was a Factorial Completely Randomized Design (CRD), with 3 replications where: Treatment factor I used lemongrass extract application. This treatment consists of 10 combinations and in 1 treatment unit there are 30 termites (Macrotermes gilvus Hagen), so the total is 900 termites. The parameters observed were the percentage of termite mortality (%) and termite activity after application with 3 categories: 1=Alive actively moving; 2=Alive not actively moving; 3=Dead, so the data was analyzed using the Variety Print Analysis Method and Kruskal Wallis Analysis. Significant data analysis results will be followed by the Duncan Mean Range Test (DMRT) at α=5%. The results of the study showed that the application of lemongrass extract (*Cymbopogon citrates* DC) 100g/l of water was significant in reducing termite (*Macrotermes gilvus* Hagen) mortality by up to 95% on day 7. The effectiveness of the feeding technique was not significantly different from the spraying technique in reducing actual mortality to 85.44 %. The interaction between the application of lemongrass extract (*Cymbopogon citratus* DC) 100g/liter of water and the application technique did not significantly reduce the mortality of termites (Macrotermes gilvus Hagen).

Keywords: *Application Techniques, Lemongrass Extract, Mortality, Spraying, Termites*

1. INTRODUCTION

Plant coconut attacked palm oil termite be marked with exists hallway termites made from land . Termite tunnel the is on the surface leading rod goto on . Next , look leaf extinct withered and dry . This matter signify attack Already leads point growing . Attack This will continues until plant the died (Pahan, 2010). Termites included into the order *Isoptera* which is one type pest potential destroyer plant especially diarrhea plantation coconut palm oil , rubber and crops forest industry . (Subekti et al ., 2008). Attack termites (*Macrotermes gilvus* Hagen) on plants in the field is one of constraint main thing that is necessary handled . This pest can give rise to damage physique in a way directly on the plant and causes happen decline results , so give rise to loss quite economical big . This matter caused termite can attack roots and stems plant so that translocation of water and nutrients from land disturbed and finally plant die (Nandika *et al.,* 2003). Partly big termicide used For ignore attack termite destroyer (*termite control*) during This is very toxic (*high toxic*) and relatively not enough friendly environment (*Unbiodegradable and unenvironmental friendly*). This is encouraging For look for method control attack termite more destructive friendly environment (*Environmental friendly*). If a termicide is used Keep going For control termites , material the active is toxic the will accumulates in nature and is very dangerous continuity life humans and the environment (Prasetyo and Yusuf, 2005). This matter signify attack Already leads to period growing . Attack This will continues until plant died (Pahan, 2010). Macrotermes Termites Gilvus Hagen is difficult controlled Because often is at in the soil and on remains wood that becomes food , place hideaway as well as place its breeding . Percentage attack termites on plants coconut palm reached 10.8%, in plants rubber 7.4%, in plants sengon 7.46%. In Indonesia losses caused by termites each year recorded around Rp. 224 billion -Rp 238 billion (Prasetyo and Yusuf, 2005). Insecticide vegetable can used as an alternative control insect pest main Because fulfil desired criteria that is safe , cheap , easy applied farmers and effective kill pest as well as own profit easy created and originated from material easy natural / vegetable recyclable (*biodegradable*) so No pollute environmental and relative safe for humans and livestock , because the residue easy lost (Cardinan , 2000). Lemongrass included plants that contain oil essential . Oil citronella essential oil consists from *citral citronellal* , *geraniol* , *myrsena* , *nerol* , *farsenol* , *methylheptenone* , *dipentene* , *methyl eugenol ether* , *kadinen* , *kadinol* and *limonene* . Active ingredients containing substance poisonous is *geraniol* and *citronella* (Wijayakusuma , 2000). Feeding technique besides For control can also be done used For learn diversity termite land . Usage technique feeding if compared to with technique control other termites have superiority include : no pollute ground , target nature specific and easy taking sample (French, 1994) The process of utilizing lemongrass (*Cymbopogon citratus* DC) has not yet been implemented Lots known by the public in a way general , partial public only Make use of lemongrass only For spice Cook kitchen . Through case this , then done study with utilise lemongrass extract (*Cymbopogon citratus* DC) for produce termicide vegetable made from naturally which is of course very useful as friendly insecticide environment . Study This done For apply citronella extract and tofu effective concentration from lemongrass extract (*Cymbopogon citratus* DC) against level mortality termite soil (*Macrotermes gilvus* Hagen).

2. MATERIAL AND METHODS

Materials used in study This is termites (*Macrotermes gilvus* Hagen), lemongrass (*Cymbopogon citratus* DC), water, wood weathered and soil . Tools used is Hoe , scissors , jar plastic

diameter 10 cm, blender, scales , glass measure , bar stirrer , hand sprayer, tweezers , bucket, paper strain and cloth gauze . Research methods used in study This is Factorial Completely Randomized Design (CRD) , with replicated 3 times where : Treatment factor I with use Application lemongrass extract . Treatment This into 10 combinations and in 1 treatment unit there are 30 of them termites (*Macrotermes gilvus* Hagen), bringing the total to 900 individuals termite . Observed parameters is percentage mortality termites (%) and activity termite after application with 3 categories : 1= Active life moving , 2=Alive not active moving , 3=Off, so data is analyzed using the Analysis Method Kruskal Wallis Variety Printing and Analysis . The results of data analysis are significant will next with Duncan's Distance Test (DMRT) at α=5% (Gomez and Gomez. 2007). Observed parameters that is percentage mortality termites (%) per treatment . Observed parameters that is percentage mortality termites (%) and activity termite after observed application in three categories , namely : 1= Active life move ; 2= Not alive active move ; 3=Dead. Observation done every day for 30 days observation . **Implementation Study** : Weighed as much as 100g, 200g. 300g and 400g lemongrass. Lemongrass is dried Then cut small small Then blended and added a little water until become fine . After all become smooth , on every treatment Add 1 liter of water and stir until late . Then deposited during One night and filtered with cloth strain , then entered to in handsprayer and ready For applied . Termites and their nests taken from field Then entered into a plastic bucket . Then entered termite as many as 30 in the jar containing glass powder wood , nest termites , soil and wood weathered Then closed with cloth gauze . Termites used is termite from caste worker . Application with use feeding used powder soaked wood with lemongrass extract for 24 hours later air-dried for moisture awake . For application spraying done with squirt in a way direct to body insect .

3. RESULTS AND DISCUSSION

The results of termite mortality observations can be seen in Table 1. Data collection was carried out at 1 DSA to 7 DSA. Observation results for 1 HSA - 7 HSA in Table 1. can be seen that percentage mortality termites (*Macrotermes gilvus* Hagen) highest found in 7 HSA namely has reach amounted to 100.00% in treatment T3 and the lowest in treatment dick that is of 5.00%. Analysis results fingerprint variety in Table 1. can obtained that percentage mortality with influence giving concentration lemongrass extract on observation 1 DSA – 7 DSA gave influence real to Termite mortality (*Macrotermes gilvus* Hagen). Concentration 100g/l water shows effective in push mortality termites on observation to the 7 HSAs viz by 95%. This matter shows that lemongrass contains compound chemicals containing geraniol that function as poison strong cells (insecticide) . This matter different with results research presented by Rahutami (2017) stated that treatment extract citronella leaves (*Cymbopogon nardus* L) show no results different real to all tested dose than 1 hour after application until 3 hours after the application being viewed of mortality parameters termite . From the results analysis fingerprint variety can obtained that percentage mortality with influence technique application lemongrass extract on observation 1 DSA – 7 DSA gave influence No real to mortality termites (*Macrotermes gilvus* Hagen). In Table 1. shows that application lemongrass extract with technique feeding its effectiveness No different real with technique spraying in push mortality real up to 84.89%. This matter different with results research presented by Anugrah (2022) stated that method spraying more effective to mortality termite namely in the 3 HSA observations it was 69.69%. Observation result mortality termites (

Macrotermes gilvus Hagen) can seen in Appendix 18-24. Data collection was carried out at 1 HSA to 7 HSA. Mortality rate termite from each treatment can seen in Table 2.

Table 1. Summary of Average Percentage of Termite Mortality .

Application Lemongrass Extract (A)	Day to Day Average						
	1	2	*3*	4	*5*	6	7
A0	5.00b	9.44c	14.44c	26.67d	35.56b	35.56b	36.11b
A1	23.89a	53.89b	67.78b	77.22c	86.67a	86.67a	95.00a
A2	32.78a	61.67b	73.89b	78.33bc	86.67a	86.67a	96.67a
A3	30.56a	64.44b	80.56ab	93.33a	98.89a	98.89a	100.00a
A4	38.33a	76.67a	92.22a	98.33a	99.44a	99.44a	99.44a
Average	26.11a	53.22	65.78	74.78	81.44	81.44	85.44
Significance	*	*	*	*	*	*	*
T1	24.44a	52.22a	64.67a	73.78a	81.11a	84.22a	86.00a
T2	27.78a	54.22a	66.89a	75.78a	81.78a	83.78a	84.89a
Average	29.17	59.08	72.39	80.67	85.94	69.78	88.94
Significance	Mr	Mr	Mr	Mr	Mr	Mr	Mr
A 0T1	5.56a	10.00	16.67a	30.00a	38.89a	38.89a	38.89a
A0T2	4.44a	8.89	12.22a	23.33a	32.22a	33.33a	33.33a
A1T1	25.56a	53.33	64.44a	74.44a	83.33a	88.89a	93.33a
A1T2	22.22a	54.44	71.11a	80.00a	90.00a	92.22a	96.67a
A2T1	25.56a	55.56	67.78a	71.11a	85.56a	94.44a	98.89a
A2T2	40.00a	67.78	80.00a	85.56a	87.78a	93.33a	94.44a
A3T1	25.56a	62.22	80.00a	94.44a	98.89a	100.00a	100.00a
A3T2	35.56a	66.67	81.11a	92.22a	98.89a	100.00a	100.00a
A4T1	40.00a	80.00	94.44a	98.89a	98.89a	98.89a	98.89a
A4T2	36.67a	73.33	90.00a	97.78a	100.00a	100.00a	100.00a
Average	35.56a	70.00	85.11a	93.78a	96.89	98.44	98.67
Significance	Mr	**	Mr	Mr	Mr	Mr	Mr

Description : Same letters on one the same column No real according to Duncan's Distance Test with α= 5%

From the results Kruskal Wallis analysis in Table 2. can obtained that percentage mortality with influence application lemongrass extract on observation 1 DSA – 3 DSA gave influence No real and on observation 4 HSA – 7 HSA gives influence real to mortality termites (*Macrotermes gilvus* Hagen). Table 2 shows that activity termites on the day First after application

Already fall into category 3 , namely died in treatment A3. On the day second and third after application fall into category 3 , namely died in treatment A2. Meanwhile on the day to 4 HSA – 7 HSA already enter category 3 viz died in treatment A1.

Table 2 . Summary of Termite Activity After Application

Application Lemongrass Extract (A)	Day to Day Average						
	1	2	3	4	5	6	7
A0	1	1	1	1	1	1	1
A1	1	2	3	3	3	3	3
A 2	2	2	3	3	3	3	3
A3	1	3	3	3	3	3	3
A4	1	3	3	3	3	3	3
Average	1	2	3	3	3	3	3
Significance	Mr	Mr	Mr	*	*	*	*
T1	1	2	3	3	3	3	3
T2	1	2	3	3	3	3	3
Average	1	2	3	3	3	3	3
Significance	Mr	Mr	Mr	Mr	Mr	Mr	Mr
A0T1	1	1	1	1	1	1	1
A0T2	1	1	1	1	1	1	1
A1T1	1	2	3	3	3	3	3
A1T2	1	2	3	3	3	3	3
A2T1	2	2	3	3	3	3	3
A2T2	2	3	3	3	3	3	3
A3T1	1	3	3	3	3	3	3
A3T2	1	3	3	3	3	3	3
A4T1	1	3	3	3	3	3	3
A4T2	1	3	3	3	3	3	3
Average	1	3	3	3	3	3	3
Significance	Mr	Mr	Mr	Mr	*	*	*

Description : Same letters on one the same column No real according to Duncan's Distance Test with α= 5%

From Table 2, the results of the Kruskal Wallis analysis can be obtained obtained that activity termite with influence technique spraying on observations 1 DSA – 7 DSA gives influence No real to mortality termites (*Macrotermes gilvus* Hagen). On the day to seven after application to engineering

spraying has enter category 3 viz dead while on technique feeding enter category 2 viz life No active move . From the results Kruskal Wallis analysis in Table 2. can obtained that interaction between technique spraying with technique feeding on observations 1 DSA – 4 DSA gave influence No real and on observation 5 HSA – 7 HSA gives influence No real to activity termites (*Macrotermes gilvus* Hagen). At stage beginning termite will do adjustment with environment life given . At stage This activity Eat termite low . Termites are capable survive and adapt self will do orientation food , while not capable adapt self will dead . Stage next termite try

tasting food given (orientation food) with road bite part surface wood . When part the No suitable , termite will switch to part other until Finally termite find appropriate and fulfilling parts condition as food . If food That appropriate , termites will continue eat , on the other hand when food That No fulfil condition termite will leave food provided and choose fasting . In a state of This condition termite will weak and gradual dead or Sick . In Table 3. dual caste average day to five after application lemongrass extract (*Cymbopogon citratus* DC) 100 gr/l water transmittance in push mortality termites (*Macrotermes gilvus* Hagen) up to 99.44%.

Table 3 . Average termite mortality on day 7

Application Lemongrass Extract (A)	Application Technique (T)		Average
	T1	T2	
A0	38.89	33.33	36.11
A1	93.33	96.67	95.00
A2	98.89	94.44	96.67
A3	100.00	100.00	100.00
A4	98.89	100.00	99.44
Average	86.00	84.89	85.44

Table 4. Average termite activity on day 7

Application Lemongrass Extract (A)	Application Technique (T)		Average
	T1	T2	
A0	1.00	1.00	1.00
A1	3.00	3.00	3.00
A2	3.00	3.00	3.00
A3	3.00	3.00	3.00
A4	3.00	3.00	3.00
Average	2.60	2.60	2.60

4. CONCLUSION

Application lemongrass extract (*Cymbopogon citrates* DC) 100g/l water significant in push mortality termites (*Macrotermes gilvus* Hagen) up to 95% on day 7th . Feeding technique its effectiveness No different real with technique spraying in push mortality real up to 85.44%. Interaction application lemongrass extract (*Cymbopogon citratus* DC) 100g/liter of water with technique

application No significant push mortality termites (*Macrotermes gilvus* Hagen).

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