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Abstract. The staple food of the Indonesian population is rice, the need for rice continues to increase following the increase in population, and one of the obstacles to increasing production is crop failure caused by rice leaf blight. Leaf blight is one of the important diseases which causes almost 70% yield loss. The purpose of this study was to determine the effect of the concentration and interval of application of tobacco leaf biopesticide on the development of leaf blight in Ciherang rice variety. This study was designed using a factorial complete randomized design, the first factor was the concentration of tobacco leaf biopesticide which consisted of 4 levels, namely 0 ml/l, 1 ml/l, 2 ml/l, and 3 ml/l. the second factor is the Giving Interval which consists of 3 levels. i. e. every 5 days, 10 days, and 15 days. Parameters of the development of rice bacterial leaf blight (BLB) that were observed were the number of grains per plant, percentage of attack and intensity of attack by leaf blight. The results showed that the highest number of grains per plant, the lowest attack percentage, and the lowest attack intensity were in the B3P1.

1. Introduction

The staple and main income of the Indonesian people come from agriculture, especially from rice commodities. Based on BPS data, the standard area of rice fields in Indonesia from 2021 to 2022 has increased from 10.41 million ha to 10.61 million ha, with a production of 54.42 million tons of GKG to 55.67 million tonnes of GKG with consumption in 2021 of 31.36 million tonnes in 2022 rising to 32.07 million tonnes, Indonesia's rice imports have increased from 2000 to 2021 of 407,741.4 tonnes [1].

Rice of the Ciherang variety is a superior variety, which is irrigated lowland rice, released in 2000, has a production range of 5-8 tons/ha, higher grain weight, and fluffier taste so that it is preferred by consumers, resistant to pests, and diseases [2], tolerant to floods and grown by more than 45% of farmers in Indonesia [3].

Rice is very susceptible to pathogens and affects the quality and quantity of yields, among several diseases that greatly impair rice yields [4] is bacterial leaf blight (BLB) caused by *Xanthomonas oryzae* pv. *oryzae* strains III and IV are the most important rice diseases in the world [5], another term for crackle disease in rice [4], seed dispersal, fast spread, broad spectrum causing huge losses reaching around 30 - 70%, crop failure or loss [6] symptoms that cause grain rot [7], gray to white lesions along the leaf veins or vascular disease, vascular infection [4] through seeds, natural holes in plants, wounds develop in xylem vessels [8]. The population is difficult to control, has many pathotypes, and is dynamic so that it damages plant resistance [9].

Control of BLB is carried out at the beginning of growth before the formation of tillers, stopping it will result in a decrease in production, efforts to control organic farming are environmentally friendly

by utilizing plants that have the potential as antipathogens [10]. Some plant species have toxic properties, can control plant pathogens, are easy to decompose and are safe for a long time, however, it takes longer to kill pathogens than using chemicals [11]. Types of plants that can be used as vegetable pesticides include lemongrass, soursop, tobacco, and so on, these plants have bioactive compounds that act as repellents, deterrents and attracting pests and diseases [12]. Several researchers tested tobacco leaf biopesticide for controlling plant pests *Heliothis virescens* [13] *Myzus persicae*. Sulz [14], *Hypothenemus hampei* [15]. Tests for BLB on the Ciherang rice variety have never been carried out. The purpose of this study was to determine the effect of the concentration and interval of application of tobacco leaf biopesticide on the development of leaf blight in Ciherang rice variety.

2. Material and methods

The study was conducted from May to September 2020. The experiment in Kwangsang village. Jumapolo, Karanganyar, Central of Java. Laboratory analysis was carried out at the Plant Agroteknology Laboratory, Faculty of Agriculture, Universitas Tunas Pembangunan Surakarta (UTP).

The tobacco leaf biopesticide used Sentosa method [16], produced from research group between Universitas Indonesia and PT. Zekindo, The Rice Seed (*Oryza sativa*) used in the Ciherang variety by the Food Crop Seed Certification Supervision Agency. The Ciherang variety rice seeds were soaked for 12 hours then drained then waited for 2 days until shoots appeared, after 14 days after planting then the seeds were sown. A week before planting, tillage is carried out, consisting of two stages, namely turning the soil over and leveling the land [17].

This study was designed using a factorial complete randomized design, the first factor was the concentration of tobacco leaf biopesticide (B) which consisted of 4 levels, namely 0 ml/l, 1 ml/l, 2 ml/l, and 3 ml/l. the second factor is the giving Interval (P) which consists of 3 levels. i. e. every 5 days, 10 days, and 15 days. Data were analyzed using analysis of variance (ANOVA) and if they were significantly different, they were further tested with DMRT with a 95% confidence level [18].

3. Result and discussion

Observations of the effect of the average concentration and interval application of tobacco leaf biopesticide on Ciherang variety rice were analyzed by Duncan multiple range test (DMRT) at 5% level presented in Table 1.

Table 1 on the observation of the number of grains of rice per plant showed a significant difference between B0 and B1, B2, B3, the highest number of grains per plant in the B3 treatment was significantly different from B0, B1 and B2. the concentration of tobacco leaf biopesticide affects the number of grains per plant, info for help [17] tobacco leaf biopesticide contains 33.08% nicotine. Nicotine is produced from tobacco roots as a secondary metabolite which is excreted through root exudation in the rhizosphere area thereby increasing the uptake of nitrogen, phosphorus, potassium [19] zinc, and iron [20]. In addition to the levels of these elements, tobacco plants also produce gibberellin hormones found in rice plants. Gibberellin plays a role in synthesizing the enzyme a-amylase which stimulates starch hydrolysis and increases cell elongation which in turn affects the number of grains per plant [21].

Observation of tillers per clump did not differ significantly between treatments indicating that the concentration of tobacco leaf biopesticide had not had an effect, possibly the microclimate that caused it was not significantly different [22], research on the concentration of tobacco leaf biopesticide still needs to be continued to obtain more tangible results.

Table 1. The effect of the concentration of tobacco leaf biopesticides on the number of grains per plant, tillers per clump, attack percentage, and attack intensity.

Treatment	Parameters			
	Number of grains per plant (grain)	Tillers per clump (stem)	Attack percentage (%)	Attack intencity (%)
Concentration of biopesticide				
B0	627.04 [a]	11.16	16.53 [b]	16.88 [b]
B1	780.92 [b]	10.63	10.36 [a]	10.31 [a]
B2	888.02 [b]	11.01	9.08 [a]	9.01 [a]
B3	976.44 [d]	10.66	7.66 [a]	8.31 [a]

Note: Numbers followed by the same letter show no significant difference in the Duncan multiple range test (DMRT) 5% level.
Description: B0= tobacco leaf biopesticide 0 ml /L, M1= tobacco leaf biopesticide1ml /L, M2= tobacco leaf biopesticide2 ml /L, M3= tobacco leaf biopesticide3 ml /L.

The percentage and intensity of BLB attacks (table 1) showed that B0 was significantly different from B1, B2, and B3. The highest attack without tobacco leaf biopesticides (B0). Increasing the concentration of tobacco leaf biopesticides reduced the percentage of BLB attacks. Tobacco leaf biopesticide contains methanol compounds which act as antibacterial [23]. It is supported by the research of [24] which states that methanol content with a concentration of 25 mg/ml acts as an antimicrobial against 6 tested bacterial isolates.

Table 2. The effect of interval of tobacco leaf biopesticide on the number of grains per plant, tiller per clump, attack percentage, and attack intensity.

Treatment	Parameters			
	Number of rice grains per plant (grain)	Tillers per clump (stem)	Attack percentage (%)	Attack intensity (%)
Interval of tobacco leaf biopesticide				
P1	889.68 [b]	11.00	11.36 [b]	10.47 [a]
P2	799.41 [b]	10.53	10.97 [a]	11.27 [b]
P3	765.23 [a]	11.06	11.36 [b]	11.73 [b]

Note: Numbers followed by the same letter show no significant difference in the Duncan multiple range test (DMRT) 5% level.
Description: P1= every5 days, P2= every10 days, P3= every15 days.

Table 2 shows that the intervals for administering tobacco leaf biopesticides P1 and P2 were significantly different from P3. At intervals of 15 days the number of grains decreased because the gibberellin hormone produced by tobacco leaf biopesticides was not sufficient for its needs so longer intervals reduced the number of grains while observing tillers per clump at intervals did not give a significant effect.

Observation of attack percentage and intensity of BLB attack on Ciherang variety showed a significant difference 5 days interval (P1) was lower than P2 and P3. This is because the content of methanol and phenolic compounds is sufficient to suppress the development of BLB [25].

Table 3. The effect interaction of the concentration and interval of tobacco leaf biopesticides on the number of grains per plant, tillers per clump, attack percentage, and attack intensity.

Treatment	Parameters			
	Number of grains per plant (grain)	Tillers per clump (stem)	Attack percentage (%)	Attack intencity (%)
Interaction of the concentration and interval of tobacco leaf biopesticides				
B0P1	647.27[a]	10.63	17.17[i]	17.07[e]
B1P1	911.37[cd]	11.30	9.50[def]	9.47[bc]
B2P1	994.50[de]	11.20	8.30[bc]	8.40[b]
B3P1	1,005.60[e]	10.87	6.60[a]	6.93[a]
B0P2	591.73[a]	10.87	16.80[i]	17.07[e]
B1P2	767.23[bc]	10.97	10.30[fg]	10.23[cd]
B2P2	852.60[bc]	9.93	9.07[cde]	9.40[bc]
B3P2	986.07[de]	10.63	15.63[h]	8.40[b]
B0P3	642.13[a]	10.60	11.27[g]	16.50 e
B1P3	664.17[a]	11.87	11.27[h]	11.23[d]
B2P3	816.97[b]	10.67	9.87[ef]	10.13[cd]
B3P3	937.67[cde]	11.20	8.67[bcd]	9.08[bc]

Note: Numbers followed by the same letter show no significant difference in the Duncan multiple range test (DMRT) 5% level.
Description: B0= tobacco leaf biopesticide0 ml /L, B1= tobacco leaf biopesticide1ml /L, B2= tobacco leaf biopesticide2 ml /L, B3= tobacco leaf biopesticide3 ml /L. P1= every5 days, P2= every10 days, P3= every15 days.

Table 3 shows that the highest number of seeds planted was in the B3P1 treatment, the highest tillers per clump were B1P3, while the lowest attack percentage and attack intensity were B3P1. Tobacco leaf biopesticides stimulate the formation of gibberellin which plays a role in the process of plant photosynthesis and then facilitates rapid cell division [26]. Increasing the concentration and increasing the time interval every 15 days of tobacco leaf biopesticides were not significantly different, the best conditions were achieved at high concentrations and intervals every 5 days were able to reduce the percentage and intensity of attacks.

Tobacco leaf biopesticide has antimicrobial activity as an antibacterial [20,27] antifungal [20,25]. The highest biopesticide content in tobacco leaves is nicotine and several N-containing compounds or groups such as 3-(1-methyl-2-pyrrolidinyl)-pyridine which play a role in increasing nutrient absorption in vanilla [19] and corn plants [20]. Nitrogen for plants is an important component of protein, chlorophyll and genetic material so that it has a direct effect on growth, reproduction and inhibits the formation of pathogenic chitin *Fusarium oxysporum* f.sp vanilla [20].

4. Conclusion

Based on the results of data analysis using the Anova test and Duncan's 5% follow-up test, the effect of the concentration and interval of tobacco leaf biopesticide on the Ciherang rice variety had no significant effect on tillers per clumps but had a significant effect on the number of grains per plant, the percentage of BLB attacks and the intensity of BLB attacks. The treatment that showed the highest number of grains (1,005.60 grains, the lowest percentage of attack was 8.60%, and the lowest intensity of attack was 6.93% in the combination treatment of 3ml/l of tobacco leaf biopesticide concentration and spraying interval every 5 days (B3P1).

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