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RESISTANCE OF SOME RICE VARIETIES AGAINST RICE SEED BUG (*LEPTOCORISAACUTA*)

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Abstract

Rice is an important cereal crops in Indonesia. Rice seed bug was reported as a major pest that caused of empty grains and may potentially cause yield loss. This research was aimed to determine the resistance of some rice varieties against rice seed bug attack. Sampling was carried out on rice crops in the areas of Luwu District, South Sulawesi. Sampling was done by purposive method that based on specific criteria of sample. Rice seed bugs were taken directly by weep-net method. Four of the rice varieties , i.e. Inpari 8, Inpari 4, Cibogo, and Cigeulis were used as seed-test. The attack intensity test of the rice seed bug based on in-vivo test. Seven of the rice seed bugs were inoculated per clump at the end of vegetative phase. The observation parameters included attack intensity, number of grains per panicle, and number of tillers per clump. This research was prepared by using a randomized block design that consists of 4 treatments and 3 replications. The treatments were T1= 7 insects per clumps of Inpari 4; T2= 7 insects per clump of Inpari 8; T3= 7 insects per clumps of Cibogo; dan T4= 7 insects per clumps of Cigeulis. The data were analyzed statistically continued by Tukey Test (LSD 5%). The results showed rice varities of Cigeulis has a higher resistance and lowest intensity than others, i.e. 45%. Cigeulis showed the quantity and quality of rice that was the most higher than others.
Keywords: *pest, rice seed bug, resistant variety*

Background

Rice is an important cereal crop that is used as a staple food in Indonesia. Rice production in Indonesia ranged between 75.4 million to 79.1 million tons with the harvested areas reached 579.4 thousand hectares (CBS Indonesia, 2016). Rice seed bug is one of the cause of the decreasing rice production in South Sulawesi that cause empty grains. Rice seed bug is the most important pest of rice plant that inoculated to rice grains on generative phase. These insects attacked the grains before the mature phase that caused empty grain, while the attacking on the mature phase caused necrotic on grain so the quality production is low.

Evrialianiand Moralita(2015) reported that rice seed bug decreased rice yield on average 40% and the high attack up to 100%. Sitompul*et al*. (2014) reported the rice seed bug population sof 5 per 9 clumps decreased rice yield 15%. The relationship between the density of rice seed bug population with decrease of rice yield showed that the attack of a rice seed bug per panicle on a week could decrease yield 27%. These insects were a pest that could decrease yield of rice so that the presence of these insects should be anticipated because it could yield loss. Therefore, several techniques were needed to increase rice yield, i.e. improve the cultivation techniques and using the resistant rice varieties to pests and disease.

The Resistant variety is one of the integrated pest management (IPM), which role in increasing rice production program. The resistant variety is also a major component in the control of pests and diseases that often inoculate the rice plant. However, cultivation

of rice plants using resistant varieties are sometimes inseparable from pests, one of them is rice seed bug. Several rice varieties that had been released by the government, i.e. Inpari 8, Inpari 4, Cibogodan, and Cigeulis. They were expected to improve the quality and increase the rice yield. Therefore, a study to determine resistance of some rice varieties against rice seed bug is needed.

Method

Sampling of Rice Seed Bug

Sampling was carried out on rice crops in the areas of Luwu District, South Sulawesi. Sampling was done by purposive method that based on specific criteria of sample. Rice seed bugs were taken directly by weep-net method on the day dan night.

Preparation of The Plant Indicators

Four of the rice varieties , i.e. Inpari 8, Inpari 4, Cibogo, and Cigeulis were used as seed-test. Rice seeds were soaked for 24 hours to stimulate germination. After germinating, the seeds were sown in separate crock of each variety. 14-day old seedlings were transferred to the bucket of the planting medium. Rice plants were covered by gauze that had air circulation so that insects keep survive and did not out of the cover.

Inoculation of Rice Seed Bug

The attack intensity test of the rice seed bug based on in-vivo test. Seven of the rice seed bugs were inoculated per clump at the end of vegetative phase.

Parameters of Observation

The observation parameters included attack intensity, number of grains per panicle, and number of tillers per clump. The calculation of the attack intensity was carried out by using the formula $I = [A / (A + B)] \times 100\%$; I, the attack intensity; A, the number of grain was attacked; and B, the number of grain was not attacked.

Design of Experiments and Data Analysis

This research was prepared by using a randomized block design that consists of 4 treatments and 3 replications. The treatments were T1= 7 insects per clumps of Inpari 4; T2= 7 insects per clumps of Inpari 8; T3= 7 insects per clumps of Cibogo; dan T4= 7 insects per clumps of Cigeulis. Data were analyzed statistically continued by Tukey Test (LSD 5%).

Results and Discussion

The attack intensity of rice seed bug on Inpari 8, Inpari 4, Cibogo, and Cigeulis respectively 67.66%, 76.00%, 59.66%, and 45.00% (figure 1). These values indicated that the resistance level of Cigeulis had the lowest than others with low intensity value 45%. The analysis of variance showed that the attack intensity value on Cigeulis 45% was significantly different from others that had an attack intensity value above 50%.

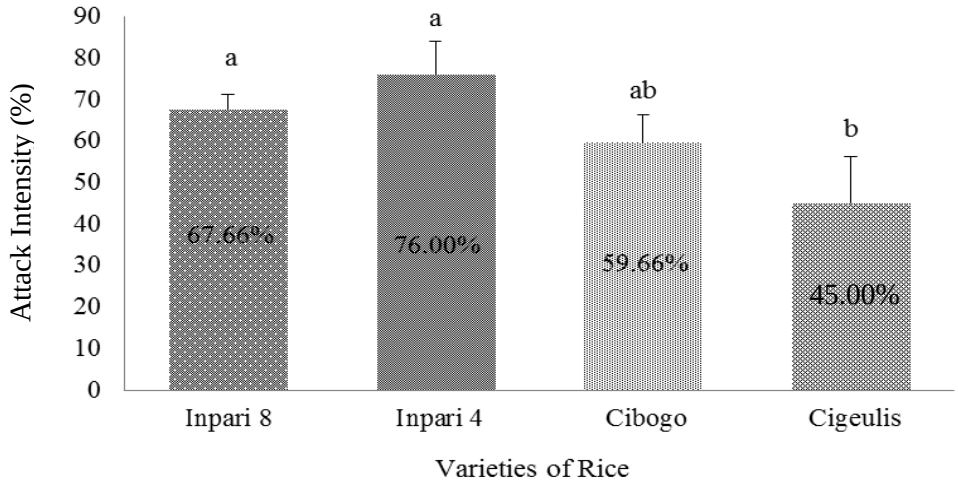

Figure 1. Attack intensity of rice seed bug on some rice varieties

The attack intensity of the Inpari 8, Inpari 4, and Cibogo were high that needed to significant management. Mustikawati and Asnawi (2011) reported rice seed bug attack at certain times decreased yield by 50%, and the 5 insects population per 9 clumps of rice would decrease rice yield 15%. The attack intensity of rice seed bug on the Cigeulis, i.e. 45.00% so the decrease of rice yields are still below 15%. It still needs to the preventive management due to the intensity approached the threshold of damage. The yield loss closely related to the intensity of rice seed bug on the grains per panicle. If the high attack intensity on the grain so the highrice yield loss.

Basically, the rice seed bug did not give a significant effect on the production and the number of tillers on each rice varieties on LSD 5%. The number of empty grains per panicle was highest on Cibogo and the lowest on Cigeulis respectively 4952.67 and 2319.33 (Table 1). This insect did not only cause empty grain, may also decrease grain quality by caused necrotic.Kalshoven (1981) explained this insect caused demage by sucking the grain on mature phase so that the grains suffered empty. This insect could not only lowering the rice yield but also caused to lower the rice quality, i.e. necrotic and empty on grains. Heavy attack caused decrease the production so it could not be harvested.

Table 1.Effect of rice seed bug attack against the rice plant

Treatments (Varieties)	The Parameters of Observation		
	Number of Empty Grains per Clump±Sd	Namber of Grains per Panicle±Sd	Number of Tillers per Clump±Sd
Inpari 8	4519.67±148.10	201.33±93.07	30.33±3.21
Inpari 4	4700.67±753.57	148.67±22.19	29.67±0.58
Cibogo	4952.67±1612.13	249.33±24.13	33.00±4.36
Cigeulis	2319.33±431.66	318.67±72.71	32.00±2.65

The Cigeulis was one of the adaptively variety in some agro-ecosystem that had been identified. However, farmers would prefer that its popular varieties in cultivation production center was dominated by only one or two varieties.In addition to increased yield potential, the increase of resistance multi-characters such as resistance to pests and diseases, drought, fall down, poisoning, and nutrient deficiency was also included as a

selection criterion and considered as requirements of the variety release (Suprihatno and Daradjat, 2008).

The world rice crop is attacked by more than 100 species of insects; 20 of them can cause economic damage and one of them is rice seed bug. The most important rice bugs in the subtropical and tropical rice areas belong to the genus *Leptocorisa*. Another genus, Stenocoris, which was previously a subgenus of Leptocorisa, also contains several species known to be present in ricefields, but their economic significance is not fully known. Rice bugs concentrate on smallscale upland ricefields that they can actively search out. They are also common in rainfed lowland rice environments. In irrigated rice, yield loss from rice bugs that feed on grains is normally minimal because their populations are diluted in vast areas of rice planted more or less at the same time. The rice bug populations in a ricefield are highly variable and damage occurs only during a short period of crop growth. The lowland rice crops of Asia are dominated by *Leptocorisaoratorius* (Fabricius) (Pathak and Khan, 1994).

Modification of any crop production practice ultimately affects yield through complex interactions with the crop and environment. All crop production practices affect insect pest populations either positively or negatively. A single practice such as plant spacing or time of planting or using resistant variety may produce opposite effects on different pest species. Often they counterbalance one another. The development of cultural control methods requires a thorough knowledge of the life history and habitats of the insect and its plant host. Farmers must decide which cultural practices are best for their location, such as direct seeding or transplanting seedlings in a wetland environment.Sumarno (1992) reported a variety classified as resistant if it has a optimal condition, i. e. 1) the plant can recover from pest attack in circumstances that may cause injury to other varieties that is not resistant; 2) the plant has genetic characteristics that can reduce the extent of damage caused by pests; 3)the plant has a set of characteristics that can be inherited to reduce the probability of pests to use this plant as a host; and 4)the plant produces more and better yield than the other varieties on the same level of pest population.

Conclusion

This research showed the rice variety of Cigeulis has a higher resistance and lowest intensity than others, i.e. 45%. The number of empty grains per panicle was highest on Cibogo and the lowest on Cigeulis respectively 4952.67 and 2319.33.The Cigeulis showed the quantity and quality of rice that was the most higher than others.

References

Central Bureau of Statistik. 2016. National Rice Production. Jakarta (ID): CBS Indonesia

Evrialiani&Moralita. 2015. Effect of Yam Seed Extract Against Rice Seed Bug (*Leptocorisaacuta*Thunb.) on Rice Plant. *Journal of Education Science Research*, 1 (2): 76-82.

Kalshoven, L.G.E. 1981. The Pest of Crops in Indonesia.Revised by: P.A. Van der Laan. Jakarta (ID): PT. IchtiarBaru.

Mustikawati, D.R., & R. Asnawi. 2011. The Attack of Rice Seed Bug and Blast Disease in Several Strain of Hybrid Rice From China in The Natar Garden Experimental, Lampung. Lampung (ID): BalaiPengkajianTeknologi Lampung.

Pathak, M. D. & Khan, Z. R. 1994. Insect PectsOf Rice. Manila (PH): International Rice Research Institute.

Sitompul, A.F., Oemry, S., &Pangestiningsih, Y. 2014. The Effectiveness of Botanical Insecticides Test to Mortality the *Leptocorisaacuta* Thunberg. (Hemiptera: Alydidae) on rice plant in Greenhouse.*Journal of the Agroecotechnology Online*. 2(3): 1075-1080.

Sumarno. 1992. Breeding for resistance of pests. Proceedings of the Symposium on Plant Breeding I. Indonesian Association of Plant Breeding.Commissariat of East Java