BROWN PLANTHOPPER SURVEILLANCE TECHNIQUE BETWEEN LIGHT TRAP AND MANUAL SAMPLING

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ABSTRACT

Surveillance methods by visual scoring was labor intensive and not illustrate the real condition on that place. Light trap sampling method is one of the very effective tools of insect pest management as it trapped a large number of specimens neutrally with a minimum of efforts. Brown planthopper (BPH), Nilaparvata lugens is one of the major insect pests species in rice plant that actively respond to the light during the night. However, light trap only trapped macropterous BPH (long wing) while on the rice plant was brachypterous BPH (short wing). These condition was challenging to monitor BPH population whether the sampling technique can illustrate the real condition. In that case, a study had been done in Seberang Perai from May 2017 until August 2017. Surveillance methods used are by using light trap and tapping board once a week. Tapping board sampling was done on the rice plant in the morning and the light on light trap was turned on the same day in late evening for four hours. On the next day, trapped insects were identified and counted in Entomology Laboratory. The results from this study has shown that positive significant correlation between light trap and tapping board sampling with value 0.33 at $p<0.01$. Although the value is low, it indicated that BPH population monitoring by using light trap (macropterous BPH) can illustrate BPH population in the rice plant (brachypterous BPH). In the meantime, one BPH in the rice plant was equal to 20.74 BPH in the light trap. With this information, extension agent or field supervisor can monitor and estimate BPH population before the control action was taken. It further reduced the loss of rice yield as well as operation costs.

Keywords: BPH, light trap, surveillance, rice plant.

INTRODUCTION

Brown planthopper (BPH), *Nilaparvata lugens* was an important rice pest worldwide likely to cause an outbreak. The symptom outbreak is called hopperburn which can lead to high yield loss to farmers (IRRI, 1979; Heong et. al., 2015). Population monitoring and surveillance technique for BPH usually done by using sweep net, airborne net-trap, pan trap, visual counting, aspirator as well as light trap (Grootaert et. al., 2010; IRRI, 1979). Light trap sampling method was one of the very effective tools of insect pest management as it trapped a large number of specimens neutrally with a minimum of efforts. The use of artificial light sources and operate automatically attracted the night-active insects for the study of taxonomy, population function and biodiversity (Altaf et. al., 2016; Grootaert et. al., 2010).

Surveillance activity in Malaysia by extension agents recorded the number of insects and their infestation symptoms by visual or eye scoring. Approximately 20 hectare per point sampling was not enough to illustrate the real condition in certain place (Department of Agriculture, 2016). This activity was very time consuming and labor intensive. The low accurate rate typically occur when the population number is too high and having extreme weather condition. The process from surveillance activity until result obtained often late and making farmers unable to carry out control activities effectively. Hence, light trap sampling method act as alternative or substitute in monitoring BPH population.

There is a challenge in monitoring BPH population in which light trap only trapped macropterous BPH (long wing) while on the rice plant was brachypterous BPH (short wing). Baehaki et. al., 2017 recorded abundance of BPH in the light trap had signaled high population in the rice plant. It indicated the relationship between the pests abundance that were caught in the light trap with pests outbreak in rice field. Therefore, the following study was conducted to ascertain effectiveness of light trap sampling technique against actual population of BPH on the rice plant along with their population development.

MATERIALS AND METHODS

The study had been done in Seberang Perai from May 2017 until August 2017. Surveillance methods used were by using light trap and tapping board once a week. Three light traps were set up at rice field area with a distance of 1 km. The light source was a 30 W normal electrical bulb with collecting tape and located at 100 cm above the ground (Altaf et. al., 2016). The transparent box with 1 mm hole around had been made and installed outside the bulb and collecting tape to minimize trapped large insects and more efficient collection of BPH samples.

Tapping board sampling was done by using a sticky plate (25 cm x 18 cm) inserted at the base of the rice plants, and BPH samples were obtained by shaking the plants (IRRI, 1979; Ooi, 1982). The sampling point were set at 30 m, 60 m, 90 m, 120 m and 150 m from light trap station to determine the distance that describes the sample correlation. These manual sampling was done in the morning and the light on light trap was turned on the same day in late evening for four hours. On the next day, trapped insects were identified and counted manually in Entomology Laboratory. The data where then analyzed by using SAS 9.4 for ascertaining the correlation between BPH samples from light trap and manual sampling.

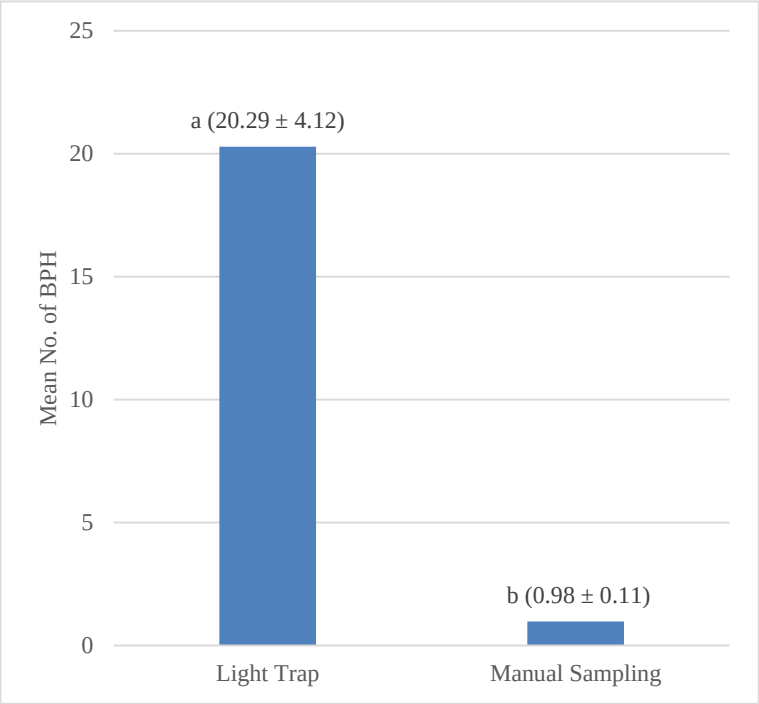
RESULTS AND DISCUSSION

Pests and natural enemies species that were caught in the light trap and manual sampling during study period varied among each other and the total number for individual BPH was 2, 235. The density and composition of the BPH was fluctuated over sampling collection influenced by rice crop stage and BPH generation pattern. Light trap samples caught macropterous BPH (long wing) while manual samples caught brachypterous BPH (short wing).

Dispersing macropterous adults into the field was soon after rice planting and evolve new generation as brachypterous BPH in the rice crop. The second generation as brachypterous form apparently are very fecund and increase population number. Near the time of crop maturity, macropterous adults again dominate and disperse from the field (IRRI, 1979; Heong et. al., 2015). The same development pattern have been recorded with three generation were seen along study period and no hopperburn symptom had been recorded.

Analysis results from this study had shown that positive significant correlation between mean number of individual BPH on light trap and manual sampling with value 0.33 at $p<0.01$. If the individual number of BPH on light trap increase, the number of BPH on rice crop also increase. A larger number of macropterous adults BPH caught by light traps reflect the growth of BPH in rice crop. Thus it indicates the relationship to the pest outbreak in rice field (Baehaki et. al., 2017; Hu et. al., 2014).

Figure 1: Comparison mean number of BPH between light trap and manual sampling with standard error.



Another findings was found that BPH samples from light trap was 20.74 times larger than manual sampling and significantly difference at $p<0.01$ (Figure 1). Farmers or extension agent can assume if BPH sample from light trap was 207, the individual BPH number on rice crop was 10. Besides helping in sampling activity, light trap sampling method can estimate BPH population on rice crop.

Table 1: Correlation between mean number of BPH on light trap and manual sampling with different distance from light trap.

	Manual Sampling				
	30m	**60m**	**90m**	**120m**	**150m**
Light Trap	-0.186	0.264	0.402*	0.203	0.324

* Correlation is significant at the 0.05 level.

In addition, positive significant correlation had been seen at 90 meter distance of manual sampling from light trap with the number of BPH on light trap (Table 1). It is suggested to do manual sampling for Brachypterous BPH in the rice crop at 90 meter distance from light trap. The samples can illustrates the collected samples of macropterous BPH on the light trap.

The conclusion from this study indicates that BPH population monitoring by using light trap (macropterous BPH) can illustrate BPH population in the rice plant (brachypterous BPH). However, the weather condition and planting season could influence BPH migration and population development. Thus, manual sampling should be done, up to 90 meter distance from light trap station to confirm the real population in rice crop.

This study also would help extension agent or field supervisor to monitor and estimate BPH population before the control action was taken. The use of high labor force with current activity can be shift to other maintenance rice field activity. The result also can be made immediately and further control action being more efficiently. At the end, the loss of rice yield can be reduced and increase farmers income.

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