Conference Paper

# Performance Analysis of Locally Fabricated Electronic Electronic Rice Stink Bug (*Leptocorisa Oratoriu. Fabricius*) Control Device

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## Abstract

The study analysed the performance of a locally fabricated electronic pester that basically intended to control the massive presence of rice stink bugs that destroys the performance of the development of rice grains by attracting and electrocuting the pest. The physical experimental method of the study was performed in the actual area of rice field at Narra, Palawan, Philippines. The experimental observation was conducted during the daytime from 8AM to 5AM which determines the effective height and distance of the device in controlling the rice stink bugs and the correlation of trapping the bugs using this locally fabricated electronic pester to the weather conditions. The result showed that there is no significant relationship between the established distance for capturing stink bugs at 2m, 3m, 4m and 5m distance separation, but it has a moderate correlation between the numbers of attracted stink bugs to the atmospheric temperature and negligible correlation to humidity. The height at ground level and 0.152 m. (0.5 ft) below the rice height attracted more stink bugs. At the different height of observation the attracted rice stink bugs has a moderate correlation to humidity, and it has no correlation to the atmospheric temperature. Thus, the result implies that the attracted stink bugs were not affected by the temperature at different height location of the device. The device was concluded as efficient which its 12VDC supply electronically step-up to electrocute the pest and recommended to consider having bigger size of attractant agent for possible more effective purpose.

**Keywords:** Control device, rice stink bug, electronic

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Received: 23 April 2018
Accepted: 8 May 2018
Published: 4 June 2018

Publishing services provided by Knowledge E



Selection and Peer-review under the responsibility of the IRCHE 2017 Conference Committee.



## 1. Introduction

Being a Filipino and Asian people, RICE is common and become a synonym of FOOD. Rice is the staple food for most of the people worldwide. It is also the primary source of income and employment for more than 100 million households in Asia and Africa [1].

Rice is also the most important food grain in most tropical areas in the world and produced all in Asia by nearly 90% with a total production of 696 million tons in 2010 [2]. Since, rice is eaten by nearly half of the world's population, the continuous production and researches in rice in different aspects is still in priority.

The importance of rice production is negatively affected by the decreasing land availability due to the increasing population and increased demand for food, establishment of infrastructure, devastation of insect pests and unhealthy rice products as it is may be cultivated with an intensified application of synthetic pesticides.

The intensified application of synthetic pesticides could also be a misperception of the farmers. It may damage the growth of plant and degrade the quality of rice grains which mostly estimated as damages caused by the insect pests. The toxic contamination in rice grains may be a threat to the human health caused by the unmanaged and excessive amount of poisonous chemicals applied.

The harmful effect of synthetic pesticides to the human health is the basis of introducing the locally fabricated electronic rice pest control device. The device was tested to determine its circuit performance and its effect as a trapping mechanism against the rice stink bugs.

## 2. Objectives of the Study

The general objective of the study is to fabricate locally a control device intended for the insect pests of rice attracted by the odor. The study specifically objects to determine the performance of the device in terms of attracting and trapping the pests. It is to determine the effective distance separation of the device as well as the effective height to trapped rice stink bugs and determine the relation of temperature and humidity to the presence of rice stink bugs.

## 3. Materials and Methods

Locally available materials were used to fabricate the rice pest control device. Electronic circuit was designed supplied by a 12VDC battery that steps up the input voltage to electrocute the attracted rice stink bugs.

Eight devices were fabricated for the testing and experimental observation. The first four was used to observe the quantity of pest trapped at different height and another four devices were used to observe the performance at different distances.

The reference of height level was the height of the standing rice crop. The observation was performed during the milking of the flowering stage of the crop. Each trial of all four different heights was performed per day.

While distance of separation between devices are the distances 2 meters, to 3, 4 and 5 meters. All distance separation was observed at height equal to the crop height. Each distance separation of the device was tested and observed per day. The four (4) devices were the samples of each distance separation. The four samples for data were observed at the same day. The same procedure was performed for the 3-meter, 4-meter and 5-meter distance separation

Data were observed from 8:00 AM to 5:00 PM for the four (4) consecutive days. Each day was treated as 1 trial. All data of temperature and humidity are taken from the PAGASA. Temperature and humidity are only for the day which data on rice stink bug observation was performed.

The statistical analysis was used to determine the significance of distance separation between devices, the height of the device and the effect of temperature and humidity to attract and trap the rice stink bug.

Observation was performed at the rice field regardless how often is the synthetic pesticides is applied in the area.

## 4. Results and Discussion

The data of the observed trapped rice stink bugs were use to determine the most effective distance separation of the device and most effective height location of the device. The height level was above, below or at the same level of rice crop. The height of the crop is the reference level.

Figure 1 below represents the number of rice stink bugs collected for the four (4) trials which is four (4) days observation. The heights of the four trials observed at 0.50 feet above and below the rice crop height and at the same height and at ground level.

Figure 1 further show that the number of attracted rice stink bugs increases as the height of the device becomes closer to the ground level.

At different height level of the experiment, the total trapped rice stink bugs was correlated statistically to the humidity and temperature in each day for the four day observations.

Table 1 above shows the result of the weather correlation of attracted and trapped rice stink bugs at different heights.

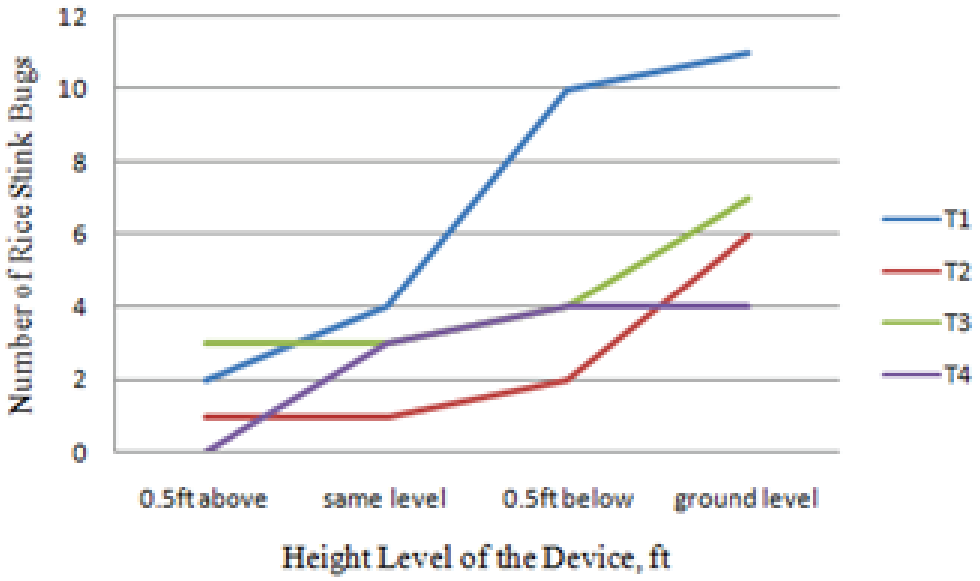


**Figure** 1: Trapped rice stink bugs at different height.

The Table 1 also implies that at different height of observation, the humidity has a moderately correlation to the presence of the rice stink bugs but has negligible correlation to the temperature.

Table 1: Weather Correlation of Attracted Rice Stink Bugs at Different Heights.

| Parameter | Descriptive Rating | Correlation |
|---|---|---|
| Humidity | 0.519 | Moderately |
| Temperature | 0.251 | Negligible |

Each distance separation was allotted for one (1) day of observation. The four (4) devices I each day is representing as a sample of data. The experiment has three (3) samples per distance separation per day.

As shown in Figure 2 below, the figure is interpreted that the rice stink bug control device collected much numbers of bugs at 2 meter and 5 meters separation compare to the 3 meters and 4 meters distances. The Figure 2 also implies that the rice stink bug control device is more effective at a distance nearer to each other or become more farther to each other.

The total number of trapped rice stink bugs per day or per distance separation of device was evaluated for its correlation to the ability of the device to attract and trap the pest in terms of weather condition. The evaluation of its correlation is as affected by the distance of separation.

As shown in table 2 below, the humidity has a negligible correlation to presence of rice stink bug but has moderately correlation to temperature considering the distance separation of device at the same height of device equal to the height of the rice crop.

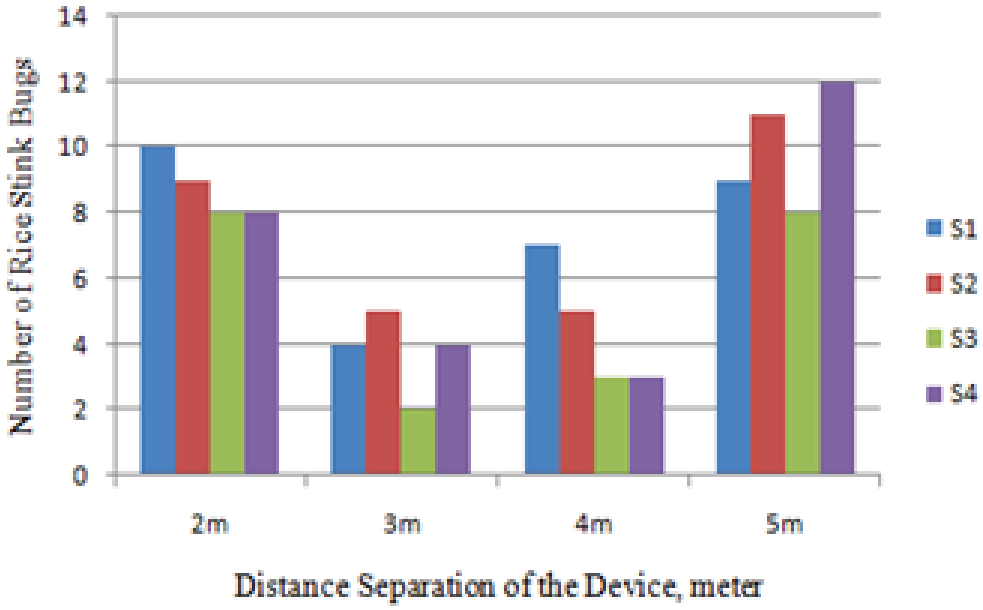


**Figure** 2: Trapped rice stink bugs at different distance.

Table 2: Weather Correlation of Attracted Rice Stink Bugs at Different Heights.

| Parameter | Descriptive Rating | Correlation |
|---|---|---|
| Humidity | 0.257 | Negligible |
| Temperature | -0.692 | Moderately |

## 5. Conclusion and Recommendation

The performance of this locally fabricated rice stink bug control device was experimentally tested. It was found out that the device is effectively performed with its purpose considering the height and the distance separation of the device.

The application of this device is recommended for pilot testing at different locations and cropping season which may draw and additional and informative conclusion. Also, a further study on attracting techniques to trap the rice stink bugs using this device is recommended.

## Author's Note

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## References

[1] International Rice Research Institute. 2013. Rice Almanac, $4^{th}$ Ed., ISBN No. 978-971-22-0300-8.

[2] Pathak M. D. and Z. R. Khan, 1994. ''Insect Pests of Rice" International Rice Research Institute. ISBN 971-22-0028-0

[3] Pingali P.L. and M. Hossain, 1998. "International Rice Research Institute" Los Banos, Philippines

[4] Rice Production Handbook. 2001. Cooperative Extension Service, University of Arkansas. Publication number MP 192. p. 126

[5] Chinnaswamy R, Patel RJ (1983) Effect of pesticide mixtures on the blue green alga, anabaena flosaquae. Microbiology page 141

[6] Bowling, C.C. 1962.Effect of Insecticides on Rice Stink Bug Populations. J. Econ. Entomol. Pp. 648-651.

[7] Espino, L. 2007. Relative susceptibility of stages of rice panicle development to male and female Oebalus pugnax. Southwest. Entomol.. 32:(4): 203-212.

[8] S.Chelliah and K.Gunathilagaraj. Pest Management in Rice-Current Status and Future Prospects, Tamil Nadu Agricultural University, Coimbatore 641 003, India.

[9] Way, M.O. 2009. Farming Rice: A monthly guide for Texas growers, pp 3-4 *In* L.T.Wilson [ed.], Texas Rice: Texas A&M AgriLIFE Research Newsletter. Vol. 9:4. Texas AgriLife Research and Extension Center, Beaumont, TX.

[10] Bernhardt, J.L. 2009. Color changes and development of eggs of rice stink bug (Hemiptera: Pentatomidae) in response to temperature. *Ann. Entomol. Soc. Am.* 02: 638-641.