THE EFFECT OF CLIMATE VARIABILITY ON AGRICULTURAL PEST

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INTRODUCTION

The relationship of climate variability on insect pest occurrence in the farmland of Central Luzon State University was studied to establish information beneficial to agricultural pest management. More specifically, the study considered four agricultural insect pests that inflict severe damage to rice yields annually: Brown Planthoppers (BPH), Green Leaf Hoppers, Stem Borer, including Parasitic Wasp.

Brown planthopper is a typical vascular feeder and considered one of the most serious pests of all rice herbivores. They damage rice directly through feeding and also by transmitting two viruses, rice ragged stunt virus and rice grassy stunt virus. BPHs feeding by large numbers usually causes complete drying of rice plants a condition commonly known as “hopperburn”.(Sogawa, 1982). Green leaf hopper infestations can also cause “hopperburn”. The insect causes indirect damage to rice plant by transmitting number of virus diseases during feeding. It is an efficient vector of rice tungro virus (Ling, 1967; Suwela, et al, 1992). Stem borers cause extensive damage by destroying the growing tips or by killing the entire plant. Infestations are often difficult to detect, but as larvae grow and begin to tunnel downward in the stem, they periodically chew open small holes in the bark. Parasitic wasp is included because almost every pest insect species has at least one wasp species that preys upon it or parasitizes it, making wasps critically important as natural biocontrol (Ivanova-Kasas, 1970).

DATA AND ANALYSIS

Using light trap equipment, two year monitoring of pest invasion and climate changes

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were conducted to ascertain benchmarks of climate changes that influence distribution of the species. Correlation and graphical analysis were used to determine the significant relationship between the two years monthly totals of the pest population samples and the three climatic variables such as temperature, rainfall and relative humidity. Lag time of the climate variables up to five months were also included to determine the predictability of the agricultural pests.

OBSERVATION AND DISCUSSION

The result showed no correlation between temperature and brown plant hoppers, although on the first year the graphical correlation of temperature lagged four (4) months with the current population of brown plant hopper (Figure 1) showed pattern of relationship. In the absence of any farming record, we could only assume that some agricultural intervention suited only for BPH may have been initiated that led to the suppressed population during the second year. The green leaf hopper (Figure 2), and stem borer (Figure 3), on the other hand, showed high correlation coefficients (r^2) 0.7620 and 0.62171, respectively. The population trend of the other two insects (Green Leaf Hopper and Stem Borer) seems to show that once an increase in monthly temperature is observed, an increase in population of the insect pests will be visible in four months time giving ample time for mitigation and preparedness. Unusual result, however, was obtained for parasitic wasp where the monthly population total is highly correlated with rainfall (Figure 4) and relative humidity of the next month (r^2 = 0.72762 and 0.60883, respectively). The result show that the behavior of the insect in terms of population growth is a good indicator for the possible rainfall and relative humidity next month.

CONCLUSION AND RECOMMENDATION

Based on the facts presented, the following conclusion was drawn:

(1) By closely monitoring the temperature variation, agricultural production may be improved by early agricultural intervention knowing that at certain increase in temperature there is a corresponding increase in the population of green leaf hopper and stem borer in four (4) months time; (2) Considering that the two species (green leaf hopper and stem borer has similar behavior to climate changes, effective

pesticides for both species may be developed; (3)The parasitic wasp dynamics maybe used to predict the weather for next month so that dam releases for irrigation may be efficiently scheduled; and (4) The impact of climate variability on insect pests occurrences are good inputs to agricultural pest management and farm weather forecasting to sustain sufficiency in agricultural production; (5) Other disease causing pest to agriculture may be studied in relation to climate variability.

It is therefore recommended that instruction from the World Meteorological Organization be issued requiring all agrometeorological observation to include monitoring of the insect dynamics for future comprehensive study particularly in relation to climate change.

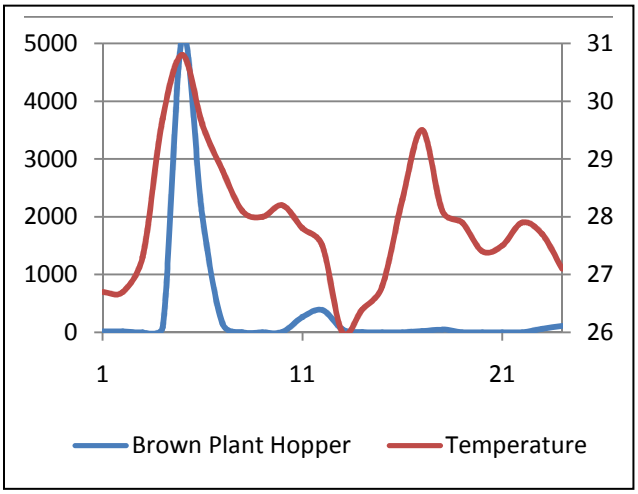

Figure 1. Current monthly totals of brown plant hopper and average temperature four (4) months ago

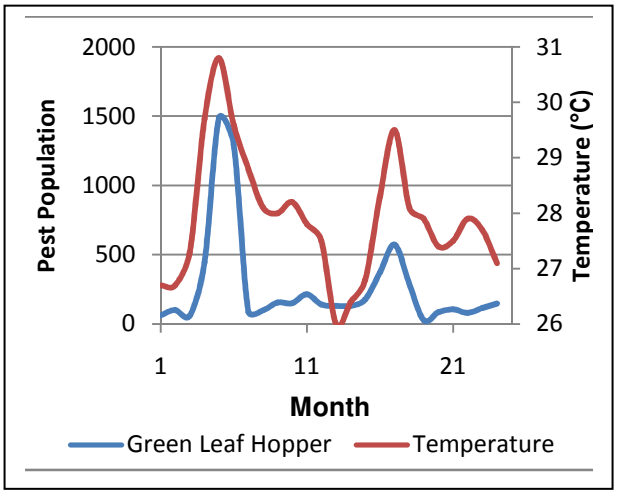

Figure 2. Current monthly totals of green leaf hopper and average temperature four (4) months ago

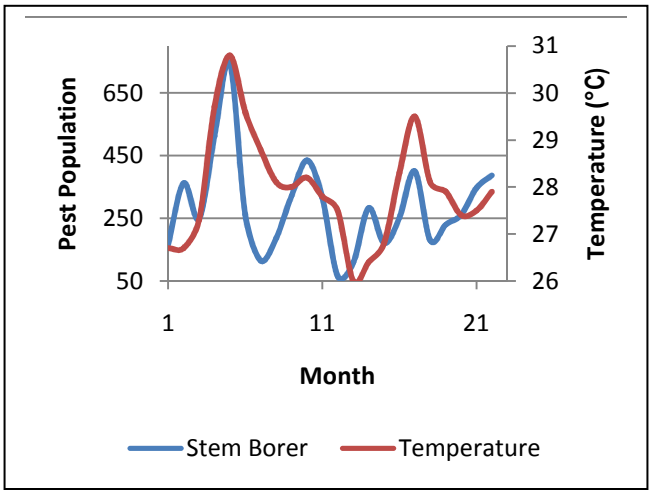

Figure 3. Current monthly totals of stem borer and average temperature four (4) months ago

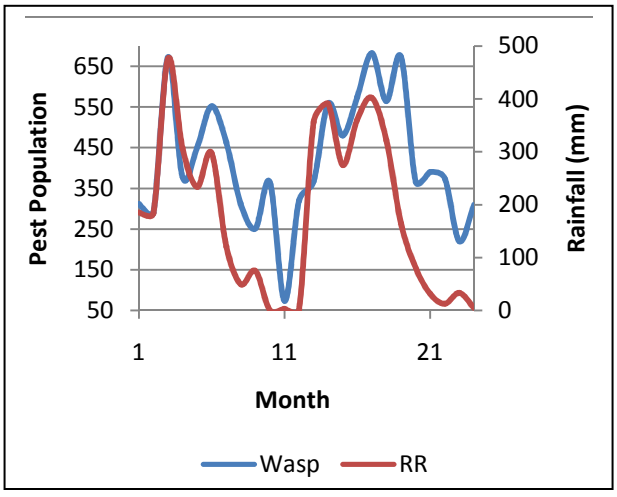

Figure 4. Current monthly totals of parasitic wasp and total monthly rainfall next month

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