Entry No. IRRC-0027

Category	: International Rice Research Conference
Select Theme	: Climate change and environmental sustainability
Endorsement email	:
Keyword 1	: Adaptation to climate change
Keyword 2	: Climate smart agriculture
Keyword 3	: Mitigation of climate change
Title of Entry	: Effect of elevated CO2 and temperature on the biology of brown planthopper, Nilaparvata lugens populations collected from different parts of India.
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Select only one type of presentation	: 15 minute oral presentation
Abstract	: Global average temperature is projected to increase by 1.4 - 7.5oC in the 21st century; atmospheric CO2 level is expected to reach 560 ppm by the end of 21st century. Climate change is expected to have great impacts on crop pests directly as well as through their host plants indirectly. The brown planthopper (BPH), Nilaparvata lugens (Stål) (Hemiptera: Delphacidae) is the most economic pest of rice. It directly damages the plant by sucking phloem sap, causing hopper burn resulting in 100% yield loss under heavy infestation. The present study was envisaged to assess the interactive effects of elevated CO2 and temperature on BPH populations collected from Punjab (Ludhiana dt), Andhra Pradesh (West Godavari dt) and Telangana (Nalgonda dt) states of India. Three levels of CO2 concentration and temperature combinations viz., ambient CO2@380 ppm and ambient temperature (aCO2+aT&30°C), elevated CO2@500 ppm and ambient temperature (eCO2+aT & 30°C) and elevated CO2@500 ppm and elevated temperature (eCO2+eT & 33°C) were continuously maintained under specially designed CO2 chambers at Indian Institute of Rice Research, Rajendranagar, Hyderabad. The BPH populations were individually reared on young rice seedlings (cv TN1) in flexi cages to avoid intermingling of populations. The experiment was conducted in 1st, 5th and 10th generations. Observations were recorded on nymphal duration, % wing dimorphism, longevity, fecundity and honeydew excretion. The three BPH populations responded similarly to different CO2 concentrations. Elevated CO2 levels resulted in higher fecundity, prolonged nymphal duration, adult longevity, more brachypterous forms than macropterous and higher honeydew excretion of 3rd instar nymphs compared to aCO2+aT with advanced generations i.e. 1, 5 and 10. Biochemical analysis was done in uninfested and BPH infested plants exposed to different CO2 and temperature levels. In 30 days old BPH infested plants, higher depletion of soluble sugars, proteins than that of phenols and free amino acids was observed at elevated CO2 levels compared to ambient CO2

levels. Location specific mitigation strategies for management of hoppers will be required to address the varying responses of populations to climate variables.

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