AUTHOR Chaiyawat, Patchanee.
TITLE Effects of silica in resistance and susceptible rice varieties on Nilaparvata lugens (Stal) and its natural enemy Cyrtorhinus lividipennis Reuter.
IMPRINT [Los Baños, Laguna], 1994.
DESCRIPT 139 leaves : ill.
NOTE Bibliography: p. 55-65.
NOTE Thesis (Ph. D.) -- University of the Philippines at Los Baños, 1994.
KEYWORDS (NAL) Silica; Pest resistance; Nilaparvata lugens; Cytrorhinus lividipennis

EFFECTS OF SILICA IN RESISTANT AND SUSCEPTIBLE RICE VARIETIES ON *NILAPARVATA LUGENS* (STÅL) AND ITS NATURAL ENEMY *CYRTORHINUS LIVIDIPENNIS* REUTER

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SUBMITTED TO THE FACULTY OF THE GRADUATE SCHOOL
UNIVERSITY OF THE PHILIPPINES AT LOS BAÑOS
IN PARTIAL FULFILLMENT OF THE
REQUIREMENTS FOR THE
DEGREE

DOCTOR OF PHILOSOPHY
(Entomology)

March, 1994

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ABSTRACT

CHAIYAWAT, PATCHANEE, University of the Philippines at Los Baños, March 1994. Effects of Silica in Resistant and Susceptible Rice Varieties on *Nilaparvata lugens* (STÅL) and Its Natural Enemy *Cyrtorhinus lividipennis* Reuter.

Major Professors: Drs. D. G. Bottrell and E. N. Bernardo

The study determined the effect of silica in rice (*Oryza sativa* L.) plants on the brown planthopper (BPH), *Nilaparvata lugens* (Stål), and its predator *Cyrtorhinus lividipennis* Reuter. Rice varieties with different levels of genetic resistance to BPH (highly susceptible TN1, susceptible IR22, moderately resistant IR46, and resistant IR72 and Mudgo) were grown hydroponically with different levels of silica (0, 100, 200, 300, and 400 ppm in the nutrient solution) then inoculated with BPH and the predator.

Significantly more silica was found in all varieties grown in culture solution with silica. Silica uptake by plants was greatest at levels between the 100 ppm and 200 ppm. In general, silica content was higher in leaves than leafsheaths in 45-day old and 65-day old rice.

The silica level in the hydroponic solution did not adversely affect survival of BPH nymphs in all varieties at the seedling stage (14 days old). However, on the older plants (45 days old) the adverse effect of silica was

noticeable on TN1 and IR22 on the 16th day after confinement of BPH. The effects were detected as early as 4 days on the resistant 45-day old IR72 and Mudgo plants.

On 14-day old plants, silica did not significantly affect BPH survival and development except on the resistant IR72 variety. However, silica prolonged the nymphal period of BPH on all varieties. On 45-day old plants, adverse effects of silica were detected for the following parameters: survival, number of adults that developed, population growth index, nymphal period, and fecundity.

Silica level in the culture solution did not affect the amount of honeydew excreted by BPH adults. This suggests that silica did not affect food intake of BPH and therefore was not a mechanical impediment to feeding.

The role of silica appeared to be indirect or in association with other resistance factor(s) as suggested by the more pronounced adverse effects on the resistant IR72. The adverse physiological effects caused by silica apparently synergized with other resistance factors in the rice plants. Modes of action are not known.

Silica in the culture medium did not directly affect (through the plants) predator's survival. Some predators lived up to 8 days on rice plants when prey was not available indicating that there was some feeding on the plants. Similarly, silica did not affect the predator's survival indirectly through the prey, although some evidence

of indirect effect was observed on the resistant IR72. However, these were inconsistent. The rather negligible mirid adult emergence on IR72 was attributed to varietal resistance, which reduced BPH density and therefore denied the predator of food.

Implications are that silica may bolster the rice plant's defense against BPH and the synergized effect on BPH-resistant varieties can enhance the level of resistance. Therefore, through its dampening effect on BPH, silica may contribute in mediating BPH-predator interactions.