Behavioral Responses of the Whitebacked Planthopper *Sogatella furcifera* (Homoptera: Delphacidae) on Rice Plants Whose Odors Have Been Masked

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In a two-choice test, more *S. furcifera* females settled more often on exposed plants than on parafilm-masked ones, regardless of the susceptibility of rice varieties. This indicates that rice volatiles play an important role in the insect’s short-range orientation to its host. The fact that more insects settled on exposed resistant Rathu Heenati (RHT) than to masked susceptible Taichung Native 1 (TN1) suggests that there must be certain common volatiles released by both varieties. Few females landed on masked plants of either RHT or TN1. This implies that the insect could not recognize at a distance that a plant was resistant or susceptible without olfactory stimuli. *S. furcifera* excreted less honeydew on masked plants than on exposed ones for both varieties and more on masked TN1 than on exposed RHT. The electronic monitoring of feeding behavior demonstrates that the insect made more frequent probes and had shorter phloem ingestion durations on exposed RHT than on exposed TN1 and on masked RHT than on masked TN1. Moreover, the insect had longer phloem ingestion durations on masked TN1 than on exposed RHT. These results suggest that volatile chemicals given off by resistant RHT plants have a negative effect on feeding.

**KEY WORDS:** whitebacked planthopper; *Sogatella furcifera*; olfactory; orientation; feeding behavior; insect-plant interaction; rice.

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INTRODUCTION

The whitebacked planthopper, *Sogatella furcifera* (Horváth), is emerging as a serious pest of rice in several Asian countries, particularly in areas where varieties resistant to the brown planthopper, *Nilaparvata lugens* (Stål), have been grown successfully (Heinrichs and Rapusas, 1983). Both adults and nymphs attack rice plants directly by sucking the phloem sap (Auclair and Baldos, 1982; Khan and Saxena, 1984a,b), resulting in slow growth, delayed tillering, a reduction in grain formation and plant mortality, and poor yields. *S. furcifera* thrives on susceptible rice varieties but fails to feed, grow, survive, and reproduce adequately on resistant ones (Heinrichs and Rapusas, 1983). Suitability of plants as hosts to insects is determined by the factors that influence insect establishment on plants (Saxena, 1969). Both morphological and chemical factors could affect an insect’s behavior on its host. Color, shape, and plant volatile chemicals may play a role in the initial orientation to host plants for either feeding or oviposition. However, volatile chemicals were reported to be the main factor affecting insect orientation (Finch, 1978; Chapman *et al*., 1981; Khan *et al*., 1988; Liu and Wilkins, 1988). On the other hand, initial feeding is stimulated or deterred by the presence or absence of specific chemicals or group of chemicals (Hsiao, 1969; Chapman, 1974; Bernays and Chapman, 1977; Saxena, 1986; Chapman *et al*., 1988). In the present work, for the purpose of clarifying the importance of plant odors on *S. furcifera* orientation, the insect’s settling, excretory, and feeding responses on parafilm-masked plants were studied.

MATERIALS AND METHODS

*Test Plants and Insects.* Rice plants of highly resistant Rathu Heenati (RHT) and susceptible Taichung Native 1 (TN1) were assayed against newly emerged brachypters of *S. furcifera* which were reared on TN1 plants in an insectory (20–30°C, 75–85% RH, and 12:12-h dark:light) at IRRI, Philippines. The secondary tillers of test plants were removed. All experiments were conducted at 25 ± 2°C, 65–75% RH, and 12:12-h (dark:light) photoperiod.

*Two-Choice Preference and Settling Tests.* The tillers of resistant RHT and susceptible TN1 plants (6 weeks old) were either exposed or masked with a 5 × 5-cm piece of stretched parafilm (a waterproof, thermoplastic sealing film). Pairs of tillers (both masked or one masked and one exposed) were individually inserted into a 15 × 30-cm cylindrical clear plastic cage through small holes 8 cm apart on a polystyrene disk which formed a common base of the plants. Twenty insects as a replicate were lightly anesthetized with CO₂ and placed at the center of the disk. The females were allowed free choice between the following sets of plants: (1) masked and exposed RHT; (2) masked and exposed TN1; (3) exposed RHT and masked TN1; (4) both RHT and TN1 masked; (5)