Stem borer, *Rupela albinella* (Cramer), and stem rot, *Sclerotium oryzae*, in southwestern Colombia rice fields[1,2]

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ABSTRACT

The relationship between a rice stem borer *Rupela albinella* and stem rot, *Sclerotium oryzae*, was studied in commercial rice fields in the Valle del Cauca Department of Colombia. The insect larvae and their damage were found to be associated with stem rot, but the fungal infection was not dependent on the insect's presence. The number of *R. albinella* larvae, the wounds caused by them, and stems with fungal infection increased with plant age.

RESUMEN

El taladrador del tallo, *Rupela albinella* (Cramer), y la pudrición del tallo, *Sclerotium oryzae*, en los arrozales del suroeste de Colombia.

En el Valle del Cauca, Colombia, se estudió la relación de un barrenador del tallo del arroz, *Rupela albinella*, con la pudrición del tallo, *Sclerotium oryzae*. La larva y las heridas causadas por ella están asociadas a la aparición de la pudrición del tallo, pero la infección fungal no depende de la presencia de larvas. El número de larvas y las heridas causadas por ellas y los tallos con infección aumentaron con la edad de la planta.

INTRODUCTION

A rice stem borer, *Rupela albinella* (Cramer), is a sporadic rice pest usually causing minor damage to rice in South America (2). In Colombia, Cardona and Troche (1), Salive et al. (5) and Vargas (6) reported no relationship between the presence of the insect and yield reductions. In Guyana, Rambajan (4) reported no relationship between plants with *R. albinella* larval damage and dead hearts.

In spite of the lack of economic importance of the pest, farmers correlate the damage caused by the larvae with the appearance of stem rot (*Sclerotium oryzae*). Insecticides or fungicides that are applied to manage either the insect or the fungal infection increase production costs.

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In this study we report on the relationship between the insect and the appearance of stem rot in rice plants.

MATERIALS AND METHODS

Stem rot-insect relationship

Commercial rice fields were sampled for 12 consecutive months in Jamundi and Palmira, Valle del Cauca Department in Colombia. Every week two samples were taken from each location. Samples consisted of 100 stems, excised at ground level and taken to the laboratory for inspection. At each location fields were selected at random. Stems were individually opened and inspected for larval presence, number of exit holes or insect-caused wounds, and signal of stem rot. Plant age and variety were recorded from each field sampled. Sampling was initiated in October 1989 and ended September 1990.

Rupela albinella population dynamics and incidence of stem rot

Newly planted commercial fields were selected from the two locations and sampled weekly. Sampling was initiated 10 days after seed emergence and ended at harvesting. Each sample consisted of 200 sweeps per field per week. A field was defined as any plot planted to commercial rice. The number of larvae, pupae, and wounds caused by *R. albinella* was recorded for 12 consecutive months. Sampling was initiated October 1989 and terminated September 1990. Because in Colombia rice is planted all year round, samples were pooled by plant development stage for each month.

Stem rot-simulated wounds

Rice (cv. Oryzica 3) was planted in trays (30 x 35 x 20 cm) under screenhouse conditions. One hundred days after emergence plants were pierced on the stem to simulate *R. albinella* larval damage (exit hole). Wounds were produced with a dissecting needle previously sterilized. The needle was sterilized after each wound. Before producing the wounds, plants were sprayed with the fungicide benomyl; control plants were left unsprayed. Treatments were arranged as a completely randomized design with six replicates.

Each tray contained wounded and control (no wounds) plants. Samples were harvested at maturity and transported to the laboratory for individual inspection.

RESULTS

Stem rot-insect relationship

The Chi square analysis for both, the relationship of stem rot and larvae or larvae-inflicted wounds, indicates a lack of independence be-

tween wounds and stem rot and larvae and stem rot (tables 1 and 2). The number of healthy stems (no stem rot) with larvae or wounds was lower than expected.

Rupela albinella population dynamics and incidence of stem rot

A high larval incidence was recorded on 60- to 90-day-old plants during October and April (fig. 1). The lowest larval infestation was recorded for December, July, August and September. There was no relationship between larval presence and rainfall. Stem rot infestations reach a maximum peak in October, March and May (fig. 1). The incidence of stem rot on 90- to 120-day-old plants displayed high variation with peaks during October and June (fig. 2). The number of larvae in this plant age reached high densities in March, May, September and October.

Larvae were observed inside the stems shortly after oviposition (30 days after planting), but the highest larval incidence was observed between 121 and 140 days after planting (fig. 3). All along the plant growing period, stem rot infestation was about 10% higher than larval infestation or wounds on stems.

Under greenhouse conditions all stems presented stem rot independently of the presence of wounds. Stem rot on the leaf sheath was significantly higher on unwounded plants than on artificially wounded plants. On the other hand, more wounded plants than healthy ones presented stem rot.

DISCUSSION

The high incidence of stem rot in wounded plants and plants with *R. albinella* larvae or their damage suggests a relationship between the insect and the disease. However, the similar percentage of stems affected by stem rot with or without the presence of wounds or insects suggests that wounds inflicted by the insect speed up fungal colonization and development but are not required for infection. Some fungal diseases are more severe in the presence of stem borer than in unattacked plants, but insect-caused wounds are not necessary for fungal colonization. In our study no attempt was made to quantify the magnitude of fungal infection.

The percentage of unwounded stems with evidence of stem rot was higher than the percentage of stems with larvae or with signs of larval damage, further indicating a casual relationship between the insect and the disease. Furthermore, the percentage of stems with insect damage (wounds) is about half of that on stems with fungal infection (fig. 3) at all stages of plant development. In India sheath rot requires mechanical injury for infection (3), but in this study 54% of affected plants do not show insect-caused wounds.

TABLE 1.— *Relationship between stem rot and the presence of* Rupela albinella*-caused wounds in Palmira, Colombia, in 1989-90.*

	Percentage stems with stem rot		
Wounds	Yes	No	Total
Yes	24.8	0.6	25.4
No	42.3	32.3	74.6
Total	67.1	32.9	100.0

Chi^2 = 1341.8, DF = 1, Significant at P=0.001.

TABLE 2.—*Relationship between stem rot and the presence of* Rupela albinella *larvae in Palmira, Colombia, in 1989-90.*

	Percentage stems with stem rot		
Larvae	Yes	No	Total
Yes	35.9	5.8	41.7
No	31.2	27.1	58.3
Total	67.1	32.9	100.0

Chi^2 = 1092.58, DF = 1, Significant at P=0.001.

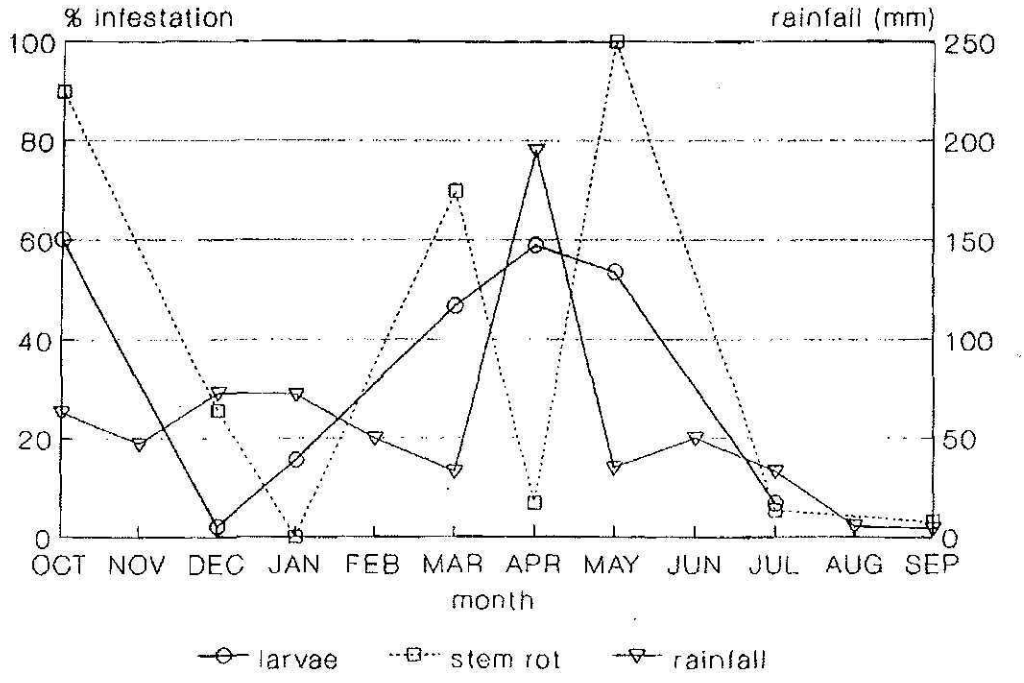

Fig. 1.—Relationship between *Rupela albinella* larvae and stem rot on 60 to 90-day-old plants in Colombia from 1989 to 1990.

TABLE 3.—*Relationship between* R. albinella *simulated wounds and stem rot.*

Type of infection	Affected Stems With Stem Rot Wounds	
	Yes	No
Sheath	1.6	31.0
Stem	92.8	63.0
Inside stem	4.6	3.7
Others *	1.0	2.3
Total	100.0	100.0

*=Other types of infection.
Chi square = 101.736; DF = 3; significant at P = 0.001.

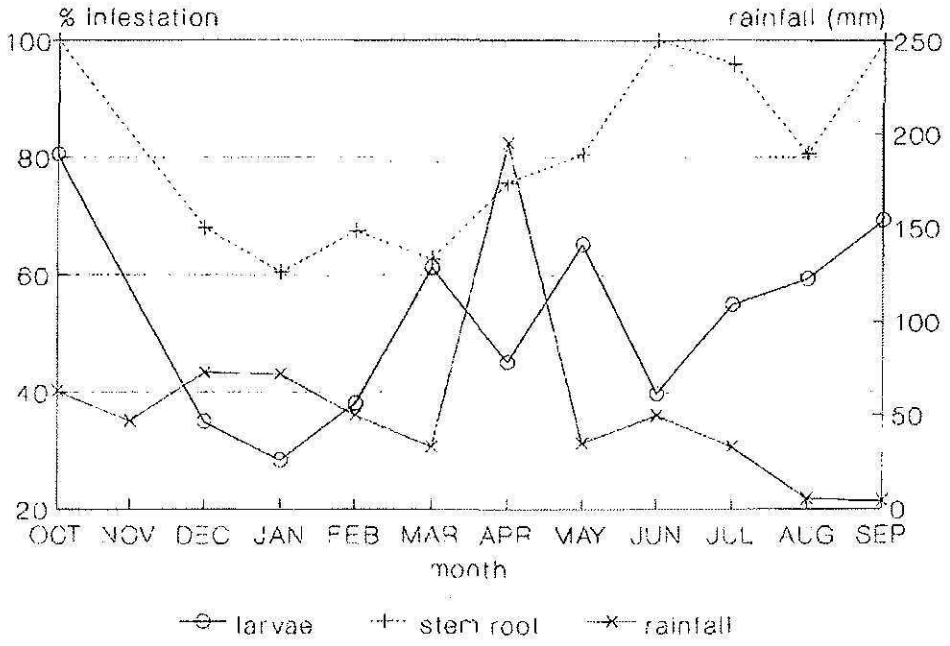

Fig. 2. Relationship between *Rupela albinella* larvae and stem rot on 91 to 120-day-old plants in Colombia, from 1989 to 1990.

Our findings suggest a casual relationship between the stem borer larvae and stem rot; however, there is no dependency of the disease on insect presence or its damage. The high incidence of stem rot on artificially caused wounds indicates that the fungi may gain access through wounds caused by the insect, but the infection can occur with no larvae present, or even without larval wounds.

Previous works have reported a lack of correlation between *R. albinella* damage with rice yield reductions (1, 5, 6). Therefore, it is concluded that in spite of the common and abundant presence of the insect in rice fields and the possible association with stem rot, *R. albinella* is of little economic importance in rice. Additional studies are needed to quantify the magnitude of the fungal infestation as affected by wounds caused by insects.

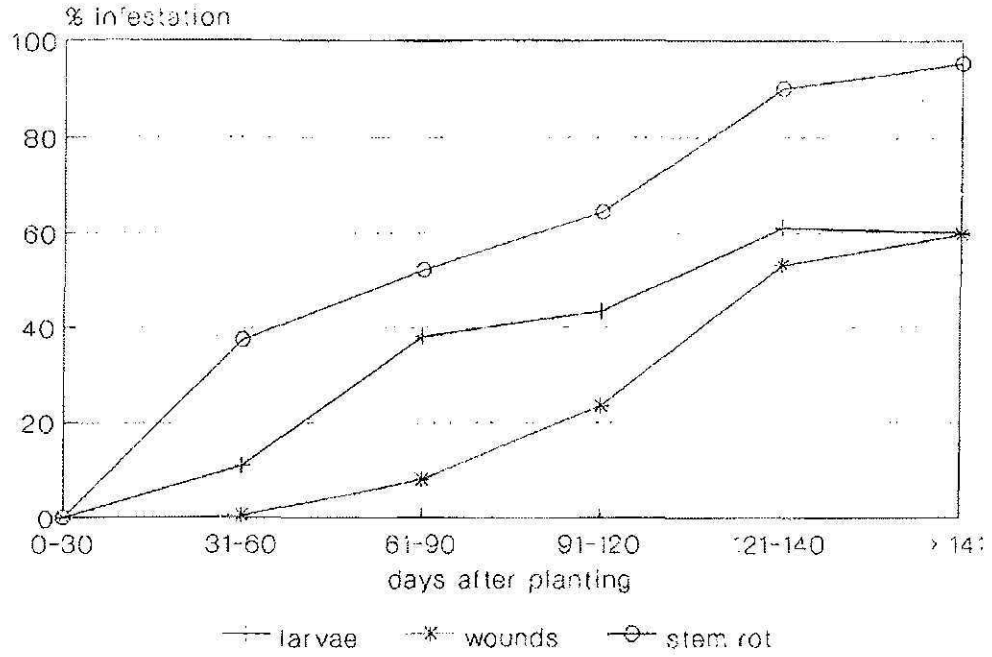

Fig. 3. Relationship between *Rupela albinella* and stem rot as affected by plant age in Colombia from 1989 to 1990.

Technical personnel and farmers in Colombia should benefit from this information, as no control tactics are needed for *R. albinella* at the population levels commonly found in rice fields in southwestern Colombia (1, 5, 6).

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