Journal of the American Society of Sugar Cane Technology, Florida and Louisiana Divisions, September 1992
12:22-26

# SURVEY AND ESTIMATED INJURY OF THE MEXICAN RICE BORER IN TEXAS SUGARCANE

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## ABSTRACT

The Mexican rice borer, *Eoreuma loftini* (Dyar), is the most serious insect pest of sugarcane in Texas. The objectives of this study were to geographically document *E. loftini* injury across the Lower Rio Grande Valley (LRGV), determine within-field distribution of injury, and determine the frequency distribution of injury on stalks with respect to internode position. Injury by *E. loftini* was surveyed in 20 fields during 1989, 20 fields during spring 1990 and 43 fields during fall 1990. Samples (25 plants or stalks) were taken in four locations within each field. Samples taken in the fall suggested a trend for higher injury to stalks in western LRGV fields than eastern. There were no significant differences in samples taken within fields. No significant differences in injury were found between stalks of 'NCo 310' vs. 'CP 70-321' in 1989, but 'NCo 310' stalks contained more injury than 'CP 70-321' stalks in 1990. The overall percentage of bored internodes during 1989 and 1990 averaged 19 and 20.9%, respectively. Results showed more statistical variation among fields than among locations within fields. This variation may be explained by grower management practices (insecticide sprays, irrigation, fertilizer, etc.), salinity problems, or proximity of fields to other gramineous crops infested by *E. loftini*. Basal (lower) internodes were injured more frequently than distal (upper) internodes in both cultivars in 1990.

## INTRODUCTION

The Mexican rice borer, *Eoreuma loftini* (Dyar) (Lepidoptera: Pyralidae) was first reported in the Lower Rio Grande Valley (LRGV) in 1980 (8), although it was intercepted regularly at ports of entry on sugarcane, corn, sorghum, and wild grasses during the early 1970's (6). This pest has since replaced *Diatraea saccharalis* (F.) as the primary stalkborer pest in Texas sugarcane. Research during the 1980's centered on life history and biology (17,18), chemical (7, 10, 11, 13) and biological control (1, 2, 5, 16), and host plant resistance (9, 14). However, no information was available on the intensity or location (spatial as well as within-plant) of *E. loftini* injury. The objectives of this study were to geographically document *E. loftini* injury across the LRGV, determine within-field distribution of injury, and determine the frequency distribution of injury on stalks with respect to internode position.

## MATERIALS AND METHODS

Twenty sugarcane fields (12 'NCo 310', 8 'CP 70-321') throughout eastern (Cameron Co.) and western (Hidalgo Co.) sections of the LRGV were sampled during October and November, 1989. Within each field, 25 stalks were collected randomly from each corner (northeast, northwest, southeast, southwest). Samples were taken at least 25 rows by 30 m inside the field for each corner. Stalks were split mechanically (Intercane Systems, Windsor, Canada) and the percentage of bored internodes was calculated. In 1990, 20 fields (12 'NCo 310', 8 'CP 70-321') were sampled during April and June, and 43 fields (21 'NCo 310', 22 'CP 70-321') were sampled during October and

November. Spring sampling involved collecting 25 plants from each corner and searching leafsheaths for stalkborer larvae. Within-field sampling during the fall was the same as in 1989 except stalk injury was recorded by internode position. Only the first 14 internodes (basal or lower internode = 1, distal or upper internode = 14) were included in the frequency distribution analysis, although all internodes were included for total injury calculations. Bored internode percentages were subjected to square root transformation before t-test analysis (comparison of 2 variables, Proc T-Test, 15) or analysis of variance (comparison of more than 2 variables, Proc GLM, 15). Means were separated using the Ryan-Elinot-Gabriel-Welsch multiple range test (REGWQ, 15).

## RESULTS

Stalk injury in 1989 averaged 19% bored internodes, with a range of 3.7 to 41.3% bored internodes (Table 1). Four of 20 fields had greater than 30% bored internodes. There was higher stalk injury in western than eastern fields [23.8% ± 10.6 (SD) vs. 14.1% ± 11.2, respectively, n = 10, $P$ = 0.032]. Within-field distribution of *E. loftini* injury showed no statistical differences among the four corners ($P$ = 0.17). Comparison between cultivars showed numerically but not statistically higher injury to NCo 310 than CP 70-321 fields (20.5% ± 13.1, n = 12; 16.7% ± 9.7, n = 8, respectively; $P$ = 0.559).

Table 1. Comparison of percent *Eoreuma loftini*-bored internodes among fields and LRGV locations for cultivars NCo 310 and CP 70-321, fall 1989.

| Field | Location | % bored Internodes Mean (SD) | | Field | Location | % bored Internodes Mean (SD) | |
|---|---|---|---|---|---|---|---|
| ----------NCo 310---------- | | | | ----------CP 70-321---------- | | | |
| 1 | east | 7.4 | (5.2) | 13 | east | 20.7 | (10.7) |
| 2 | east | 24.1 | (12.2) | 14 | east | 5.1 | (3.6) |
| 3 | east | 39.1 | (8.9) | 15 | east | 12.2 | (8.6) |
| 4 | east | 4.9 | (2.4) | 16 | east | 15.4 | (5.9) |
| 5 | east | 3.7 | (3.6) | 17 | east | 8.8 | (4.2) |
| 6 | west | 41.3 | (3.0) | 18 | west | 36.9 | (20.6) |
| 7 | west | 14.3 | (3.1) | 19 | west | 13.9 | (2.6) |
| 8 | west | 37.0 | (19.3) | 20 | west | 20.3 | (9.5) |
| 9 | west | 20.9 | (5.8) | | | | |
| 10 | west | 12.3 | (3.2) | | | | |
| 11 | west | 21.7 | (10.0) | | | | |
| 12 | west | 19.3 | (9.2) | | | | |

Early season infested-plant samples in April 1990 showed no statistical differences among LRGV locations (west 15.0% ± 10.5, east 13.4% ± 4.7, n = 10, $P$ = 0.961), within field corners ($P$ = 0.654), or cultivars (NCo 310 14.9% ± 8.9, n = 13; CP 70-321 12.9% ± 6.2, n = 7; $P$ = 0.741). Infested-plant samples taken in June did not show statistical differences among locations (west 10.9% ± 8.5, east 7.5% ± 4.0, n = 10, $P$ = 0.464), within field corners ($P$ = 0.063), or cultivars (CP 70-321 9.4% ± 5.5, n = 9; NCo 310 9.0% ± 7.7, n = 11; $P$ = 0.838).

Stalk injury in fall 1990 samples averaged 20.9% bored internodes, with a range of 8.6 to 48.7% (Table 2). There was a trend for higher injury in western compared to eastern fields (23.4% ± 10.2, n = 21 vs. 18.4% ± 8.5, n = 22, respectively, $P$ = 0.055). There were no statistical differences among within-field corners ($P$ = 0.763). 'NCo 310' stalks exhibited higher injury than 'CP 70-321' stalks (23.5% ± 9.6, n = 21; 18.3% ± 9.1, n = 22, respectively; $P$ = 0.046). Frequency

distribution of internode injury for both cultivars suggested more injury to middle and lower internodes than to upper internodes (Fig. 1).

Table 2. Comparison of percent *Eoreuma loftini* bored internodes among fields and LRGV locations for cultivars NCo 310 and CP 70-321, fall 1990.

| Field | Location | % bored Internodes Mean (SD) | | Field | Location | % bored Internodes Mean (SD) | |
|---|---|---|---|---|---|---|---|
| ----------NCo 310---------- | | | | ----------CP 70-321---------- | | | |
| 1 | east | 16.9 | (7.2) | 22 | east | 12.9 | (6.1) |
| 2 | east | 25.6 | (13.0) | 23 | east | 17.0 | (6.2) |
| 3 | east | 19.8 | (7.4) | 24 | east | 40.8 | (27.0) |
| 4 | east | 15.6 | (3.4) | 25 | east | 11.2 | (6.5) |
| 5 | east | 23.5 | (5.7) | 26 | east | 11.4 | (5.6) |
| 6 | east | 22.0 | (7.4) | 27 | east | 11.9 | (2.6) |
| 7 | east | 14.3 | (6.3) | 28 | east | 10.6 | (5.0) |
| 8 | east | 26.7 | (13.1) | 29 | east | 15.1 | (7.6) |
| 9 | east | 34.5 | (9.8) | 30 | east | 8.6 | (1.0) |
| 10 | east | 25.8 | (8.1) | 31 | east | 20.5 | (4.7) |
| 11 | west | 21.3 | (4.1) | 32 | east | 9.4 | (3.9) |
| 12 | west | 41.5 | (8.1) | 33 | east | 10.3 | (8.2) |
| 13 | west | 17.2 | (10.1) | 34 | west | 18.9 | (4.6) |
| 14 | west | 8.6 | (2.2) | 35 | west | 15.9 | (6.5) |
| 15 | west | 26.9 | (10.9) | 36 | west | 23.1 | (11.2) |
| 16 | west | 11.2 | (1.5) | 37 | west | 21.3 | (2.4) |
| 17 | west | 48.7 | (5.0) | 38 | west | 13.1 | (3.8) |
| 18 | west | 15.3 | (5.2) | 39 | west | 14.4 | (6.0) |
| 19 | west | 27.8 | (9.2) | 40 | west | 22.0 | (8.6) |
| 20 | west | 23.3 | (4.9) | 41 | west | 35.5 | (13.1) |
| 21 | west | 27.4 | (4.5) | 42 | west | 36.3 | (8.5) |
| | | | | 43 | west | 22.5 | (8.8) |

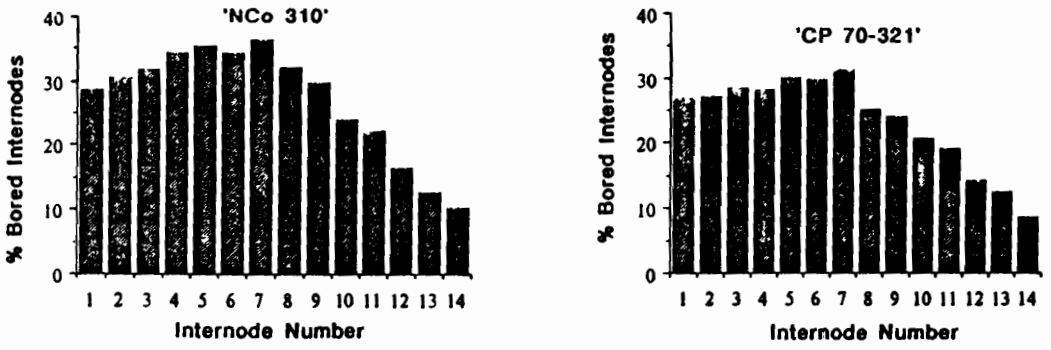


Fig. 1. Frequency distribution of *Eoreuma loftini* injured internodes (basal or lower internode = 1, distal or upper internode = 14) for 'NCo 310' and 'CP 70-321' stalks, fall 1990, LRGV, Texas.

## DISCUSSION

Numerical trends in both years were for higher stalk injury in western LRGV fields and in 'NCo 310' fields. Analyses suggest that there is more variation among fields than among locations (corners) within fields. This high among-field variation is exemplified by the large ranges in injury to the same cultivar (1989, NCo 310: 3.7 - 41.3%, CP 70-321: 5.1 - 36.9%; 1990, NCo 310: 8.6 - 48.7%, CP 70-321: 8.6 - 40.8%). This variation may be explained by grower management practices (insecticide sprays, irrigation, fertilizer, etc.), salinity problems, or proximity of fields to other gramineous crops infested by *E. loftini*.

Injury by *D. saccharalis* in Texas sugarcane prior to the successful 1977 establishment of the braconid parasitoid *Cotesia* [=*Apanteles*] *flavipes* (Cameron) (4) averaged 18.7% bored internodes in untreated plots in 1972 (3) and about 31% (12-51%) in 1977 (12). Thus, sugarcane injury by stalkborers appears to have remained approximately the same, with the range of bored internodes (3.7 - 48.7%) similar to that observed in the mid 1970's. Direct yield reduction per internode bored by *E. loftini* has not been determined for any cultivar, therefore effects of equivalent percentages of bored internodes by the two species cannot be directly compared. Mexican rice borer injury appears to be located in older internodes which usually contain higher amounts of sugar. Therefore future areas of research should include studies designed to determine the economic damage potential of this pest, and the variability of *E. loftini* infestation and injury among cultivars and among internodes within stalks.

## ACKNOWLEDGMENTS

This research was funded in part by the Rio Grande Valley Sugar Growers, Inc. and Hatch project 6796. Thanks are extended to S. Alvarez, M. Barrosa, J. Bustemante, M. Garcia, J. Huerta, and H. Perez for technical support. Approved by the Texas Agricultural Experiment Station as TA# 30039.

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