Screening Transgenics Unveils Apparent Resistance to Hornworm (*E. ello*) in the non-Transgenic, African Cassava Clone 60444

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INTRODUCTION

Erinnyis ello (L), Sphingidae, is one of the most important pests of cassava in the neotropics (Bellotti et al. 1992). It has a wide geographic range, covering from Brazil, Argentina and Paraguay to the Caribbean and southeast USA. The insect can produce yield losses up to 64%, as well as planting material losses of 72% (Arias and Bellotti, 1984).

CIAT has elaborated an Integrated Pest Management–IPM- program to help control the hornworm. More than 500 varieties of the cassava collection have been tested looking for resistance. Recently, a possible source was detected when transgenic plants of cassava, from African cultivar 60444, carrying one cry1Ab gene, were challenged with larvae of first instars. The non-transgenic controls turned out to be resistant. Here we summarize the experiments carried out to confirm the initial observations.

OBJECTIVE

- Determine the effect of leaves from transgenic and non-transgenic cassava plants, cultivars 60444 and CMC-40, of first instar hornworm larvae fed on them.

MATERIALS AND METHODS

Transgenic plants were maintained in biosafety greenhouses. Some of the bioassays were carried out in the greenhouse or under controlled conditions in the laboratory. First instar larvae were fed on transgenic lines L27, L80 and L92, all derived from cultivar 60444. Non-transgenic plants from the same cultivar, plus the susceptible cultivar CMC-40, were also used as controls to feed them. Weight gain and mortality were scored every 24 h until pre-pupa or pupa stages started appearing.

RESULTS

Most larvae fed with transgenic and non-transgenic lines derived from cultivar 60444 died by day five or six, and their average weigh did not exceed 0,5 g; none reached the pupa stage. Contrastingly, those fed on CMC-40 lasted until day twelve; reached their highest weight at day eleven (average beyond 3 g) and most became pupa. There was only one larva, fed on transgenic line L27, whose weight was close to 2 g by day eight, although it did not gain extra weight afterwards, and did not became pupa.

Table 1 depicts two statistically different groups classified on the basis of days to death and percentage of mortality. Twenty five percent of the larvae fed on CMC-40 died by day six, while more than 70% of larvae fed on 60444 died by day 5 or 6.

Table 1

Line or Cultivar	Average Days to Death	% Mortality (days alive)
CMC-40	6.6 A	25 (13)
L-27	4.4 B	80 (13)
L-80	3.6 B	100 (5)
L-92	3.5 B	100 (6)
60444	3.1 B	100 (5)

Figure 1

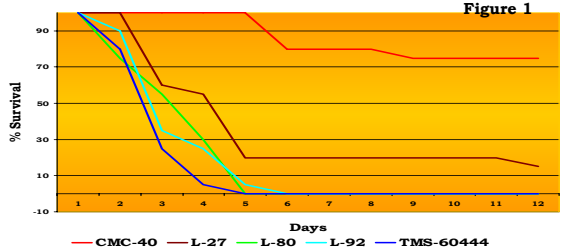


Figure 1 confirms that survival of those larvae fed on CMC-40 was higher than those fed on 60444, transgenic and non-transgenic lines. Only one larvae fed on L27 survived beyond day 12 but did not transform into pupa.

Figure 2

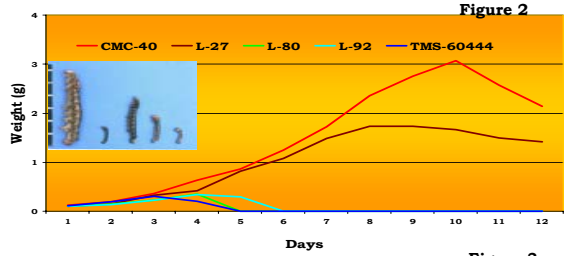
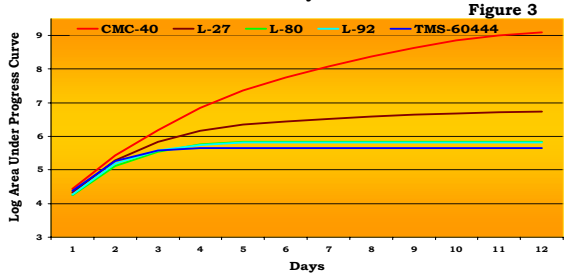


Figure 2 shows the average daily weight increase of larvae, which was statistically the same for those fed on lines derived from 60444, and lower than the ones fed on CMC-40. The inset shows larvae fed on -from left to right- CMC40, 60444, L27, L80 and L92

Figure 3



The Area Under Progress Curve, as a function of weight and survival (Figure 3 and Table 2) corroborate that larvae feeding on 60444-derived lines had less chance to survive.

Table 2

Genetic Material	Area under Curve
CMC-40	9.1176 A
L-27	6.7492 B
L-80	5.8309 C
L-92	5.8156 C
TMS-60444	5.6588 C

CONCLUSIONS

Cultivar 60444 may contain genes for resistance to the hornworm, an observation that needs to be confirmed in the field, in cassava growing areas where the pest is endemic. It is worth noting that 60444 derives from crosses with the wild species *Manihot glaziovii*, a species know to be the source to resistance to ACMD. If there was an effect of the cry1Ab gene inserted in the transgenic lines, it was masked by the strong insecticidal effect of the cultivar 60444.

REFERENCES

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