Exploiting egg-induced plant signalling for stemborer management

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INTRODUCTION

• Maize (Zea mays L.) is the major staple food and cash crop for millions of people in sub-Saharan Africa.
• Stem borers are devastating pests of maize in the region causing yield losses of up to 88%.
• Exploiting egg-induced plant defence may lead to developing cost-effective and environmentally benign approaches of stemborer control that are appropriate to resource-poor African farmers.

OBJECTIVES

• To determine changes in the profile of volatiles that diverse maize cultivars emit when stem borers deposit eggs on them.
• To determine effects of egg-induced plant volatile on the behaviour of key egg and larval parasitoids.
• To identify biologically-active components responsible for any observed behavioural responses in the parasitoids.

METHODS

Headspace sampling (collection of volatiles)

Bioassay (naturals)

GC linked electrophysiology

GC & GC-MS Analysis identification & quantification of bioactive compounds

RESULTS BEHAVIOURAL STUDY

(a) Egg parasitoid (T. bournieri)

(b) Larval Parasitoids (C. sesamiae) -landraces

(c) Larval Parasitoids (C. sesamiae) -commercial

IMPACT

Discovery of novel defence trait on certain maize landraces that could be bred into cereal cultivars with other favourable agronomic characteristics, to provide better crop resistance against stem borer attack, will help reduce hunger and poverty, as stem borers infest about 50% of the agricultural land in sub-Saharan Africa, affecting the lives of nearly 300 million people, and causing yield losses of ~$ 1.5 billion per annum.

CONCLUSIONS

• Early herbivory induces changes in the volatile profile of certain maize landraces, and attracts key natural enemies (parasitoids).
• Indirect defence response that oviposition elicits may have been lost in the commercial varieties tested.
• Potential exists to improve crop defence by introgressing the indirect defence traits from landraces into mainstream maize cultivars.

REFERENCES


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