



A Bt Gene Effectively Controls Maruca Insect Pest In Cowpea

Dr Prince Addae
Project Manager, AATF

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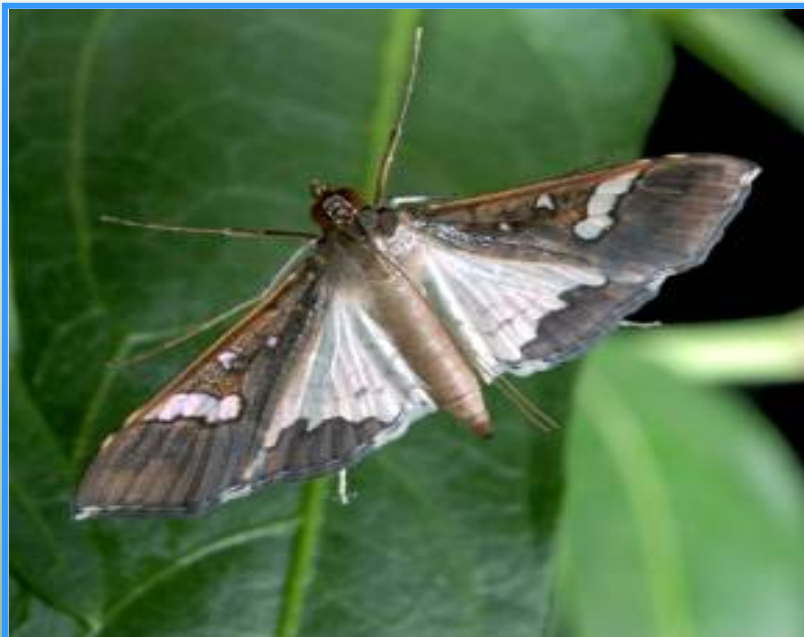


Introduction

- *Maruca vitrata* (Insect Cowpea Pod Borer) causes 20-80% yield losses in cowpea
- Farmers spray insecticides up to 5 – 8 times per season
- Cowpea resistant genes/varieties are not available
- Biotechnology was an intervention to control *Maruca*
- AATF licensed the *cry1Ab* gene, royalty free, from Monsanto Company to control the *Maruca* pest
- Cry1Ab has a long history of safe use in biotech & organic farming



Maruca vitrata (Cowpea Pod Borer)





Confined Field Trials (CFT)

- Cowpea variety was transformed with a *cry1Ab* gene by TJ Higgins (CSIRO Australia) – cowpea was an extremely difficult plant to transform
- Lines were tested in over 15 independent Confined Field Trials in Puerto Rico, Nigeria, Burkina Faso & Ghana – high levels of control in all CFTs!
- Lines were infested with 50 *Maruca* larvae per plant each in 10-13 infestations – this is an extreme level in insect pressure!
- Plants were grown under net covering without any insecticide spray
- Plants were evaluated for:
 - Number of pods produced, pod damage by *Maruca*
 - Total seed weight & healthy seed weight per plant



Pod Production of Transgenic and Non-transgenic Lines at Zaria in 2015

No Pods!



Pods!





Results of Efficacy Trial at Zaria 2015

Line	Total pods/plant	Pod damage by Maruca (%)	Total seed weight (g)	Healthy seed weight (g)
Transgenic	21.1	0	23.6	22.2
Non transgenic	9.9	16.2	13.2	9.4
LSD 5%	2.9 *	14.0*	0.4*	2.5*



Results of Efficacy Trial at Farako Ba in 2015

Line	Total pods/plant	Pod damage by <i>Maruca</i> (%)	Total seed weight (g)	Healthy seed weight (g)
Transgenic	21.6	0	30.9	30.9
Non-transgenic	3.5	96.6	5.1	0
LSD 5%	2.5 *	9.1*	8.1*	3.8*



Results of the Efficacy trials at Zaria and Farako Ba in 2015

- No *Maruca* pod damage was observed on the transgenic pods at either the Zaria and Farako Ba trials
- Damage caused by *Maruca* pest on the control pods was 16% & 97% at Zaria and Farako Ba respectively
- The highest pod damage of 97% caused by *Maruca* in the non-transgenic line resulted in zero healthy seed weight at Farako Ba



Results of Efficacy Trials cont'd

- The near complete control of *Maruca* on the transgenic line resulted in:
 - Significantly ($p=0.05$) higher total pod count
 - Higher healthy seed weights per plant
 - An estimated 20% higher yield per plot (protected from loss)
- Efforts are underway to incorporate a second Bt gene (*cry2Ab*) into this new transgenic line for Insect Resistance Management (IRM)
- The current line is under Regulatory Assessment now



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