

Experiences from Brazil in managing Fall Armyworm (FAW)

Fernando Hercos Valicente, PhD



Embrapa

Milho e Sorgo



ASEAN FAW ACTION PLAN

Supporting IPM Across Southeast Asia

Embrapa Maize and Sorghum



Located in Sete Lagoas,
Minas Gerais State
Brazil





FAW may attack more than 180 crops, survive and reproduce



Insect pests

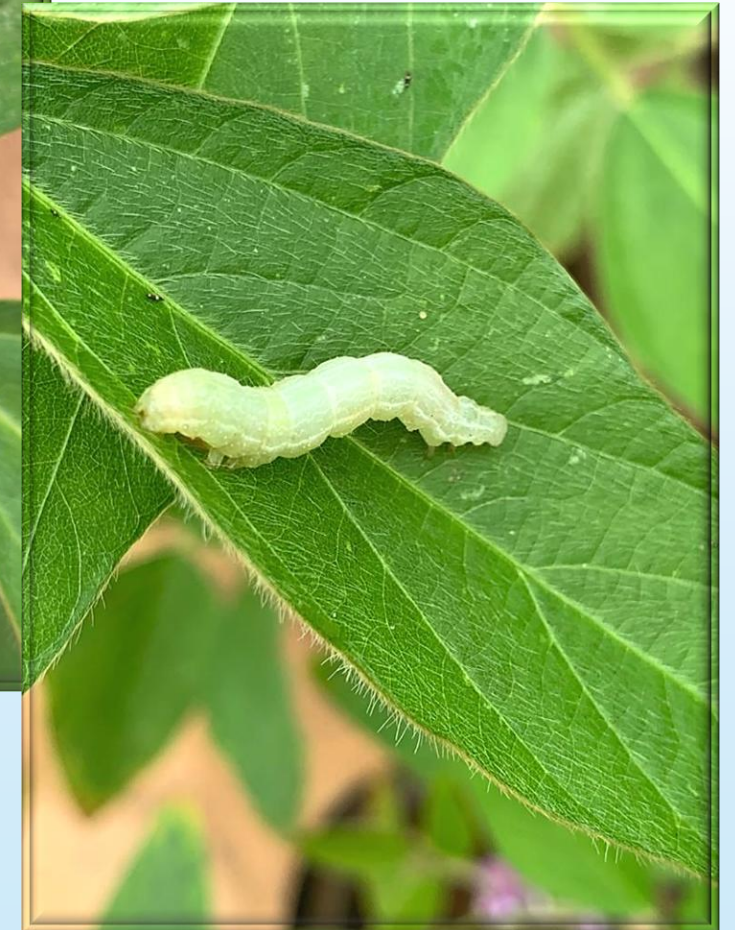


Maize



Soybeans

Cotton



Fall armyworm management



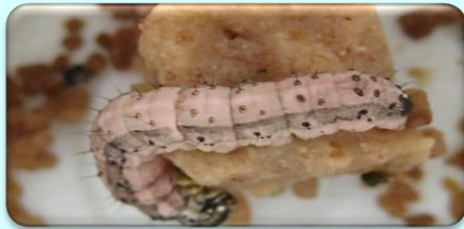
Chemical control

- Chemical insecticides



Cultural Control

- Expose pupae to high temperatures
- Damage pupae during plowing



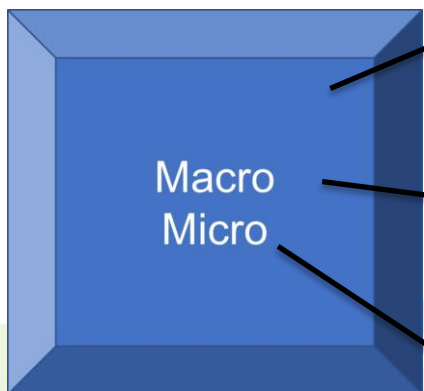
Biological Control

- Parasitoids: *Trichogramma*
- Pathogens: *Bacillus thuringiensis (Bt)*, Baculovirus and Fungi



Transgenic Maize (Bt Maize)

- Different genes (proteins expressed)
- Insect Resistance Management (IRM) – Refuge area + high dose of the protein



Parasitoids

- *Trichogramma*
- *Cotesia etc.*



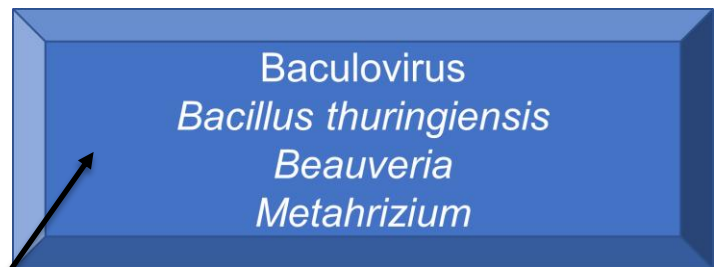
Predators

- ladybugs
- Sucking bugs
- Lacewings



Pathogens (diseases)

- Baculovirus
- Bacterium
- Fungi



Baculovirus
Bacillus thuringiensis
Beauveria
Metahrizium

Biological Control Agents/Pheromones

Baculovirus

- Efficient
- Use healthy caterpillar to multiply

Bacillus thuringiensis

- Rice as a substrate – solid fermentation
- Large scale fermentation – liquid fermentation

Trichogramma

- Egg parasite
- Rear the host – infect and distribute in the field

Pheromone

- Monitoring the presence of adults

Fungi

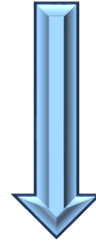
- *Beauveria bassiana*
- *Metarhizium anisopliae*

Transgenic maize

- **First** transgenic Brazilian maize with *cry1Da* gene – effective against FAW
- Gene from our collection
- Developed at Embrapa Maize and Sorghum and Helix (Brazilian private company)



Successful application of biological products



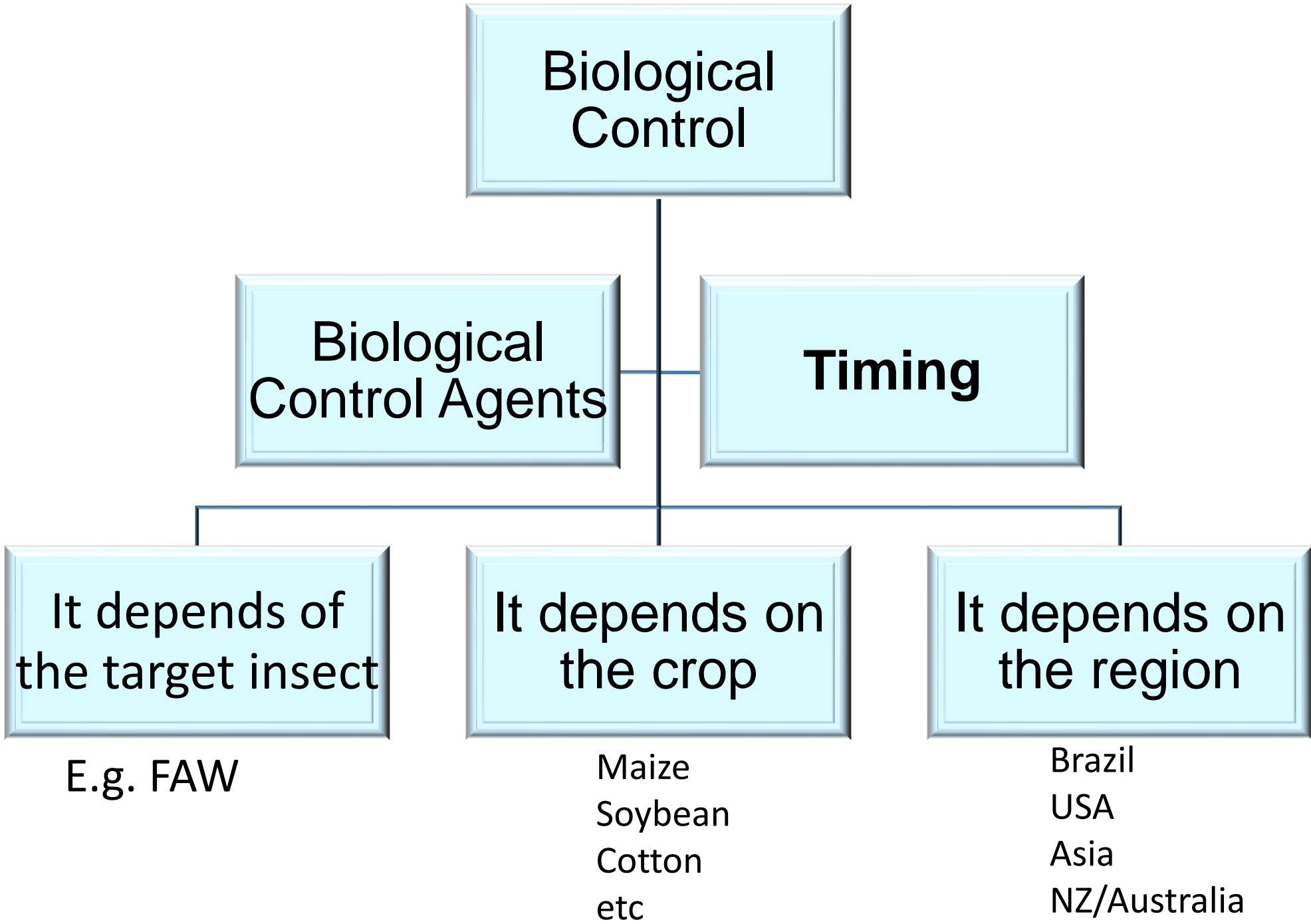
Timing

Product application
time – after
4P.M(UV)

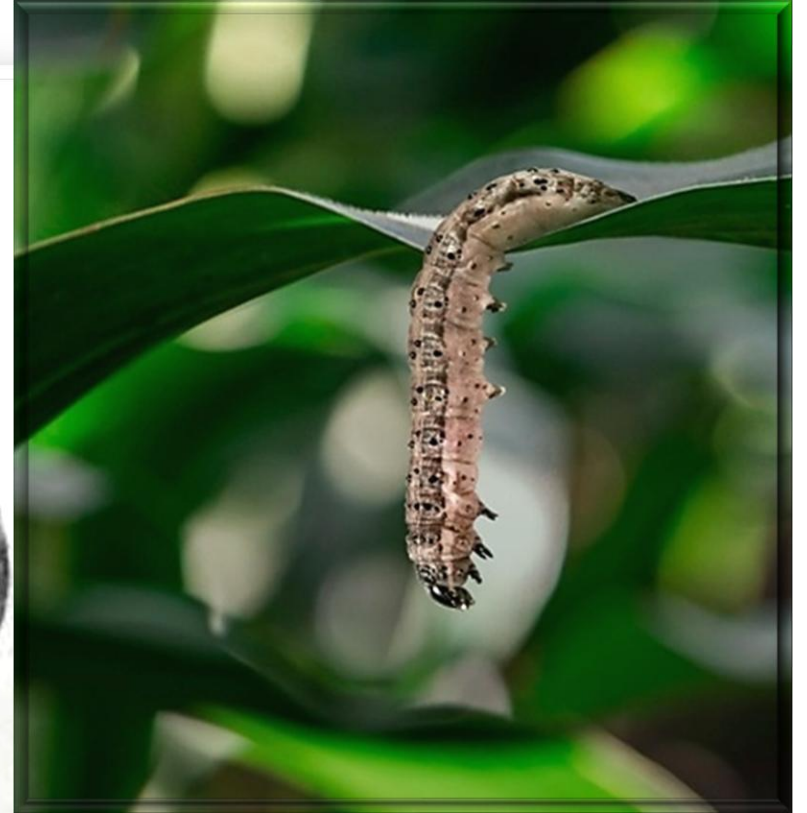
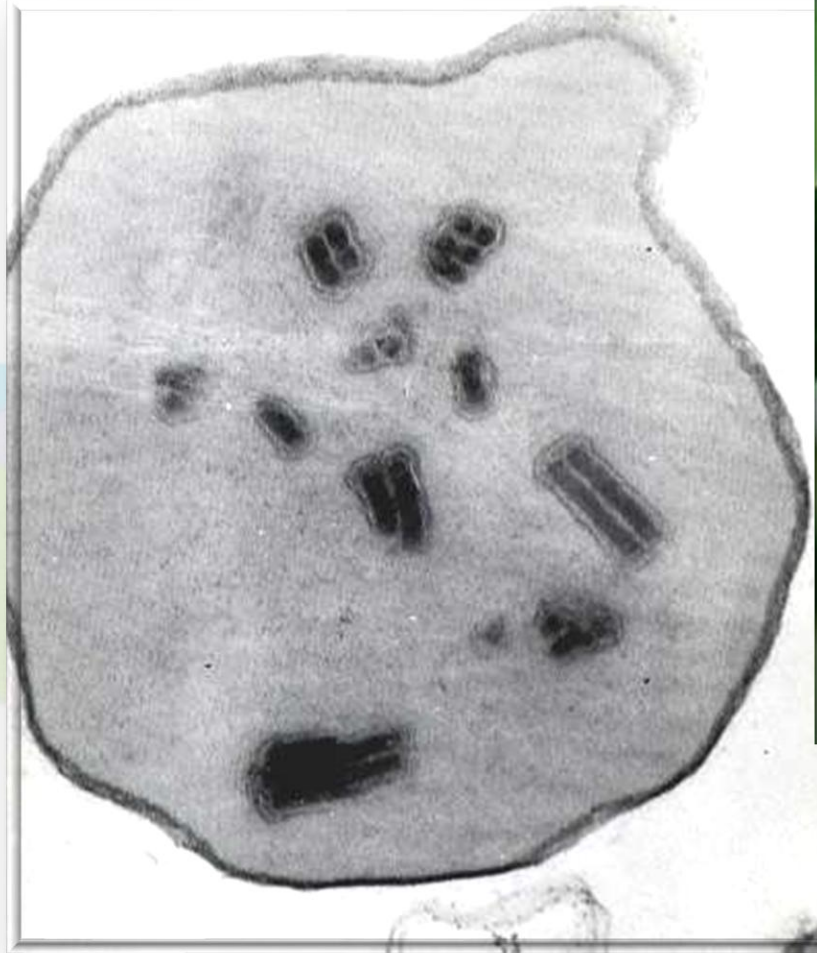
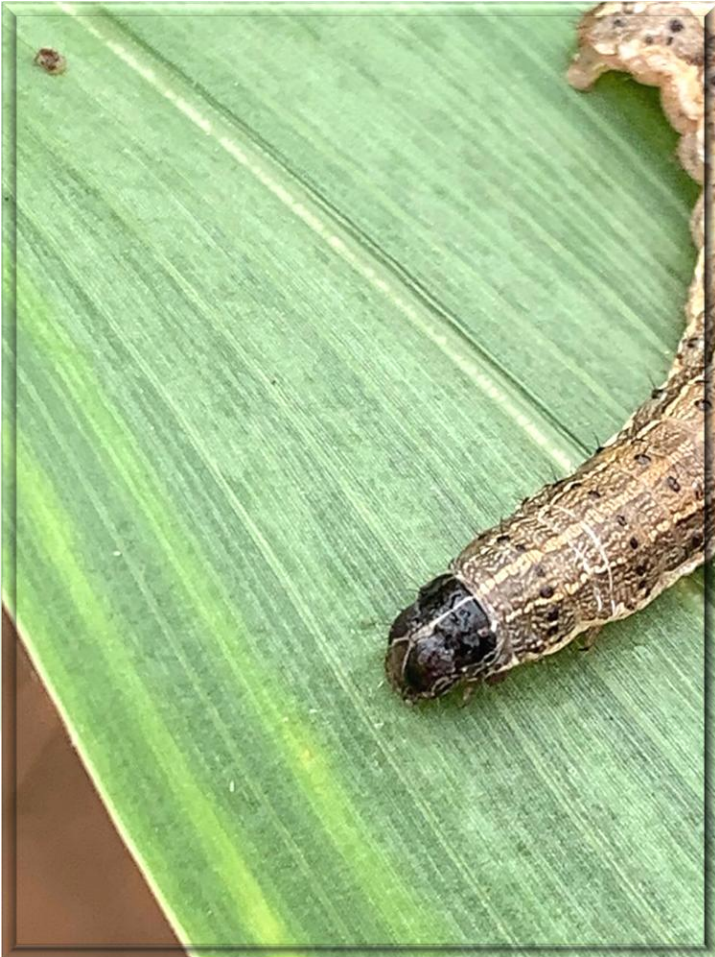
Spray between 100-
120L/ha and water
pH 6-7

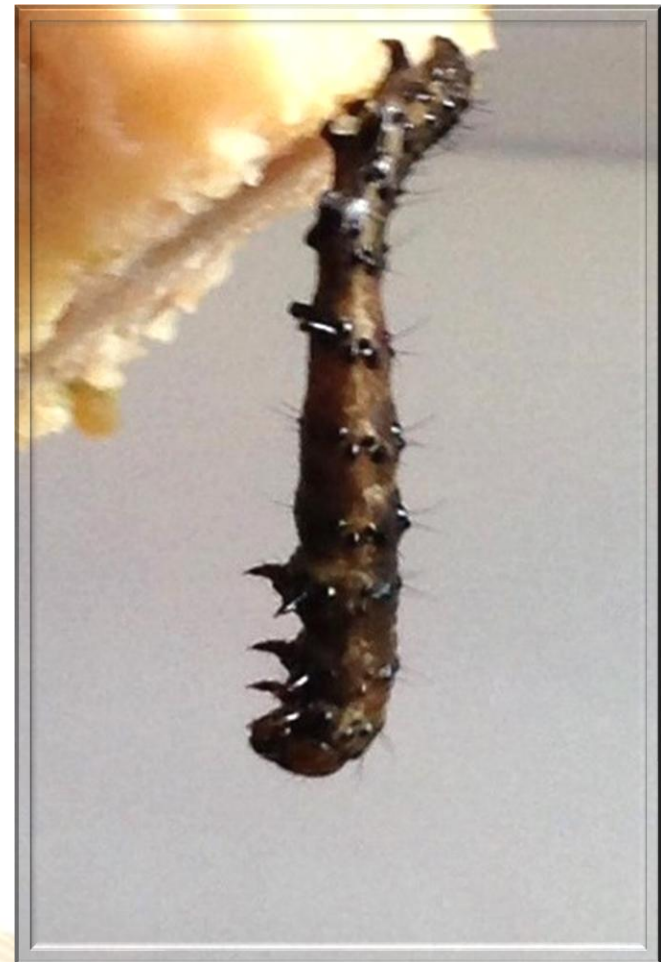
Bt and Baculovirus
must be ingested

Spray one week
after plant
emergency



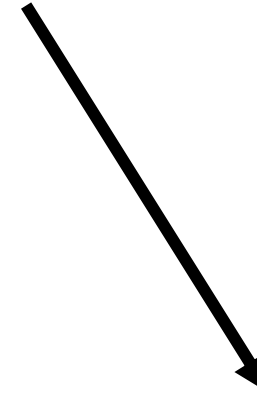
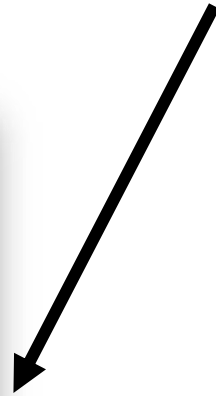
Biological Control with Baculovirus





Baculovirus Collection

Baculovirus – isolado 6 e isolado 19



Disrupts the integument




Does not disrupt the integument of the dead insect immediately after death



Different types of formulations – final product

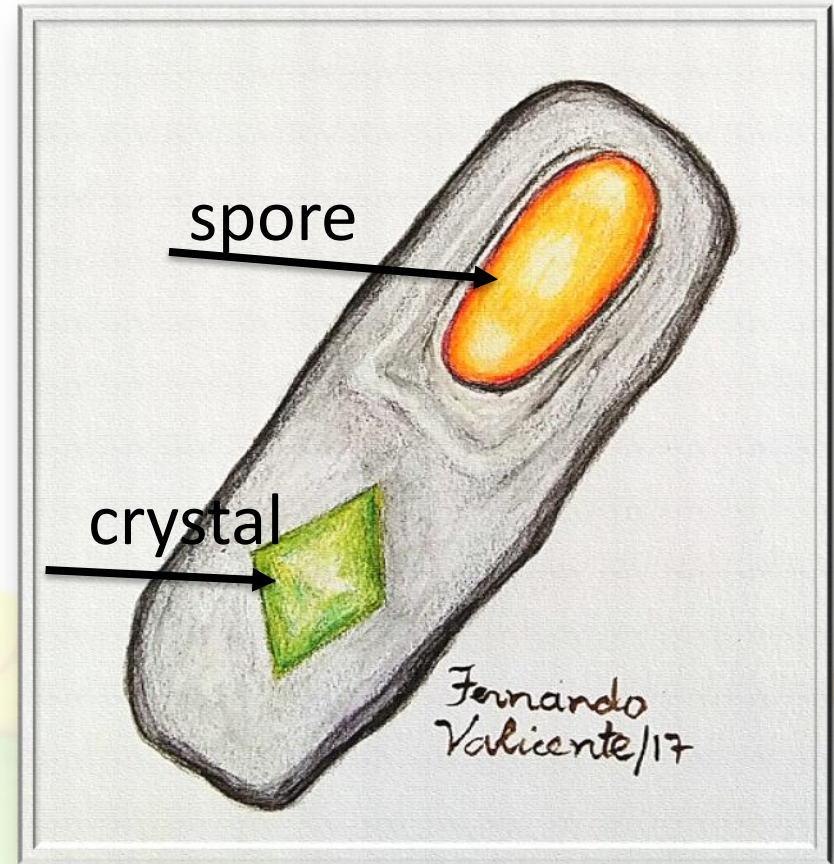


 **Baculovirus spodoptera PM**
Composição: *Baculovirus spodoptera*
Concentração I.A.: $5,0 \times 10^8$ pol/g. Fabricação: 13/06/07
Ingrediente Inerte: Caolin Conteúdo: 50 g

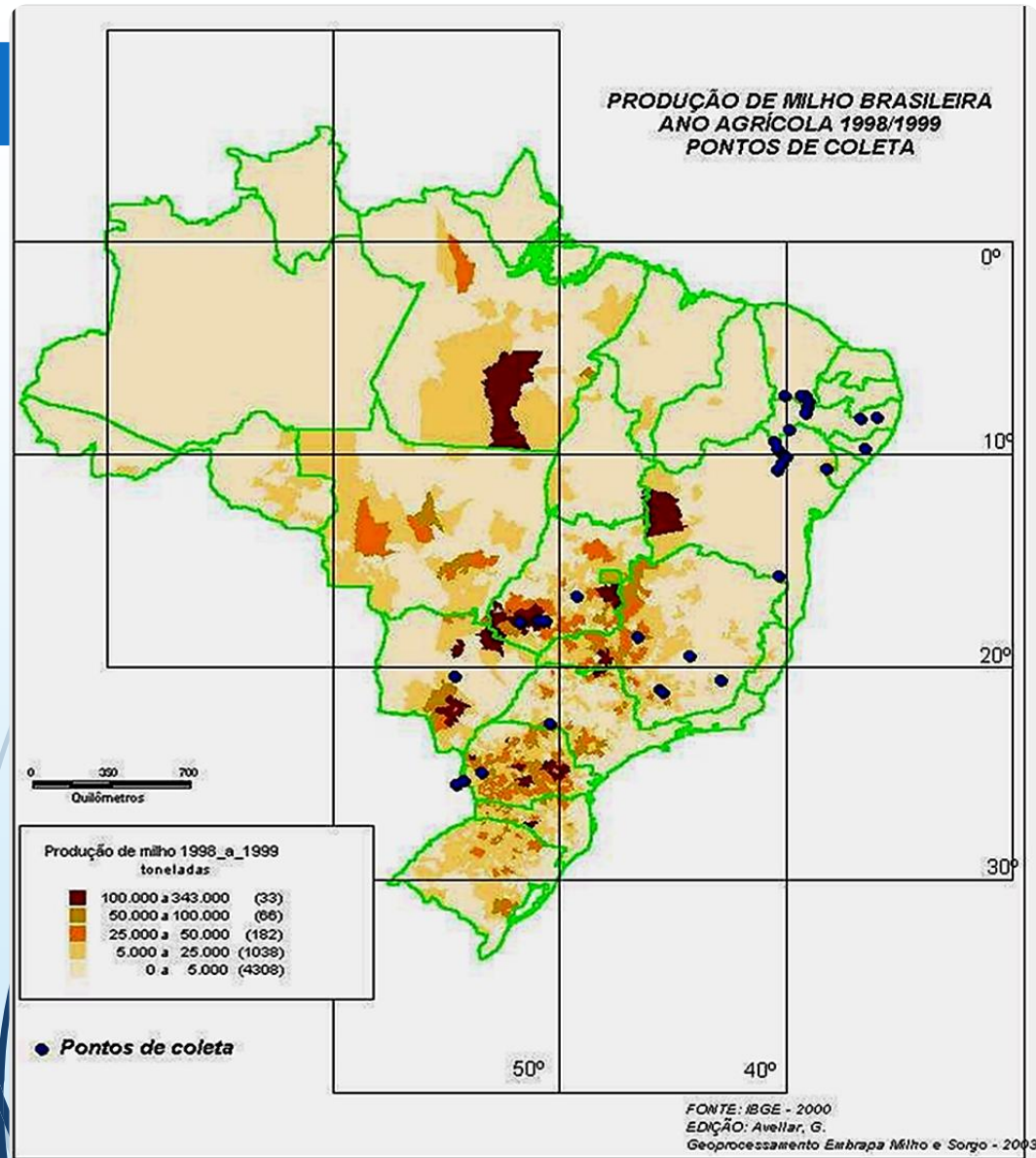


Wettable powder – 50g/ha

Biological Control with *Bacillus thuringiensis*



Bt Collection



2000 samples

- Soil, grain dust etc


10 Brazilian States and 5 regions

More than 4,600 isolates
– soil collection

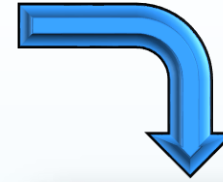
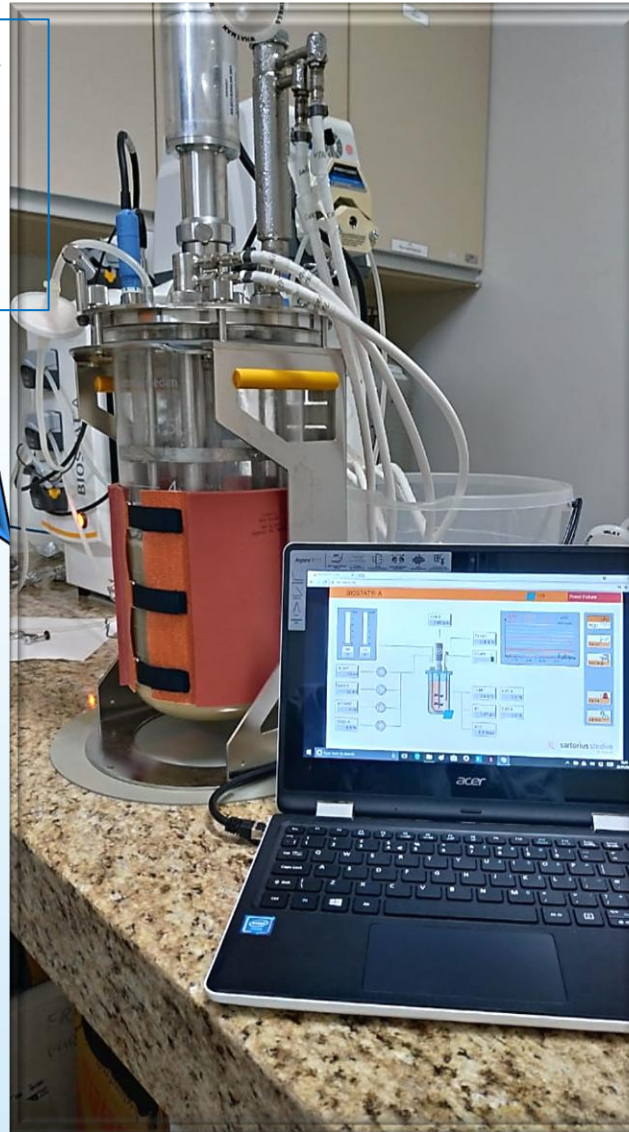
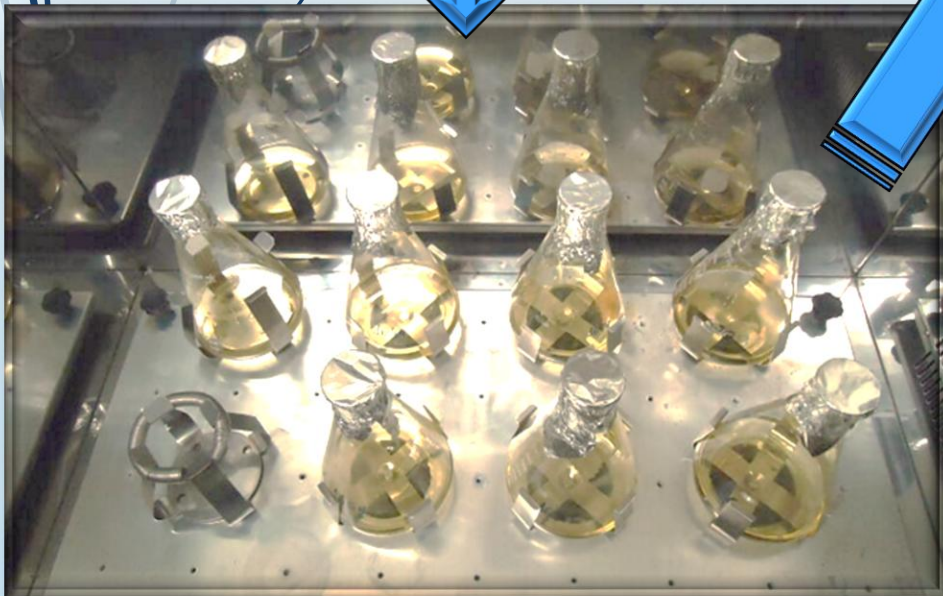
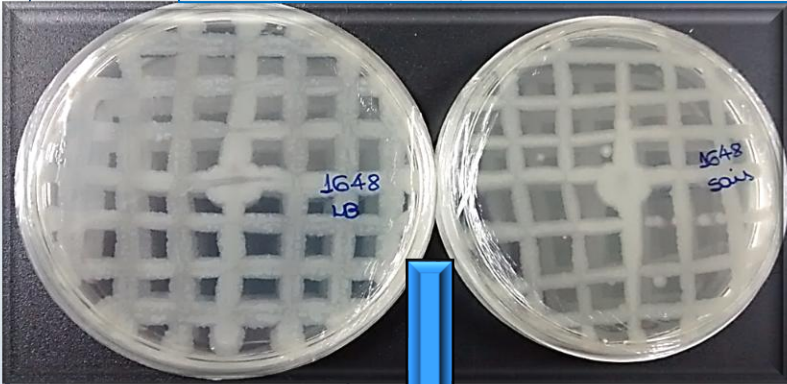
- freezers

Soil Collection at Embrapa Maize and Sorghum



- 
- We tested all isolates against some specific insect pests
 - The best isolates were negotiated (Embrapa) with private companies for large-scale research and development
 - Private companies signed a contract with Embrapa, developed their own formulation, registered, and placed it on the market.
 - Embrapa also develops its own formulations, IPM and biological control field trials and monthly survey of FAW

Isolation, identification, bioassay
against insect pests, pilot scale
fermentation



Test new equipment



Grow up to 4 strains at the same time



Large scale fermentation system



Baculovirus large scale production system



Rooms with controlled humidity, temperature, light and dark periods



Baculovirus large scale production system

Project with New Zealand

“Developing New Zealand’s climate-resilient integrated pest management strategy against fall armyworm”

- **Starts January 2025**

- BioProtection/Biocontrol - The New Zealand Institute for Plant and Food Research Limited (PFR)
- Mt Albert Research Centre - AUCKLAND – NZ
- FAW was first found in NZ in early 2022



- **2-year project**, our team of experts will work collaboratively to advance our understanding of the most efficient and successful **IPM practices** (incl. **biological control**) **for FAW**. This will **enable us to develop a climate-resilient IPM programme against this invasive pest, tailored specifically for NZ**. Our Argentinian and Brazilian collaborators will travel to NZ to **provide seminars and share their extensive knowledge on FAW IPM** with growers, industry groups, Ministry for Primary Industries (MPI) and other interested parties.

- Valicente's laboratory at EMBRAPA has all necessary resources to research the development of FAW biopesticides

- **13 biological pesticides** have been successfully developed by the **Biological Control Laboratory** (Embrapa Maize and Sorghum), and registered to date, as well as access to field stations for IPM trials

Product	Pest	Company
Acera® (Bt)	<i>Spodoptera frugiperda</i> <i>Chrysodeixis includens</i>	Ballagro
Crystal® (Bt)	<i>Spodoptera frugiperda</i>	Lallemand (Farroupilha)
CartuchoVit® (Baculovirus)	<i>Spodoptera frugiperda</i>	Vitae Rural
BaculoNat® (Baculovirus/Bv)	<i>Spodoptera frugiperda</i>	Bionat
Destroyer® Bv	<i>Spodoptera frugiperda</i>	Pragas.com/Biological Life
Virumix® Bv	<i>Spodoptera frugiperda</i>	IMAmt/Comdeagro
Spodovir® Bv	<i>Spodoptera frugiperda</i>	Andermatt
Spodovir plus® Bv	<i>Spodoptera frugiperda</i>	Andermatt
VirControl Sf®/clone Laphy® Bv	<i>Spodoptera frugiperda</i>	Simbiose/Bioma
VirControleCi®/clone Looper® Bv	<i>Chrysodeixis includens</i>	Simbiose/Bioma
VirControlHa® Bv	<i>Helicoverpa armigera</i>	Simbiose

The background of the slide is a light blue, out-of-focus microscopic image showing cellular structures. On the left side, there is a solid blue arrow pointing to the right, and several thin, dark blue curved lines that sweep across the page. The text is centered within a white rectangular box with a thin blue border.

Thanks for your attention!!!
fernando.valicente@embrapa.br