CORN, COTTON AND SOYBEAN: INSECT MANAGEMENT IN SOUTHERN REGION (SP and MS-East)

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Southern Region

- Intensive agriculture
- Extensive areas
- Monoculture
- Successive crops
- Biological bridges

Increase of the pest control problems

Increase doses - use of tank mix - more applications

High Risk of developing Resistance
CROPS SYSTEMS

Pests
Tobacco budworm
Spodoptera spp.
Cotton leafworm
Soybean looper
Mites (Tetranychides)
Whitefly
Bugs
Bollweevil
White grubs
brown burrower bug
Sugarcane giant borer
Western Bean Cutworm

Helicoverpa sp

Commons Hosts
soybean and cotton
corn, soybean, cotton and millet
cotton
bean, soybean, cotton and potato
soybean and cotton
bean, soybean, cotton, vegetables and others (corn)
Soybean, corn and cotton
cotton
Soybean, corn and cotton
Soybean, corn and pasture
sugarcane
Corn, Soybean and bean
Cotton, Corn, Soybean and bean
Successive and concomitant crops

Aug: millet / summer bean
-Sep: millet/ precocious soybean/summer bean
-Oct: millet/soybean
-Nov: summer corn/soybean
-Dez: cotton/soybean/summer corn
-Jan: soybean/cotton/summer corn/autumn bean
-Feb: soybean/cotton/summer corn/narrow cotton/autumn bean
-Mar: soybean/cotton/summer corn/autumn corn/narrow cotton
-Apr.: cotton/autumn corn/narrow cotton
-May: cotton/autumn corn/narrow cotton/winter bean
-Jun: cotton/autumn corn/narrow cotton/irrigated corn/winter bean
-Jul: cotton/autumn corn/narrow cotton/irrigated corn
Successive and concomitant crops

- Ratoon crops
- Volunteer plants
- Tomato
- Sorghum
- Sunflower
- Peanut
- Sugar cane
TROPICAL AGRICULTURE E IPM

- DISPERSION

-SUPPLYING CROP ➔ RECEIVING CROP

- CONSTANTE REDISTRIBUTION

- ALTERNATIVE HOSTS
Tropical Agriculture E MIP

Spodoptera spp

Spodoptera spp
Heliothis

Spodoptera spp
Pseudoplusia

Bemisia
Pseudoplusia

STRAW
MILLET

Heliothis
Helicoverpa

Heliothis
Helicoverpa

Heliothis
Helicoverpa
Bemisia
Lagarta-das-maçãs:
*Heliothis virescens* (Fabrícius, 1781) (Lepidoptera: Noctuidae)
*Helicoverpa zea* (Bod., 1850) (Lepidoptera: Noctuidae)
Lagarta-das-maçãs: 
*Heliothis virescens* (Fabrícius, 1781) (Lepidoptera: Noctuidae)  
*Helicoverpa zea* (Bod., 1850) (Lepidoptera: Noctuidae)
<table>
<thead>
<tr>
<th></th>
<th><strong>Soybean</strong></th>
<th><strong>Cotton</strong></th>
<th><strong>Corn</strong></th>
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<tbody>
<tr>
<td>Planting season</td>
<td>02/10 a 20/11</td>
<td>20/12 a 20/01</td>
<td>15/11 a 05/03</td>
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<tr>
<td>Planting system</td>
<td>No-till</td>
<td>No-till</td>
<td>No-till</td>
</tr>
<tr>
<td>Varieties</td>
<td>Desafio rr, 5909rr</td>
<td>Bayer 775, 901</td>
<td>P30F53, DKB340, 2B710</td>
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<tr>
<td>Main Pest Species</td>
<td>Chrysodeixis includens, Bemisia tabaci</td>
<td>Chrysodeixis includens, Bemisia tabaci</td>
<td>Dichelops sp, Spodoptera frugiperda</td>
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<tr>
<td>Main insecticides</td>
<td>Chlorantraniliprole + lambdacyhalothrin, - Lufenuron + profenos, - Methoxyfenoside - Flubendiamide - Acephate - neonics + pyrethroides</td>
<td>Chlorantraniliprole - Methoxyfenoside - Flubendiamide - Acephate - neonics + pyrethroides</td>
<td>- acephate - methidathion - chlorpyrifos - diflubenzuron</td>
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<tr>
<td>Pest monitoring?</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
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<tr>
<td>Tank mix?</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
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<tr>
<td>Insecticides unregistered?</td>
<td>Emamectin Benzoate?</td>
<td>Emamectin Benzoate?</td>
<td>No</td>
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<tr>
<td>Off-label doses</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Rotation crop?</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Refuge</td>
<td>Yes, so far</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td></td>
<td>Soja</td>
<td>Algodão</td>
<td>Milho</td>
</tr>
<tr>
<td>----------------------</td>
<td>-------------------------------------------</td>
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<tr>
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<td>20/09 a 10/12</td>
<td></td>
<td>10/01 a 20/04</td>
</tr>
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<td></td>
<td>No till</td>
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<td>Varieties</td>
<td>AS 3730 IPRO, AS 3797 IPRO, BMX POTÊNCIA</td>
<td></td>
<td>2B 587 PW, 2B 710 PW, 2B 433 PW,</td>
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<tr>
<td></td>
<td>RR, NS 7300 IPRO, NS 7209 IPRO, M 6410 IPRO, M 7110 IPRO, M 7166 IPRO.</td>
<td></td>
<td>DKB 390 PRO 2, DKB 290 PRO,</td>
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<td></td>
<td></td>
<td></td>
<td>DKB 310 PRO, 30 A 37 PW, 30 F 53 HX</td>
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<td>Main insecticides</td>
<td>Diamidas, Triflumuron, Teflubenzuron, Metoxifenozida, Clorpirifós, Metomil, imdacloprido, abamectina</td>
<td>Diamida, Triflumuron, Teflubenzuron, Metoxifenozida, Metomil, imdacloprido, Espinosade.</td>
<td></td>
</tr>
<tr>
<td>-------------------</td>
<td>--------------------------------------------------------------------------------------------------</td>
<td>----------------------------------------------------------------------------------</td>
<td></td>
</tr>
<tr>
<td>Monitoring?</td>
<td>IPM: EACH 2 DAYS</td>
<td>IPM: EACH 2 DAYS</td>
<td></td>
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<tr>
<td>Tank mix?</td>
<td>Herbicide + insecticide + fertilizer + fungicide + mitecide</td>
<td>Herbicide + insecticide + fertilizer + fungicide + mitecide</td>
<td></td>
</tr>
<tr>
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<td>No</td>
<td>No</td>
<td></td>
</tr>
<tr>
<td>Off-label doses</td>
<td>yes (if the label doses do not work)</td>
<td>yes (if the label doses do not work)</td>
<td></td>
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<tr>
<td>Rotation crop?</td>
<td>Soybean x corn x sorghum</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Refuge</td>
<td>yes</td>
<td>no</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Soja</td>
<td>Algodão</td>
<td>Milho</td>
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<tr>
<td>Planting season</td>
<td>15/09 a 15/12</td>
<td>30/10 a 20/11</td>
<td>10/08 a 31/12…</td>
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<tr>
<td>Planting system</td>
<td>NO-TILL</td>
<td>NO-TILL</td>
<td>NO-TILL</td>
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<td>Varieties</td>
<td>Msoy 5917 Ipro/ AS 3610 Ipro/ N5959 Ipro/ N5909</td>
<td>966/977</td>
<td>30F53/ 30A37/ DKB285/ AG7098</td>
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<td>Main Pest Species</td>
<td>Crysodeixis</td>
<td>Heliothis virescens</td>
<td>Spodoptera frugiperda</td>
</tr>
<tr>
<td></td>
<td>Helicoverpa</td>
<td>Helicoverpa armigera</td>
<td>Bugs</td>
</tr>
<tr>
<td></td>
<td>Bugs</td>
<td>Mites</td>
<td>Whitefly</td>
</tr>
<tr>
<td></td>
<td>Whitefly</td>
<td></td>
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<tr>
<td>Main insecticides</td>
<td>Diamides</td>
<td>Diamides</td>
<td>Diamides</td>
</tr>
<tr>
<td></td>
<td>Thiodicarb</td>
<td>Pirethroids</td>
<td>Spinosad</td>
</tr>
<tr>
<td></td>
<td>Methomil</td>
<td>Neonics + Pirethroids</td>
<td>Methomil/ Thiodicarb</td>
</tr>
<tr>
<td></td>
<td>IGR</td>
<td></td>
<td>Neonics + Pirethroids</td>
</tr>
<tr>
<td></td>
<td>Neonics + pyrethroids</td>
<td></td>
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<tr>
<td>Pest monitoring?</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
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<tr>
<td>Tank mix?</td>
<td>Yes</td>
<td>Yes</td>
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<tr>
<td>Insecticides</td>
<td>Yes</td>
<td>Yes</td>
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<td>unregistered?</td>
<td></td>
<td></td>
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<td>Off-label doses</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
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<tr>
<td>Rotation crop?</td>
<td>Yes (Bt not avaliable)</td>
<td>Yes</td>
<td>Yes</td>
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<tr>
<td>Refuge</td>
<td>Yes/no</td>
<td>Yes</td>
<td>No (just about 5%)</td>
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<tr>
<td></td>
<td>Soybean</td>
<td>Corn</td>
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<td>------------------------</td>
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<tr>
<td><strong>Planting season</strong></td>
<td>Out - Nov</td>
<td>Out - Nov (Safra)/Fev-Mar (Safrinha)</td>
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<td><strong>Planting System</strong></td>
<td>No-till</td>
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<tr>
<td><strong>Varieties</strong></td>
<td>Nidera – NA 5909 RG BMX – Potencia RR</td>
<td>Ag 8061 DKB 390 DKB 290 Pioneer 30F35</td>
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<tr>
<td><strong>Tank Mix?</strong></td>
<td>yes</td>
<td>yes</td>
<td></td>
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<tr>
<td><strong>Insecticides unregistered?</strong></td>
<td>Yes</td>
<td>yes</td>
<td></td>
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<tr>
<td><strong>Off-label doses</strong></td>
<td>Yes</td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td>Main Pests</td>
<td>SOJA</td>
<td>MILHO</td>
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<td>--------------------</td>
<td>--------------------------------------------</td>
<td>--------------------------------------------</td>
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<tr>
<td></td>
<td>Spodoptera spp Elasmopalpus Crhysodeixis</td>
<td>Agrotis Elasmopalpus White Grubs</td>
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<tr>
<td></td>
<td>Anticarsia Bugs Whitefly</td>
<td>Spodoptera furgiperda Aphids</td>
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<td>Main Insecticides</td>
<td>Fipronil – T.S. Metomil – Dessecação</td>
<td>Fipronil – T.S. Metomil – Dessecação</td>
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<tr>
<td></td>
<td>Triflubenzuron Flubendiamida Clorantraniliprole Clorfenapir</td>
<td>Espinosade Flubendiamida</td>
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<tr>
<td></td>
<td>Betaciflutrina + imidacloprido</td>
<td>Flubendiamida</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Lambdaclialotrina+tiametox an Acefato</td>
<td>Triflubenzuron</td>
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<tr>
<td>Monitoring</td>
<td>Yes</td>
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## Northwest – SP – Irrigation crop

<table>
<thead>
<tr>
<th>Question</th>
<th>Yes</th>
<th>yes</th>
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<tbody>
<tr>
<td>Rotation crop?</td>
<td>Yes</td>
<td>yes</td>
</tr>
<tr>
<td>Refuge for Bt crops</td>
<td>no</td>
<td></td>
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</table>
Metodologia de aplicação
1. Contato
2. Ingestão
3. Caminhamento
Metodologia de avaliação

1. Contato
2. Ingestão
3. Caminhamento
Quantificação de formas de contaminação de diferentes inseticidas no controle do percevejo marrom, *Euschistus heros*, na cultura da soja

Tabela 1. Efeito de contato. 20 percevejos adultos por tratamento. Número de percevejos vivos pro tratamento e %E.

<table>
<thead>
<tr>
<th>Tratamentos</th>
<th>1 hora após exposição</th>
<th>6 horas após exposição</th>
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<td></td>
<td>Total</td>
<td>%E</td>
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<tr>
<td>1 – Controle</td>
<td>20</td>
<td>--</td>
</tr>
<tr>
<td>2 – Acefato</td>
<td>20</td>
<td>0</td>
</tr>
<tr>
<td>3 – Piretróide + Neonic</td>
<td>0</td>
<td>100</td>
</tr>
<tr>
<td>4 – Neonic</td>
<td>0</td>
<td>100</td>
</tr>
<tr>
<td>5 – Piretroide</td>
<td>0</td>
<td>100</td>
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</tbody>
</table>
Mosca-Branca – *Bemisia tabaci* Biótipo B
CONTROL DIFFICULTIES

- Genetic plasticity
- Fecundity
- Hormoligosis
- Hosts
- Overlap generations
- Adaptability for different areas
- Capacity to develop resistance
- Attack Surprise
- Control based exclusively on the chemistry
Chemical control

- **KETOENOL**: spiromesifen, spirotetramat
- **JUVENILE HORMONE ANALOG**: piriproxifen
- **ANTHRANILIC DIAMIDE**: chlrorantraniliprole, cyantraniliprole, IKI-3106
- **NEONICOTINOIDS**: acetamiprid, imidacloroprid, thiamethoxam, thiacloprid, dinotefuron
- **SULFOXIMINE**: sulfoxaflor
- **SELECTIVE FEEDING BLOCKER**: pymetrozine, flonicamid, pyrifluquinazon
- **NATURALYTE**: spinosad, spinetoran
- **OXADIAZINE**: indoxacarb

- Mixtures
- MANAGEMENT
Insecticides advantages:

- only practical action for the control of populations of insects when these reach the damage level;

- it provides fast healing action against a visible damage or great efficiency in the preventive action;

- offers a vast range of properties, uses and application methods, for different conditions of occurrence of pests;

- it provides good economical return and use cost relatively low;

- it makes possible to the producer an isolated and independent action.
among other, limitations in the medium or short period as:

- biological unbalances;
- increase population of secondary pests;
- resistance;
- residues in foods
- environmental contamination;
- risks to the sprayers;
- solution just temporary for the problems of pests occurrence.
Insecticide on the pre-plant burndown
OBJECTIVOS:

1) The caterpillars that survive in the straw reduce the stand of the crops significantly?

2) The application of insecticides in the pre-plant burndown for the no-till reduce the infestation of caterpillars significantly?

3) The Bt crops are damaged for the big caterpillars that survived in the straw?
FAW
FAW
Evaluations
Attack initial intense of *Agrotis ipsilon* (black cutworm)
Seed treatment importance
Seed treatment importance
Testemunha 1D quase totalmente destruída pelas lagartas
pest management has not been an easy and very defined task

- resistance to several chemical groups
- increase of the use of Bt crop in cotton, corn and soy.
- great reproductive capacity
- interval among generations relatively short
- polyphagy
- crop system successive and/or concomitant
- favorable scenery for the dispersion and adaptation of the pest and evolution of the resistance to the pesticides.
MANAGEMENT PROGRAMS

• To consider characteristics of each region
• Planting calendar for each region
• Sanitary emptiness
• Control of voluntary plants
• IRM serious and efficient
• Refuge areas in Bt crop
• Pest control in crops that act as “pest suppliers” for the subsequent crop
• Use correct and safe of pesticides with regard to the label of each product are fundamental for the sustainability of the agriculture in the tropical areas.
Work Team

- Geraldo Papa
- Cristiani Negrão
- José Antonio Augustini
- Fernando J. Celoto
- Maurício Rotundo
- Willian Takao
- Daniele Romano
- Marco Antonio Sandoval Macedo
- Lucas Luis de Souza Viganó
- Halisson Sodré da Silva Vieira
- Gabriella Talita
- Victor Montoro
- João Antonio Zanardi Jr
- Victor Coleta
- Anselmo Giro Neto
- Eduardo Barbosa
OBRIGADO/Thank you

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