RESULT FROM 2 ½ YEARS OF BWACT USE IN THE BOLL WEEVIL SUPPRESSION PROGRAM OF PARAGUAY

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Abstract

Cotton in Paraguay is the main "cash" crop for more than 100,000 small family farms. The Paraguayan system of cotton production is unique and currently provides employment for approximately 1,000,000 people (20% of country's population); it generates an annual "cash flow" of US$ 400,000,000.

Even with the a social and economic importance of this crop, from 1990/91 to 1996/97 the planting decreased 80%, from 1,375,000 acres to 275,000 acres. One of the main reasons for this reduction was the arrival of the boll weevil (*Anthonomus grandis Boh.*); it entered from Brazil and quickly established in 90% of the production zones, causing an increase in the production cost of 35% and a decrease in the cotton production of 40%. In the cotton crop 1997/98, the Ministry of Agriculture designed and started a "NATIONAL PLAN TO REACTIVATE COTTON" (NPRC); as part of the NPRC, there is a "National Boll Weevil Suppression Program". The weevil program is based on the installation Boll Weevil Attract and Control Tubes (BWACTs or TMPs or TMB) at cotton planting and stalk destruction.

BWACTs are used in the entire cotton cultivation area at a rate of 1 per field or 2.5 acres, maximun. After 2½ years of the Program, the boll weevil population has been decreased by 85% and there has been a decrease in the quantity of insecticide used for boll weevils from 6-8 applications per crop to less than 1 in the cotton crop of 1998/99.

Equally important there was a decrease in production losses from boll weevil damage of about 40% in the 1996/97 crop to damage levels of no economic importance in the 1998/99 crop. The cost of the BWACT program is $ 8.80 per acre per crop.

Objectives of the Boll Weevil Suppression Program

- With a low per acre cost, to reduce the boll weevil population and avoid economic damage during the cotton crop cycle.
- To diminish production costs and,
- To increase the production, achieving a sustaintable crop within the Paraguayan cotton system.

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Characteristic of the Paraguayan Cotton System

Graph # 1
Graph # 2
Graph # 3
Graph # 4
Graph # 5
Graph # 6

Technical Basis of Boll Weevil Suppression Program

The Boll Weevil Suppression Program is "preventive" in approach; it is designed to reduce the "over all" population to levels incapable of causing economic damage during the critical period of the cotton crop. Based on the behavior and biology of the boll weevil in Paraguay, the program accomplishes the suppression of populations by using the technology of the BWACT and stalk destruction at the end of the cotton crop and at planting of the following crop. The use of the BWACT at planting will protected the crop for about 50 days without spraying and this provide for a build-up of parasites and predators that normally continue to provide for boll weevil control during the remainder of the critical fruiting cycle.

The "end of crop" installation drives the population to a low level and subsequently natural mortality forces the weevils to a lower level for the benefit of a next crop.

Graph # 7
Graph # 8
Graph # 9

Basic Characteristics of the Boll Weevil Suppression Program

- Pilot Program: June 1997 in about 100,000 acres in the center of the eastern cotton region.
- Suppression Program at a national level started with the cotton crop 1997/98 in 500,000 acres.
- The BWACTs and cottonseed are distributed free of cost to the producers as a Social Program of the State.

Methodology

- At the end of the cotton crop, destruction of the stalks and the installation of 1 BWACT per 2.5 acres.
- Installation of 1 BWACT per 2.5 acres at cotton planting.
- In heavy weevils it is better to install another BWACT 30 days after the first installation.

Advantages

- Delays 6 to 8 weeks the appearance of the boll weevils.

- Very adaptable to the production system of small producers as it compensates for delays in stalk destruction and planting.
- The installation of the BWACT is more flexible, than the application of insecticides.
- It is not dangerous for the environment or the small grower.
- Has a low cost of about $ 8.80 per acre per year.

Disadvantages

- The Boll Weevil Suppression Program with use of BWACT is difficult to measure on a regional level.
- It is a difficult for untrained farmers and technicians to understand the technology.
- It requires area wide planning and implementation that is generally developed by Government Servis of Plant Protection or Grower Foundations.

Results

The results of the program may be observed in the graphs of boll weevils captured in 1,100 to 1,200 traps of the National Monitoring Program of the National Agronomic Institute (NAI); the traps have been distributed in the cotton production zones of the eastern region since 1995.

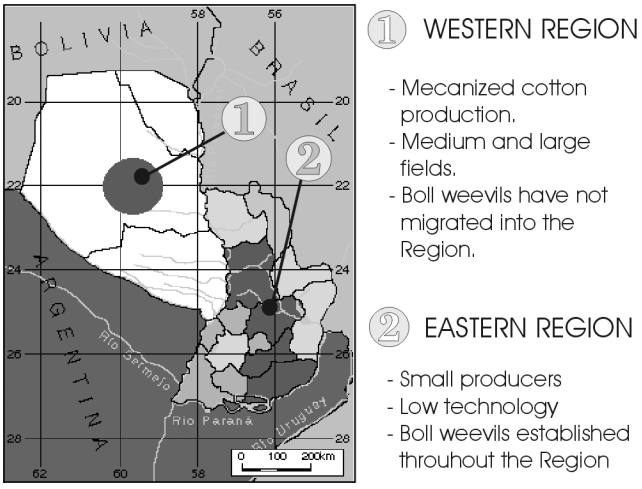
The lower graph illustrates the quantity of BWACT that were placed in the cotton fields since the boll weevil suppression program began and compares the quantity of insecticide application for boll weevil control, before and after the use of BWACTs.

Conclusions

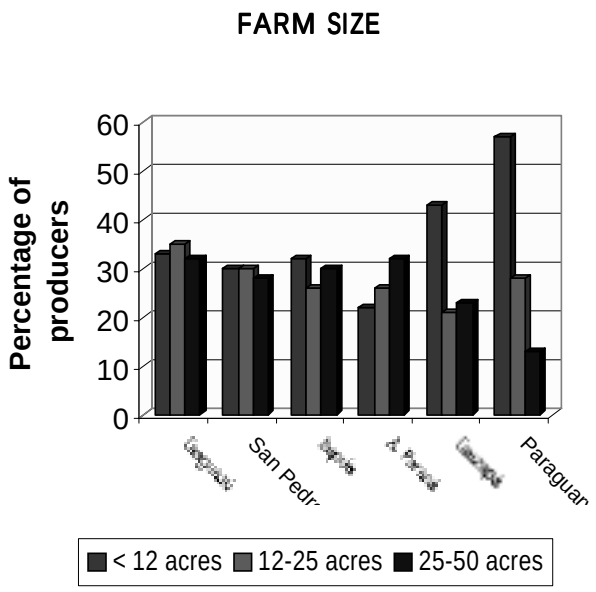
- During the years 1996/96/97, the populations of boll weevils were high and during the cotton crops of those years from 6 to 8 applications of insecticides were required to control weevils.
- From the beginning of the National Suppression Program with the BWACT (October – November of 1997) the population of boll weevils has been decreased 85% and the use of insecticides against boll weevils has been decreased from 6-8 applications during the cotton crops 1995/96 and 1996/97 to 3 during the 1997/98 crop to 0.8 during the 1998/99 crop, in the fields that had BWACTs.
- During the 1997/98 and 1998/99 crops, the damage from boll weevils in the fields containing the BWACTs was economically insignificant.
- It is clear that in Paraguay, where a system of small producers (“family farms”) exists with a very particular ecology, a national preventive program with the use of BWACTs in an economic and viable alternative.
- The low cost of this program is very important for Paraguay, as cotton is the main source of “cash” for 1,000,000 people.
- The preventive programs based on stalk destruction and the suppression of boll weevil populations in the periods between crops, from the end of harvest thru planting until the appearance of the first cotton bloom, reduces the populations and diminishes the number of boll weevils during the critical period of the new cotton crop. This generally reduces the number of boll weevils below the economic damage threshold.

Source

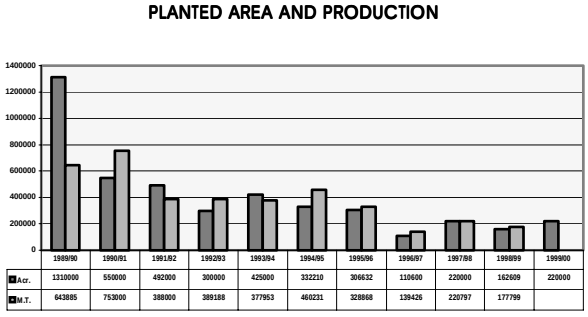
Data provide by the National Agronomic Institute, the Direction of Statistical and Censuses and the Direction of Agrarian Extension of the Ministry of Agriculture and Ganaderia of Paraguay – Actualized to October of 1999.



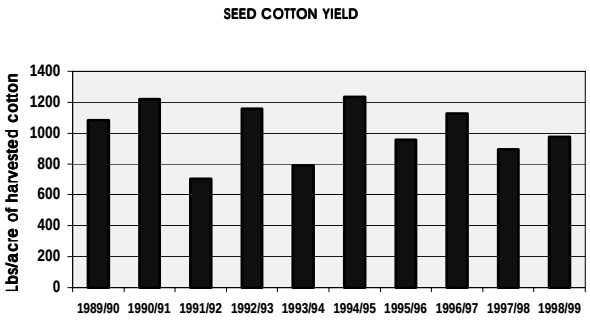
Graph #1



Graph #2



Graph #3



Graph #4

COTTON CROP	FIBER YIELD %
1994/95	32,01
1995/96	34,53
1996/97	34,37
1997/98	33,90
1998/99	35,75

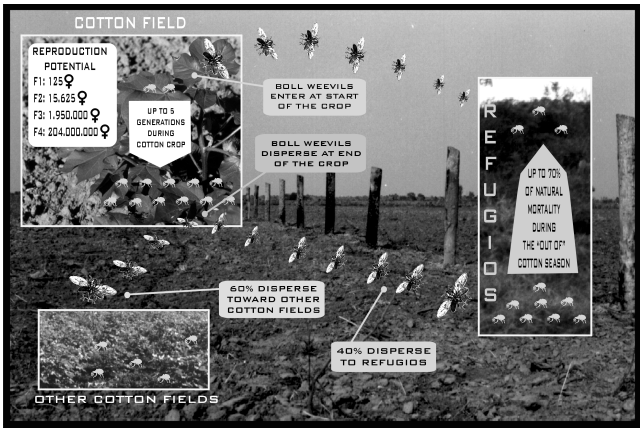
Graph #5

THE IMPORTANCE OF COTTON IN PARAGUAY

PLANTING LEVEL - ACRES	370	620.000	865.000	1.120.000
FAMILY FARMS	75.000	125.000	175.000	225
PEOPLE WORKING IN THE CROP	375	625.000	875.000	1.125.000
PEOPLE WORKING IN THE GINNING	1.200	1.800	2.400	3
TRUKS IN THE TRANSPORT OF COTTON	150	250	350	450
THE MOVEMENT OF MONEY DUE TO COTTON				
VALUE OF LABOR	45.000.000	75.000.000	105.000.000	135.000.000
VALUE OF INPUTS	15.000.000	25.000.000	35.000.000	45.000.000
SALES OF LINT	141.750.000	236.250.000	330.750.000	425.250.000
GINNING SERVIS	33.750.000	56.250.000	78.750.000	101.250.000
TRANSPORT OF COTTON	2.700.000	4.500.000	6.300.000	8.100.000
AMOUNT MILLONS U$S:	*238*	*397*	*556*	*715*

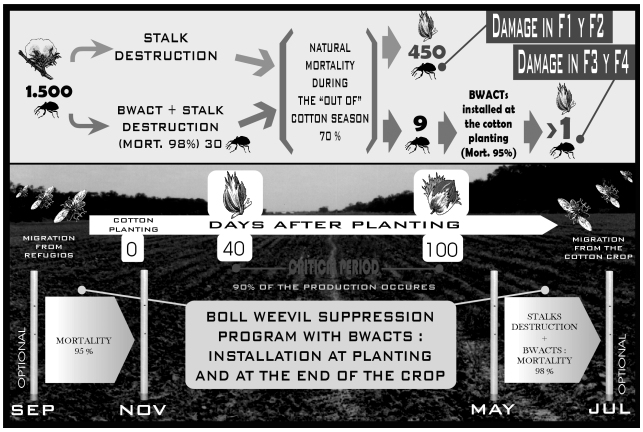
Graph #6

BEHAVIOR OF BOLL WEEVILS IN PARAGUAY



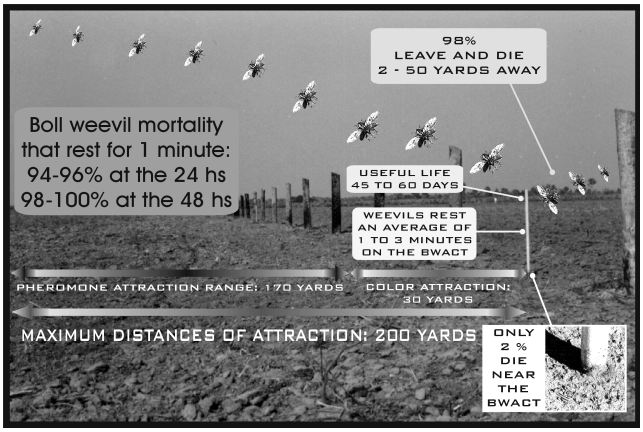
Graph #7

BOLL WEEVILS CONTROL STRATEGY



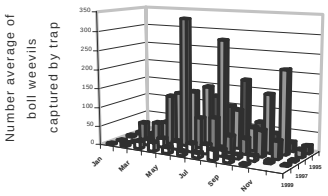
Graph #8

MODE OF ACTION OF THE BWACT

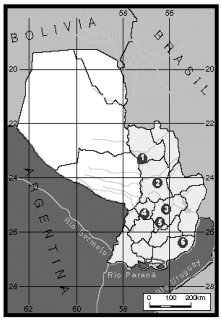


Graph #9

AVERAGE MONTHLY TRAP CAPTURES OF WEEVILS IN
THE NATIONAL MONITORING OF PARAGUAY



	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1999	2,8	9,7	19,6	22,5	14,4	10,5	12,9	26,6	12,6	2,8		
1998	1,6	2,9	14,4	23,3	21,3	21	24	16,4	9,9	13,5	6,9	1,6
1997	5	46,1	51	128	334	78,9	84	43	41	67	46	3
1996	4	7	42,9	128	137	154	280	101	60	151	217	20
1995				26,4	54,8	122	99,6	173	65	41	23	19,2



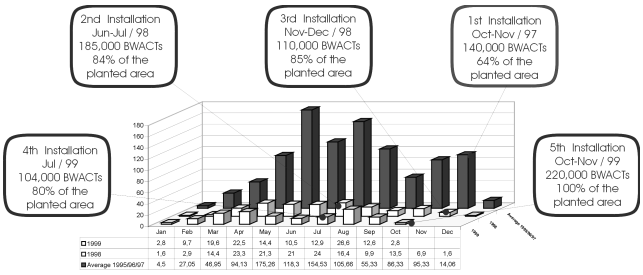
TRAP LINES

Number of traps: 1,100 – 1,200
Places:

1) Concepción
2) Choré
3) Caaguazú
4) Caacupé
5) Natalicio Talavera
   Tomás Romero Pereira

Graph #10

KEY DATA FROM 2 ½ YEARS OF BWACT USE IN THE PROGRAM AT A NATIONAL LEVEL IN PARAGUAY



NUMBER OF APPLICATIONS OF INSECTICIDES FOR BOLL WEEVIL			
BEFORE THE USE OF BWACT		AFTER THE USE OF BWACT	
COTTON CROP 1996/96: 6 APPLICATIONS	COTTON CROP 1996/97: 8 APPLICATIONS	COTTON CROP 1997/98: 3 APPLICATIONS	COTTON CROP 1998/99: 0.8 APPLICATIONS

Graph #11