Exclusion, suppression, and eradication of pink bollworm (*Pectinophora gossypiella* (Saunders)) from the southwestern US and northern Mexico

Eoin Davis, Pink Bollworm Rearing Facility Director
USDA-APHIS PPQ, Phoenix, AZ

Pink Bollworm (PBW) in the USA

- PBW first detected in the USA in Texas in 1917
- Mid-1960s– Established in southern California, western Arizona, northern Mexico
- CA began PBW control & exclusion program in San Joaquin Valley in 1967; sterile insect releases
- Successful exclusion

Pink Bollworm (PBW) in the USA

- Most serious cotton pest in the southwestern USA for 40 years
- More than 72 million acre equivalents of pesticides in AZ & CA alone
- Control costs in excess of $1.3 billion

Source: Arizona Cotton Research & Protection Council

Development & Progress

- 1990s– Significant development work on area-wide population suppression in areas where PBW was well established

Development & Progress

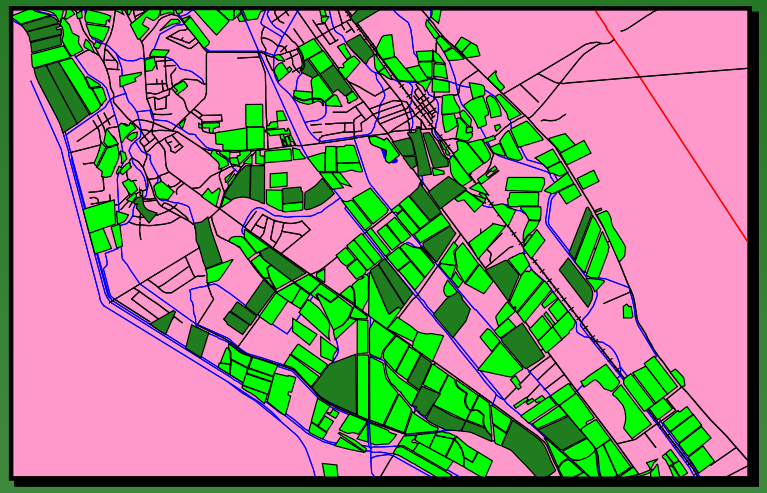
- Broad-ranging, integrated program
  - Cultural controls
  - Mapping
  - Detection
  - Mating disruption
  - SIT, with significant cost reductions
  - BT cotton (once available)

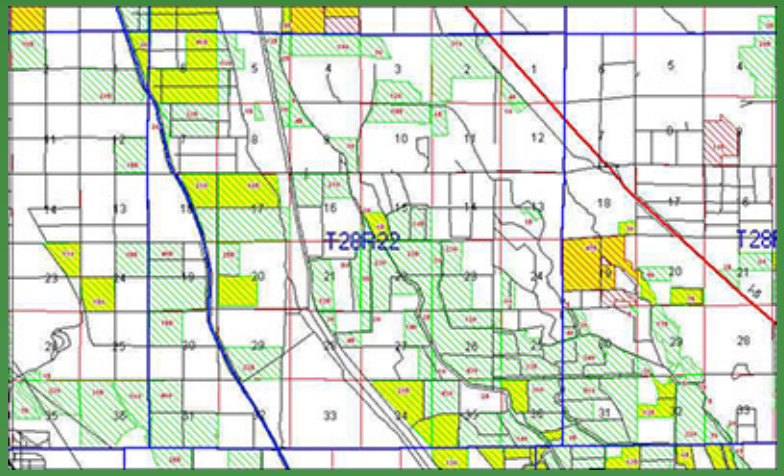
Development & Progress

- Cultural controls
  - Determinate varieties
  - Fall defoliation
  - Spring planting date controls
  - Eliminate hostable material over winter

Development & Progress

- Mapping
  - Field locations
  - Sizes (acreage)
  - Bt vs non-Bt varieties





Development & Progress

- Detection
  - Cotton varieties
    - Bt vs non-BT
  - Desert trap lines in addition to field traps

Development & Progress

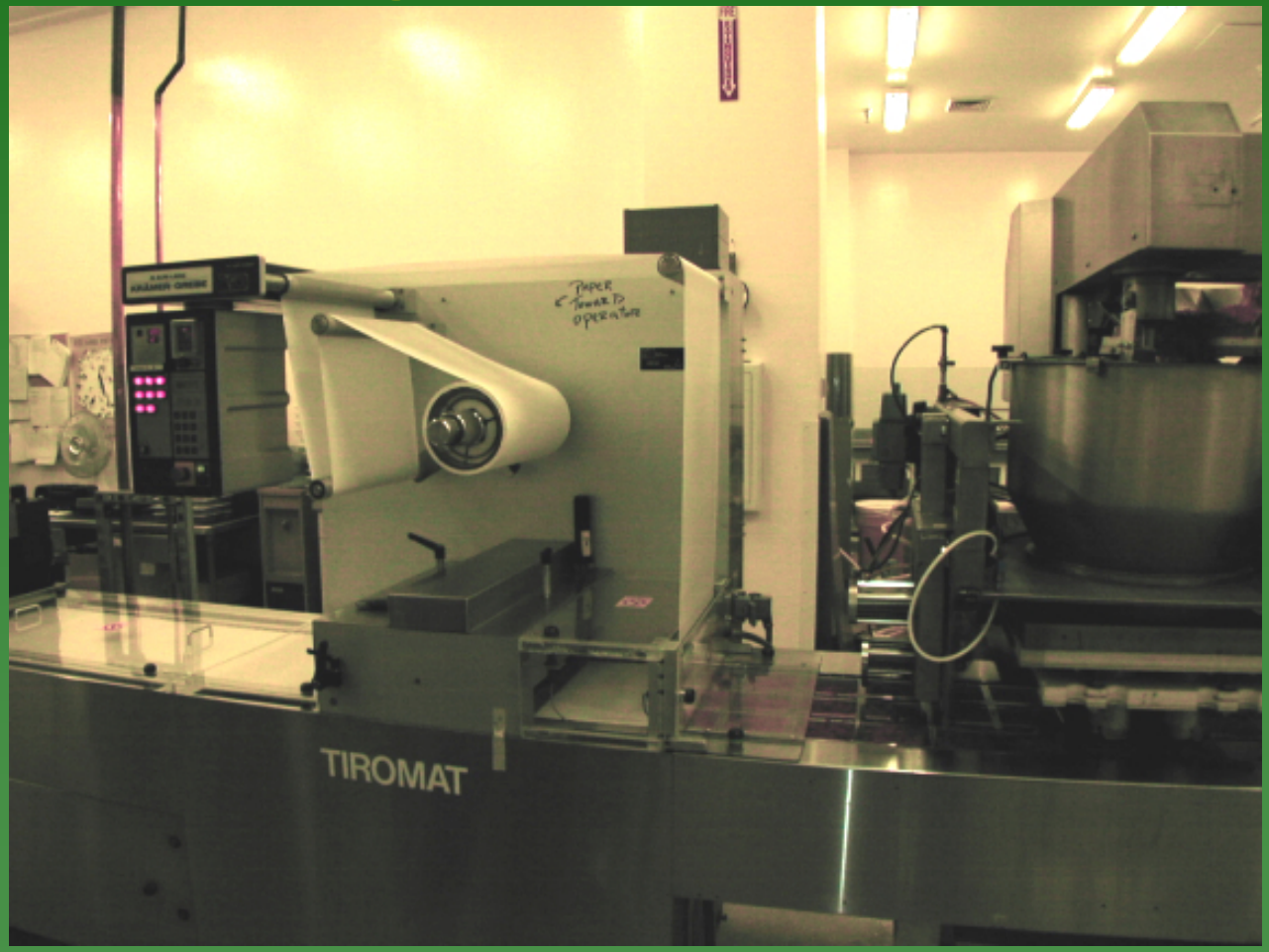
- Control & eradication strategy:
  - Cultural controls
  - SIT
    - New rearing facility allows increased output, lower costs
  - Mating disruption
  - Bt cotton (1996)
  - Limited to no insecticide use

New rearing facility (PBWRF)

- Major changes in diet processing and larval rearing containers were implemented in new facility.
- High volume production possible
- 1995 -2004 @ 5 million/day
- 2005 @12.5 million/day
- 2007 - 10 @ 28 million/day

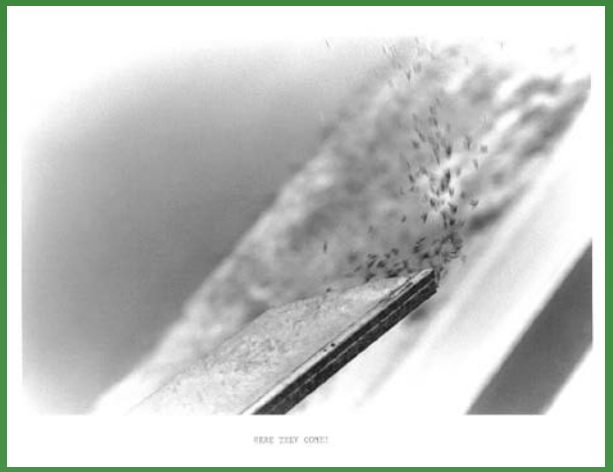
Automated diet production

Rearing unit implant line

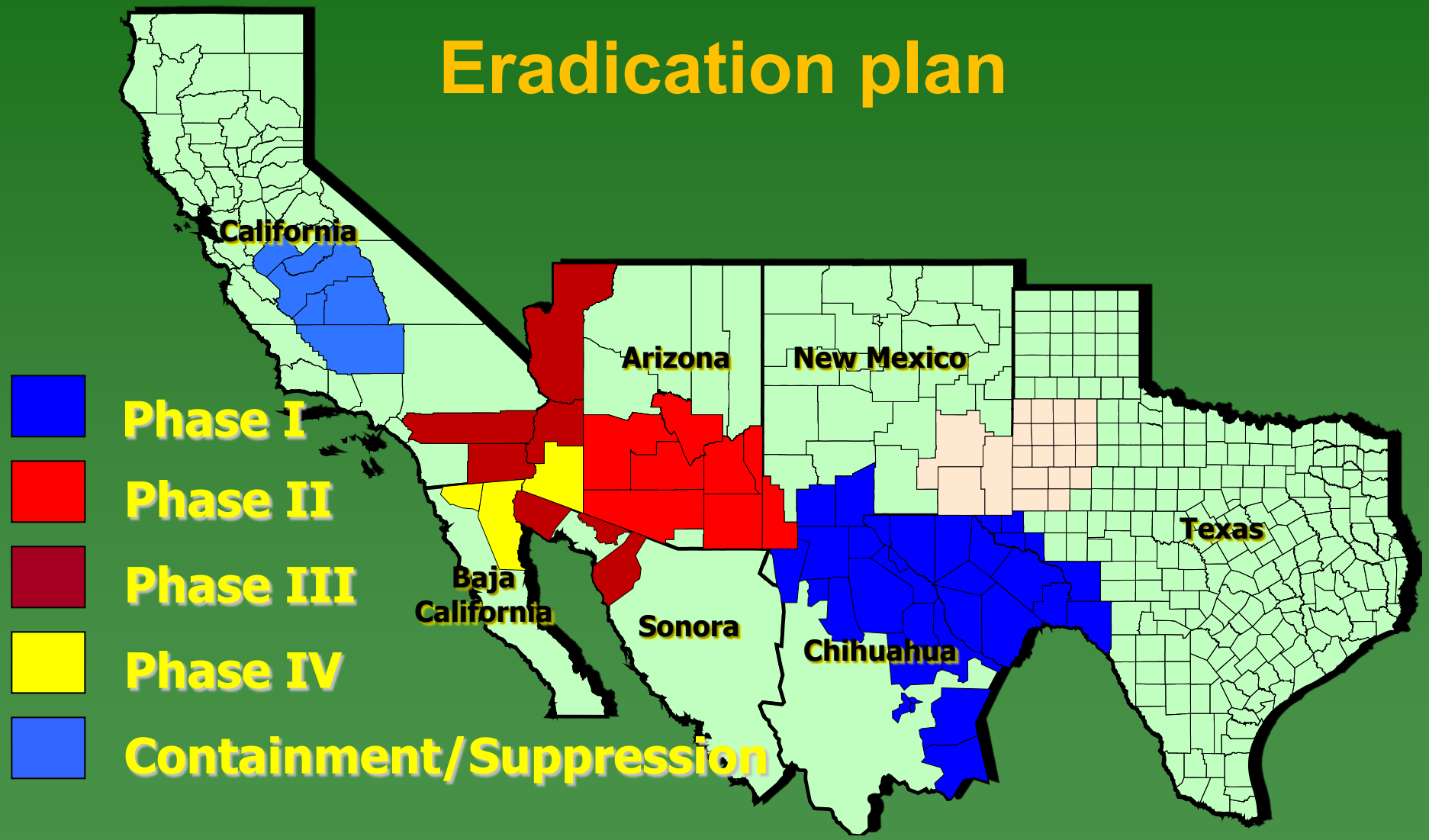


PBW released by piloted aircraft

- Refrigerated release machine placed in aircraft.
- Aircraft flies @ 500 feet (150m) and releases moths over cotton fields.
- Moths emerging from aircraft flying at 110 MPH (175kph).
- Released an average of 250/PBW/acre/day during eradication program (620/ha).



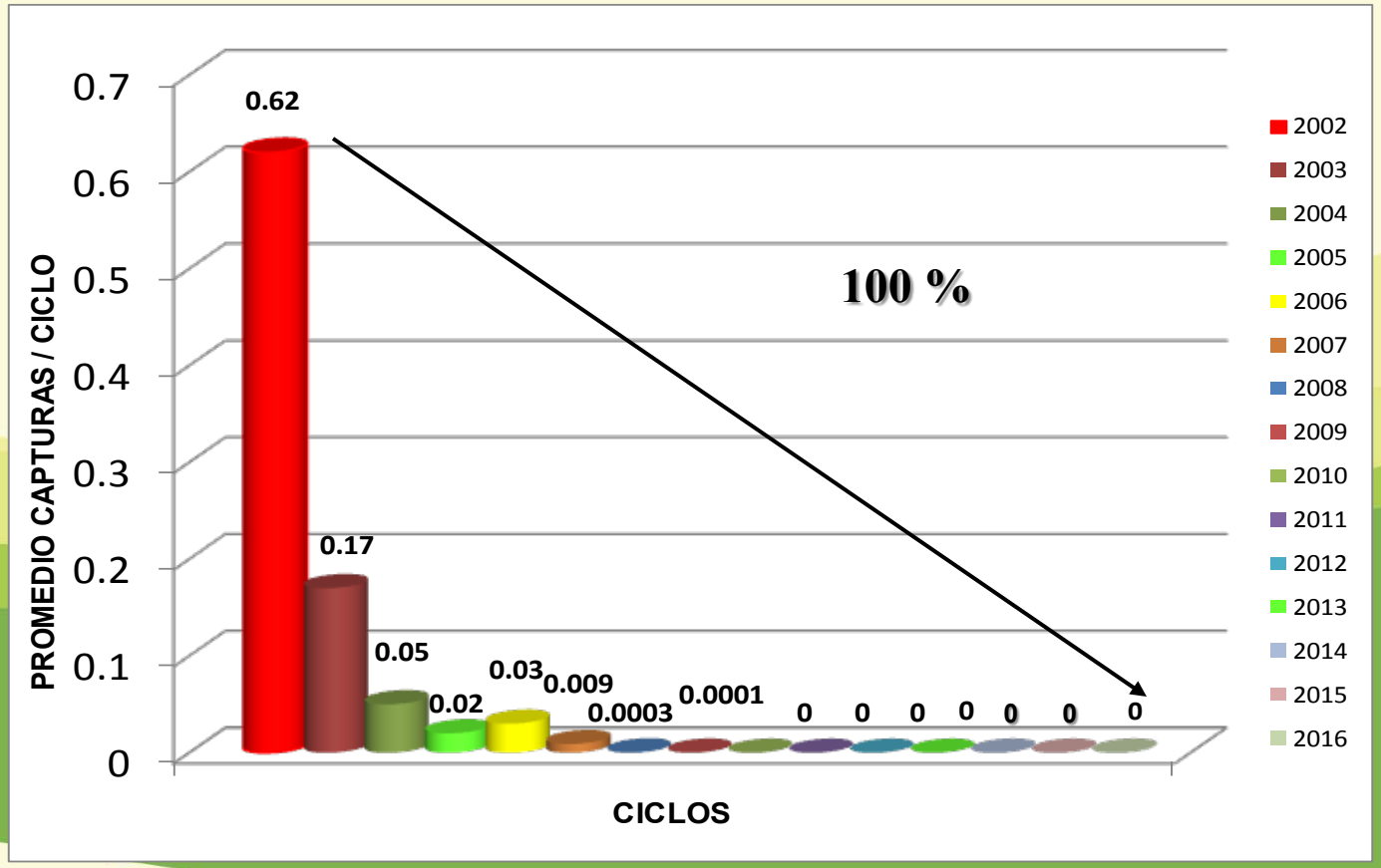
Eradication plan



Is it working?

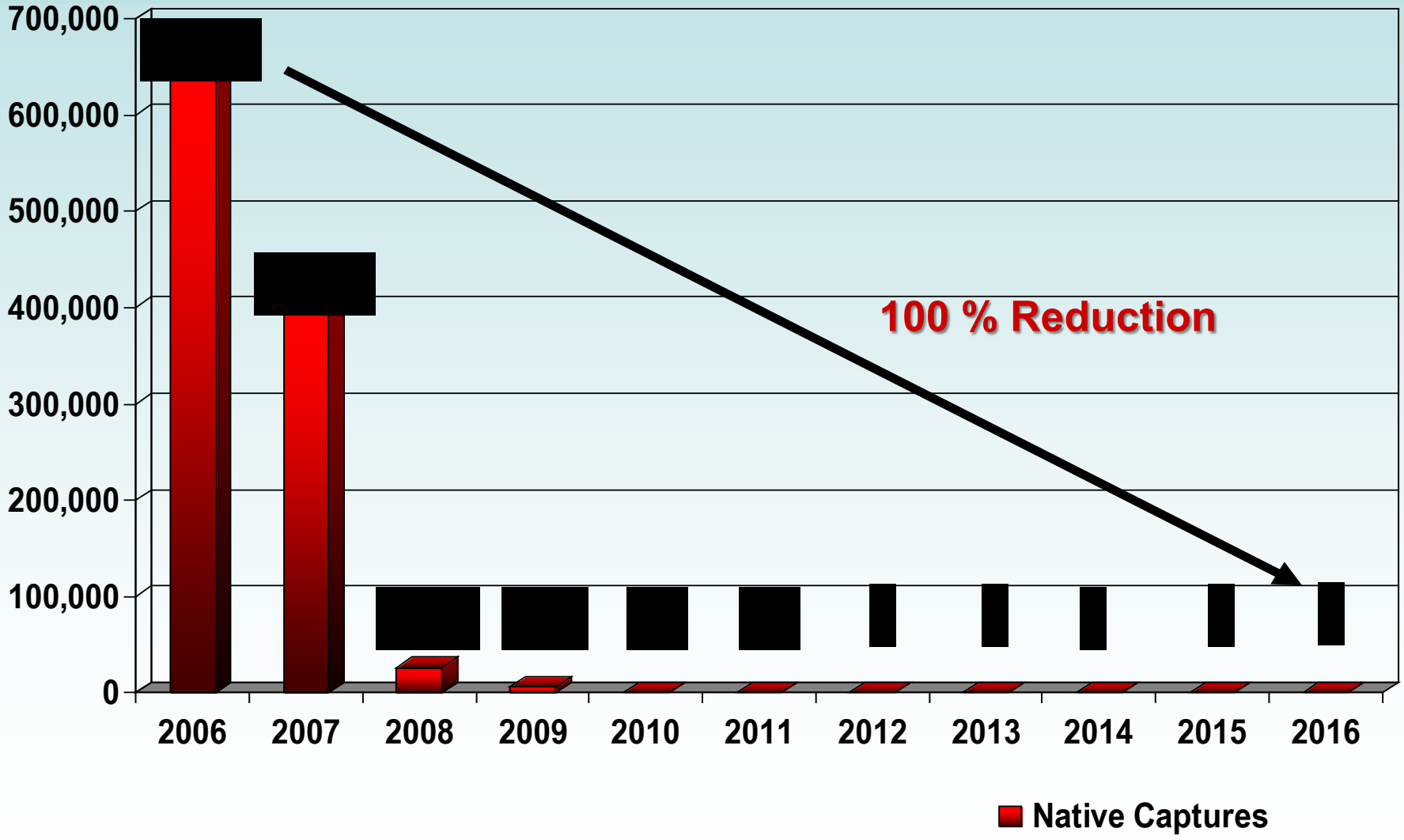
Some data from the US and Mexico

PROMEDIO DE CAPTURAS DE GUSANO ROSADO POR CICLO REGION NORTE (JUAREZ)

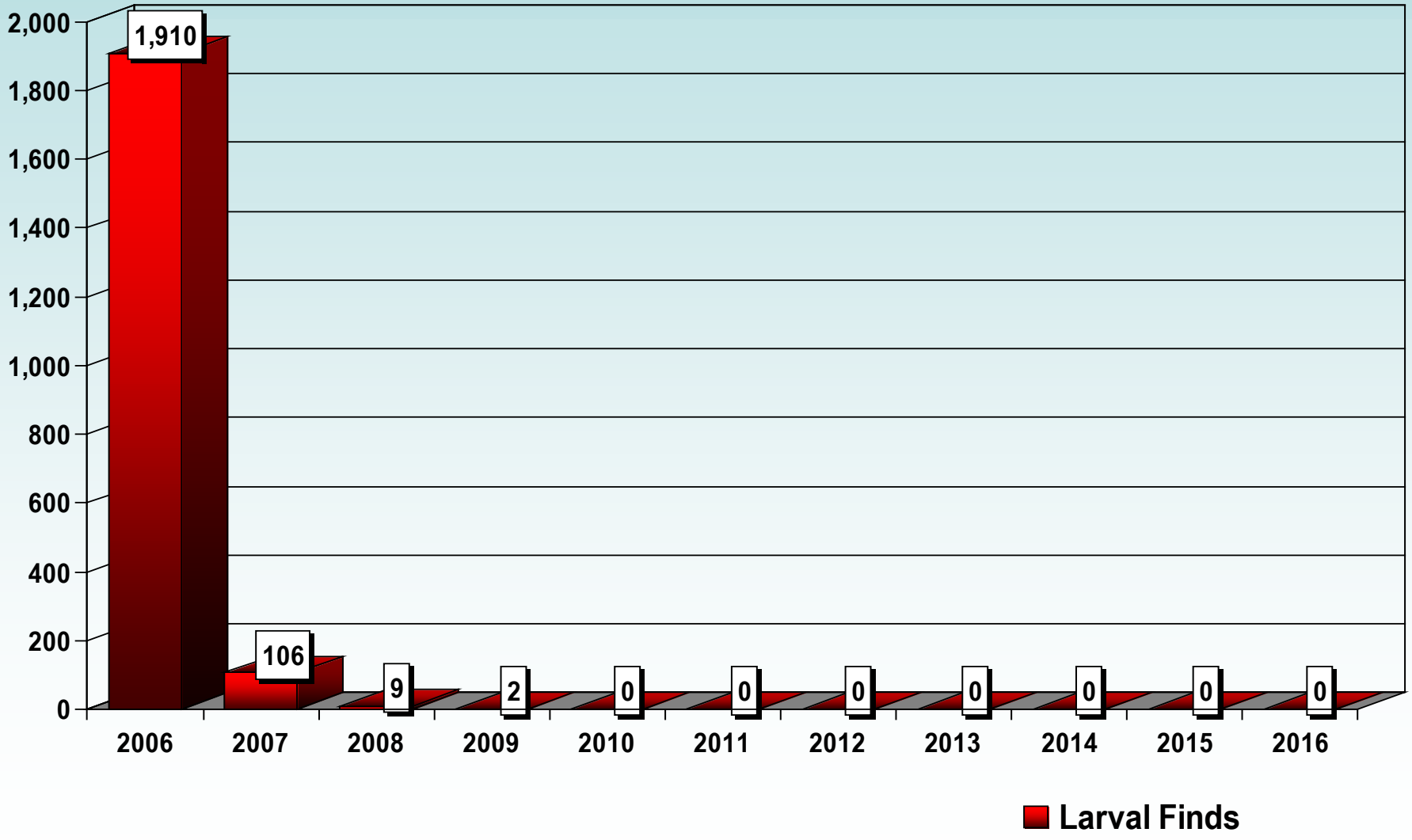


CICLO	PALOMILLAS
2005	1108
2006	1957
2007	447
2008	11
2009	4
2010	0
2011	0
2012	0
2013	0
2014	0
2015	0
2016	0

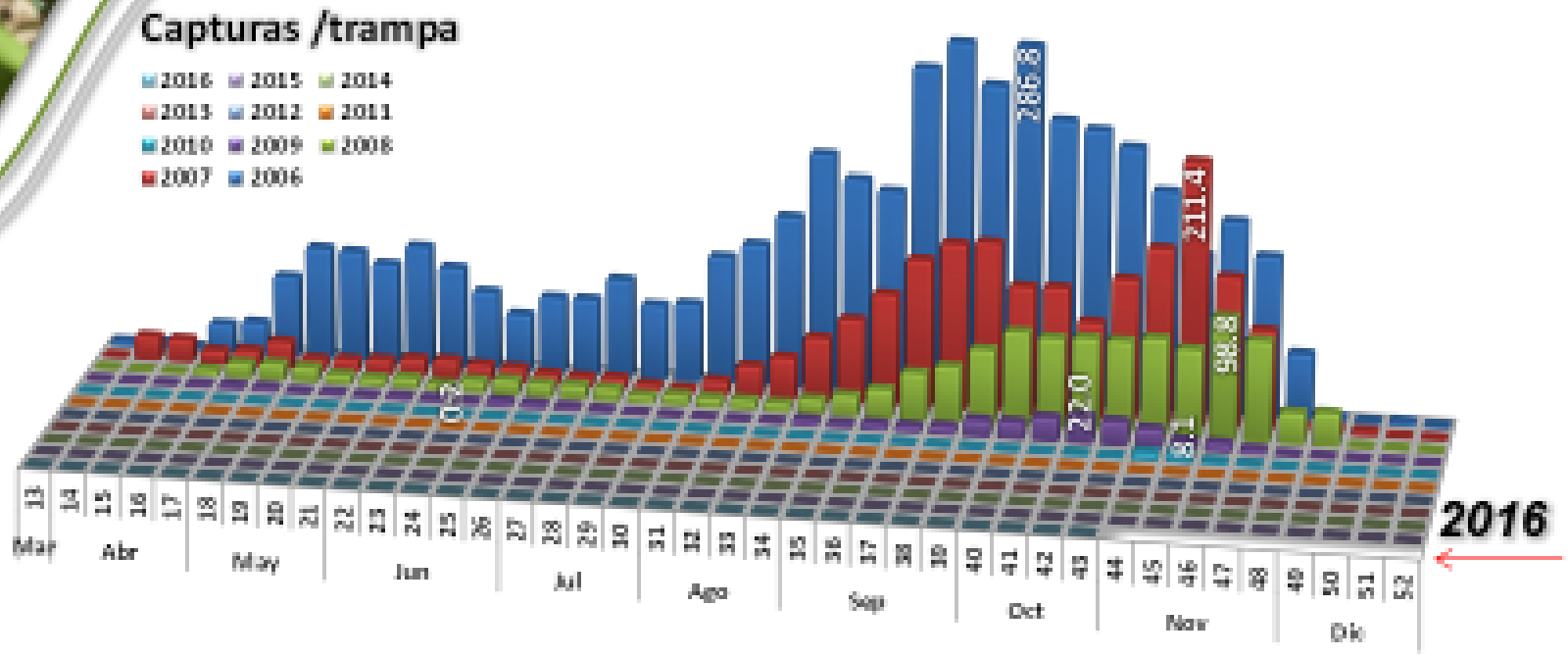
Arizona Reduction in Native Captures 2006-2016

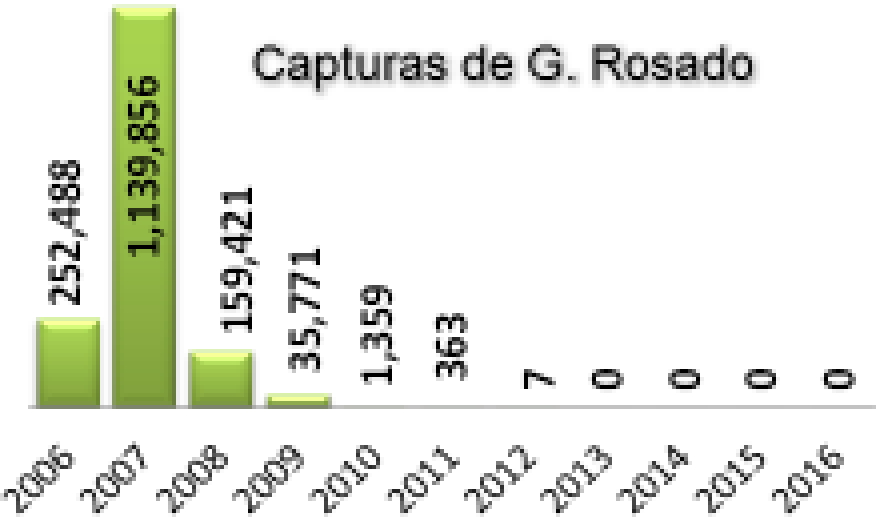


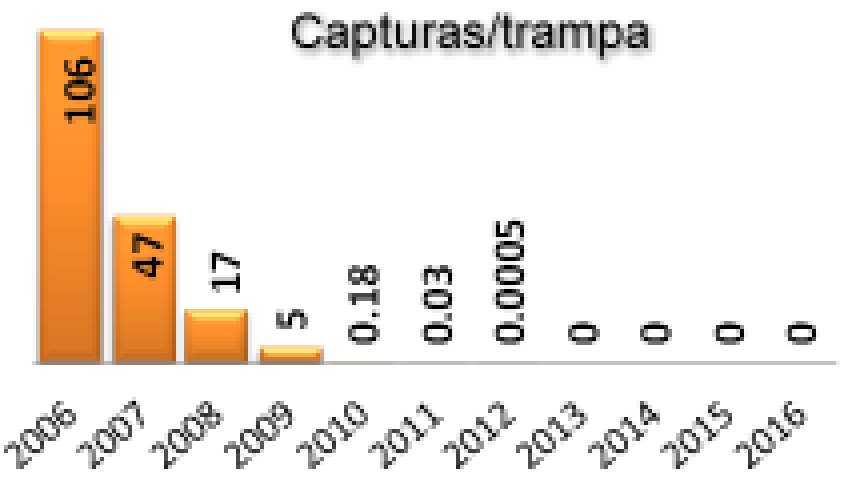
Arizona Reduction in Larval Finds 2006-2016



Resultados de capturas de Gusano rosado, San Luis Río Colorado.







SAGARPA
SECRETARÍA DE AGRICULTURA, GANADERÍA, DESARROLLO RURAL, PESCA Y ALIMENTACIÓN

COMITÈ ESTATAL DE SANIDAD VEGETAL DE BAJA CALIFORNIA

GobBC
GOBIERNO DEL ESTADO

PROGRAMA BINACIONAL DE ERRADICACION DEL GUSANO ROSADO Y PICUDO DEL ALGODONERO EN BAJA CALIFORNIA
2016

SENASICA
SERVICIO NACIONAL DE SANIDAD, INOCUIDAD Y CALIDAD AGROALIMENTARIA

SISTEMA PRODUCTO ALGODON

USDA

SAGARPA
SECRETARÍA DE AGRICULTURA, GANADERÍA, DESARROLLO RURAL, PESCA Y ALIMENTACIÓN

EVALUACION DE RESULTADOS MUESTREO DE BELLOTAS

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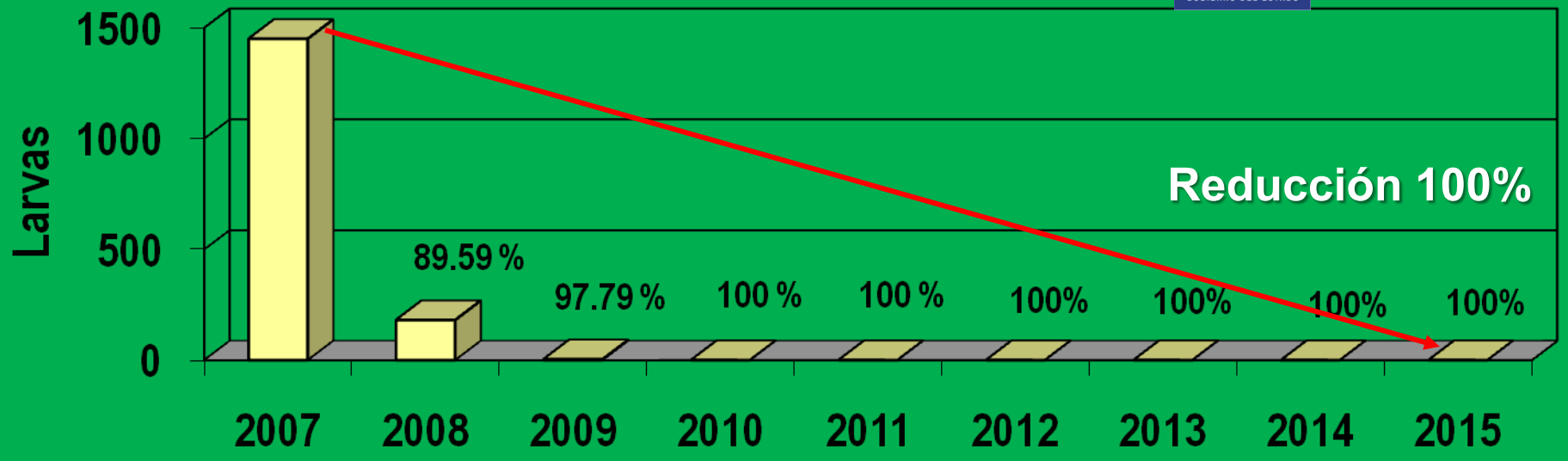
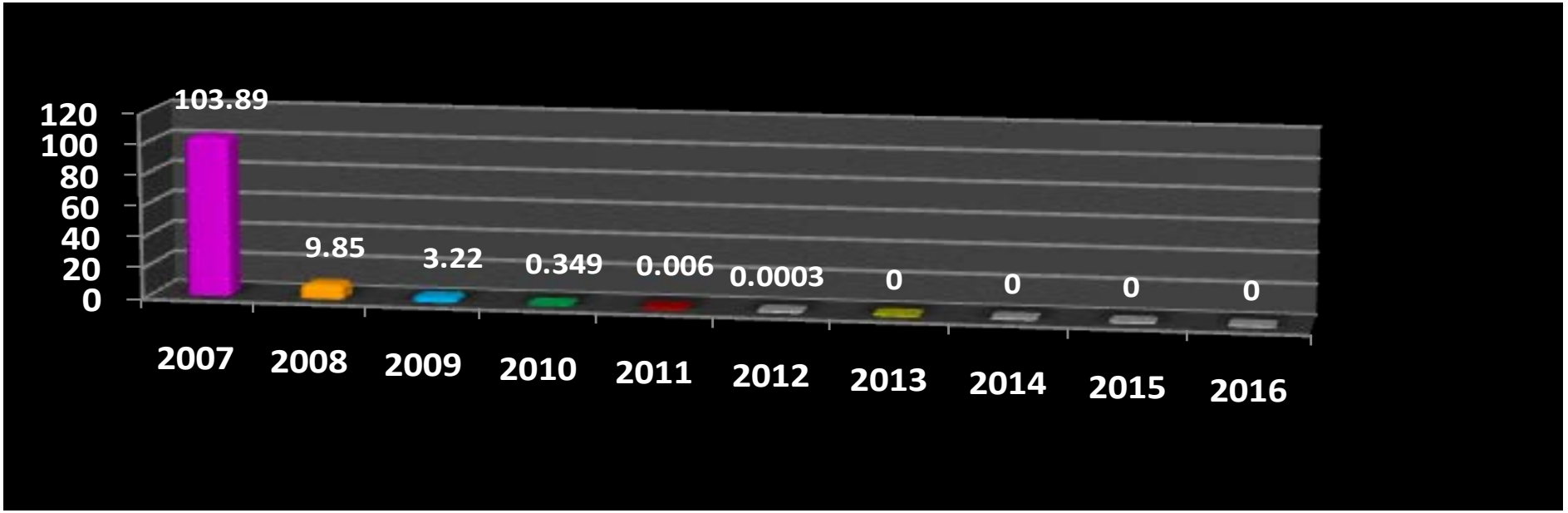


Año	Muestras	Bellotas	Larvas	% Infestación	Reducción	Reducción Acumulada
2007	250	5,000	1450	29.00%		
2008	300	6,000	181	3.02%	89.59%	89.59%
2009	300	6,000	4	0.07%	97.79%	99.76%
2010	300	6,000	0	0.00%	100.00%	100.00%
2011	1,250	24,000	0	0.00%	100.00%	100.00%
2012	1,100	30,000	0	0.00%	100.00%	100.00%
2013	225	4,500	0	0.00%	100.00%	100.00%
2014	330	6,600	0	0.00%	100.00%	100.00%
2015	300	6000	0	0	100	100

DETECCION DE PALOMILLAS DE GUSANO ROSADO POR TRAMPA POR CICLO

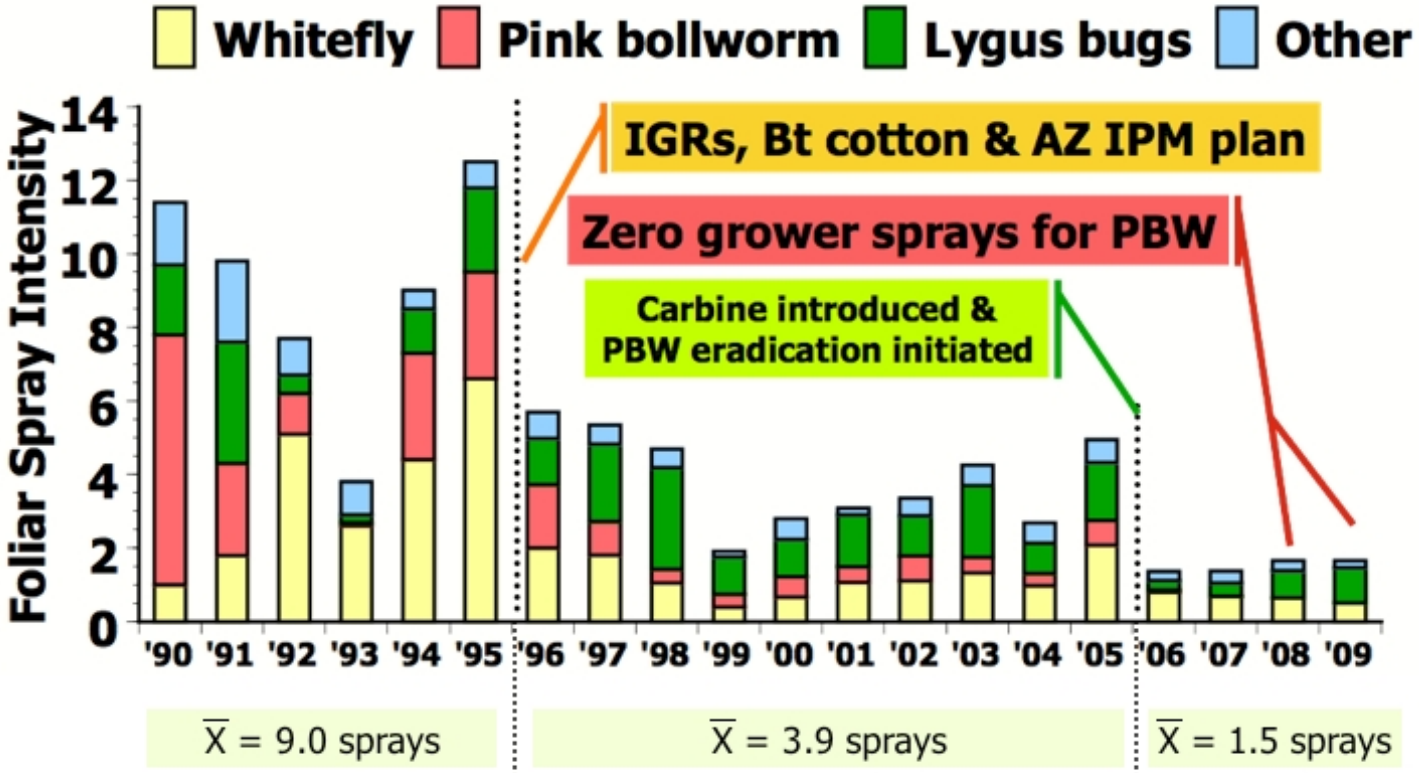


Año	Capturas de palomillas	Promedio C/T/S	Reducción x ciclo	Reducción acumulada
2007	2,705,400	103.89		
2008	709,203	9.85	90.52%	90.52%
2009	162,226	3.22	67.31%	96.90%
2010	15,258	0.349	89.16%	99.66%
2011	401	0.006	96.50%	99.98%
2012	18	0.0003	96.0%	99.99%
2013	0	0.000	100%	100%
2014	0	0.000	100%	100%
2015	**0**	**0.000**	**100%**	**100%**
2016	**0**	**0.00**	**100%**	**100%**

Eradication progress

- No wild moth captures since May 2012
- No Bt resistance seen in wild or PBWRF moths
- Dramatic reduction in pesticide use

Statewide Use Patterns



	Lygus	Whitefly	PBW	Lygus	Whitefly	PBW	Lygus	Whitefly	PBW
No. of Sprays	1.57	3.58	2.72	1.50	1.25	0.64	0.66	0.58	0.02
Cost of Control	$16.61	$69.03	$28.17	$27.21	$36.25	$8.53	$13.42	$16.56	$0.34
% of Total Control Costs	12.9%	52.8%	21.9%	35.4%	45.1%	11.0%	38.4%	47.8%	1.1%

Ellsworth, P.C., 2010. Pink Bollworm Control Costs & Value of Bt Technologies to Arizona Cotton Growers. University of Arizona, College of Agriculture and Life Sciences, Cooperative Extension, Tucson, Arizona.

Thank You!