

# The Role of IPM in a Crowded and Hungry World – Trends in Field Crop IPM in the US

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# Crops in the South: Historically Pest Intensive

Soon after the discovery of Insecticides

- Calendar-based spray schedules
- Disregard for natural enemies/biocontrol
- Limited field scouting
- Limited consideration of environment
- Limited consideration of human health issues
- Issues began to emerge

# Calcium Arsenate Application



# On-farm Results of Insecticide Intensive Management

- Synthetic Organic Insecticides - late 1940s
- Cotton pest control heavily insecticide-based
- Resistance - 1954 boll weevil, 1963 bollworm/budworm
- Banks grass mite miticide resistance in corn and grain sorghum late 1960s
- By 1983 25 pests of cotton resistant to organochlorine insecticides
- Growers slowly realized they must change

# Off-Farm

- Pesticide residues and effects in
  - ✓ Animals
  - ✓ Plants
  - ✓ Soil
  - ✓ Water
- Human Health Issues
  - ✓ Acute poisonings
  - ✓ Chronic conditions
- Social and Political Pressure
  - ✓ Silent Spring - 1962
  - ✓ Establishment of the EPA – 1970
  - ✓ Changes in how pesticides used
    - Training
    - Licensing
    - Record keeping
    - Awareness
    - Stewardship/Conservation



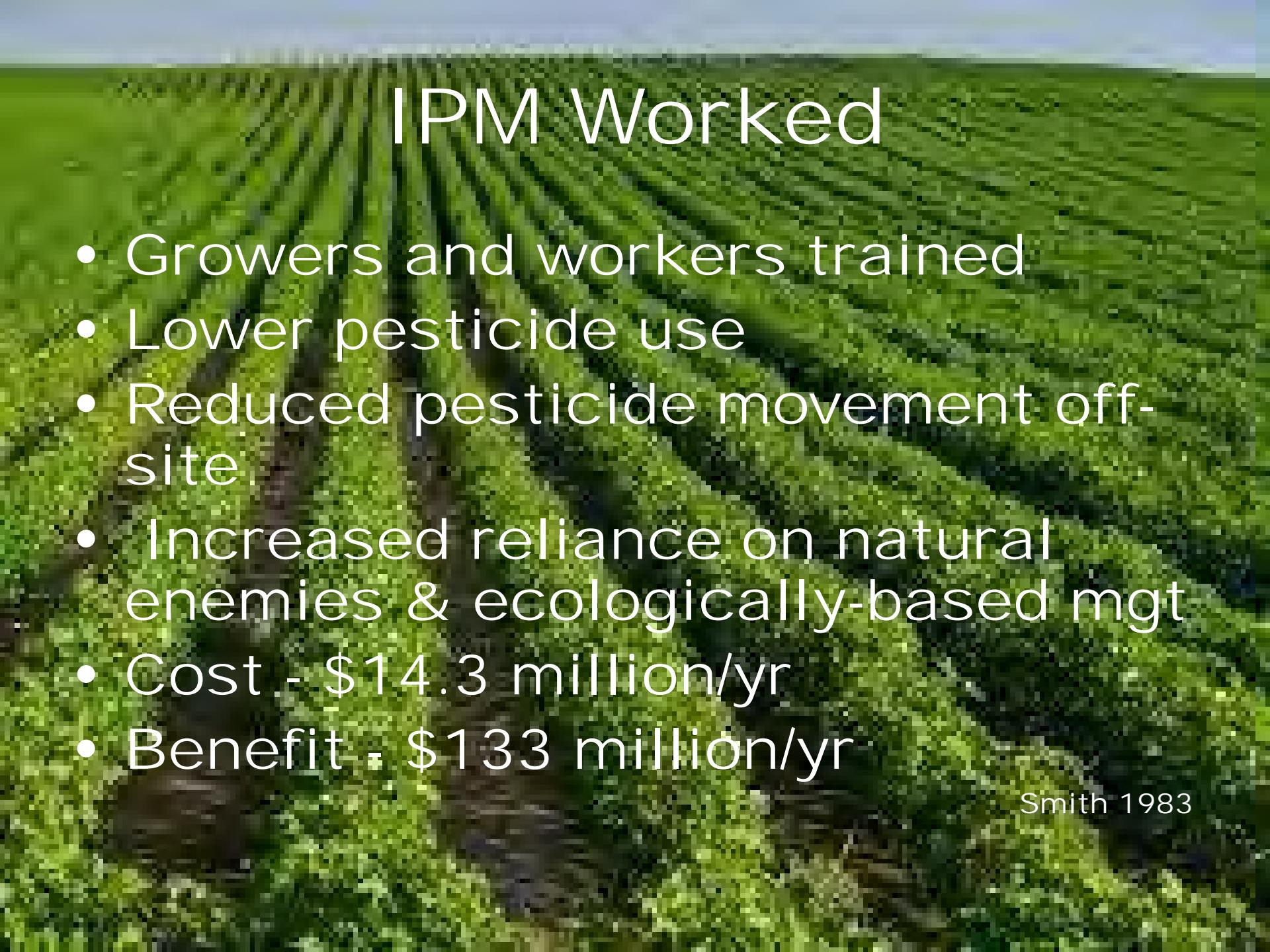
# Advent of Scouting/Consulting

- State Extension Services began scouting programs - 1967
- Federal support of IPM programs - 1972
- Research/Extension developed thresholds
- Reliance on ecologically-based mgt systems
- 6.8 million cotton ac in scouting programs – 1983

# Renewed Focus on Cultural Management



- Crop Rotation
- Planting Dates
- Variety Selection – Short Season
- Early Harvest and Quick, thorough crop residue destruction
- Scouting and Thresholds – supporting Biocontrol



# IPM Worked

- Growers and workers trained
- Lower pesticide use
- Reduced pesticide movement off-site
- Increased reliance on natural enemies & ecologically-based mgt
- Cost - \$14.3 million/yr
- Benefit - \$133 million/yr

Smith 1983

# More Change on the Farm

## Late 1990s to 2000

- Boll weevil and pink bollworm eradication
- GMO crops
  - ✓ Bt varieties/hybrids
  - ✓ Herbicide resistant varieties & hybrids
- Traditional Host Plant Resistance
- Seed Treatment insecticides & fungicides
- Preventative Treatments
  - ✓ Atoxigenic *Aspergillus flavus* strains

Bottom Line – Pest Management increasingly purchased in or on the seed

Farm efficiency & profits improved



# Boll Weevil Eradication

## 2015

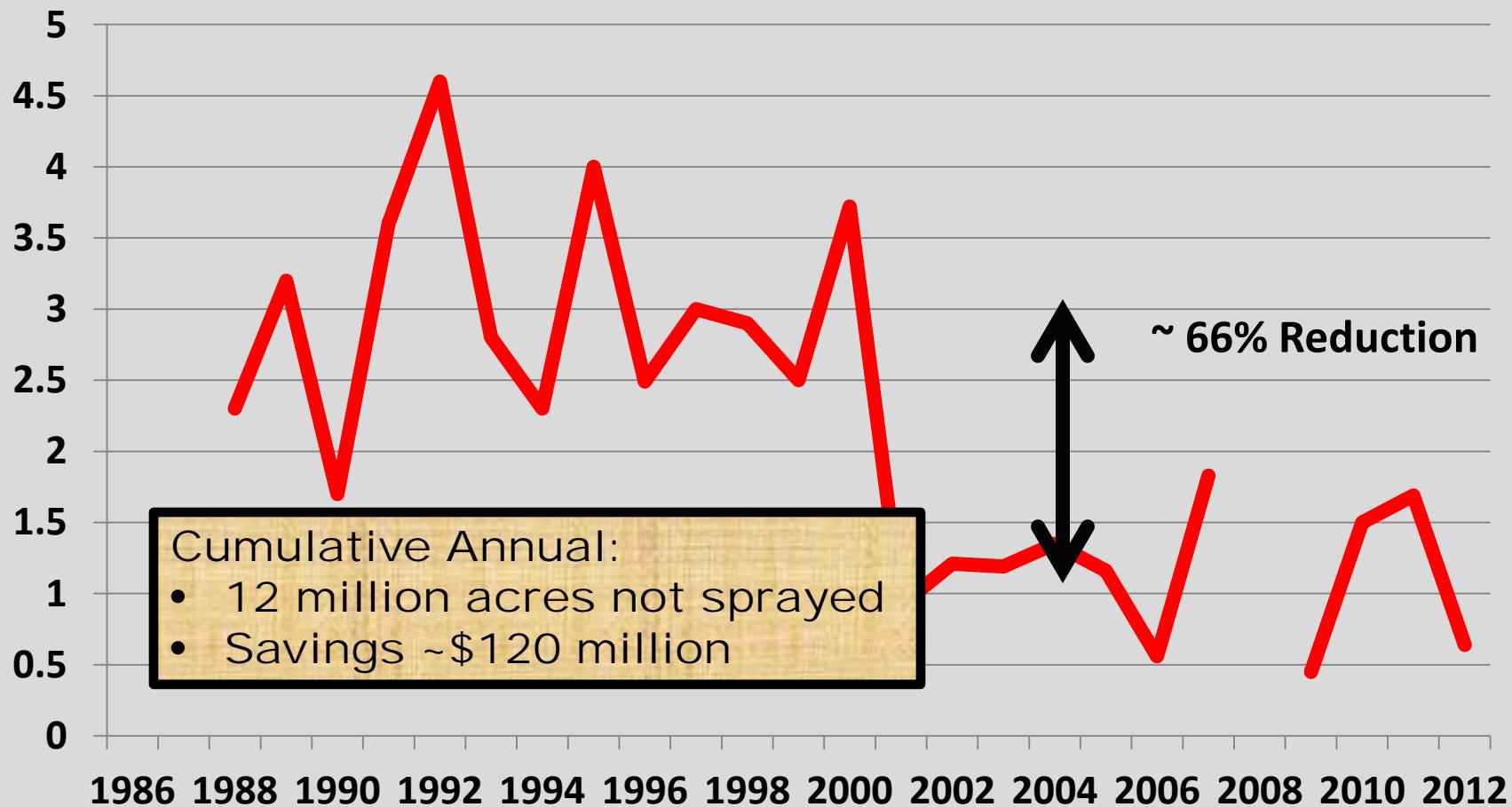
### Impacts of Boll Weevil Eradication in Texas

Tons of Insecticides Not Applied for Weevil Control

Cumulative Positive Net Economic Impact of BWE in  
Texas 1996 - 2012 ... \$2.3 billion



# Result of BWE and Bt Transgenic Crops Foliar Treatments For All Insect Pests on Texas Cotton



Source: Cotton Insect Losses BWCC

Not all of the results were positive, however.



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# Lower Rio Grande Valley

## 1981 vs 2012

**Intensive Agricultural Area**  
**Relatively Small**  
**Isolated from other U.S. Agricultural Areas**

1981

35-40 Chem Co. Fieldmen  
18 Crop Consultants  
30+ Aerial Spray Svcs.  
USDA-ARS Research Sta.  
A&M Res. & Ext. fully staffed

2012

12 Chem Co. Fieldmen (31%)  
5 Crop Consultants (72%)  
5 Aerial Spray Svcs. (83%)  
USDA-ARS Station Closed  
A&M Res. & Ext. reduced

John Norman. 2012. personal com.

# Changes in Infrastructure for Field Specific IPM

- 6-yr period – Consultants down 28-35% (AR and LA, 2006-12)
- 6-yr period – Aerial Applicators down 11% (7 southern states)
- 6-yr period – Commercial Ground applicators down 6.9% (12 southern states)
- 5-yr period Extension Entomologists down 33% (15 southern states)

**Bottom Line: Significant Loss of Infrastructure supporting Field Specific IPM**

# Back on the Farm



More Change ... Present and Future

- Resistance – weeds, western corn rootworm, bollworm, fall armyworm
- Invasive and Changing pests – bagrada bug, brown marmorated stink bug, Bermuda grass maggot, sugarcane aphid, spotted winged drosophila, tawny crazy ant, old world bollworm ...
- **Bottom Line - instability**

# Why the increase in invasives?



## Meanwhile on Campus

- Fewer students from farms
- Emphasis & funding
  - ✓ Discovery
  - ✓ Not so much field-specific farm service careers
- Result
  - ✓ Fewer qualified students to work with farmers
  - ✓ Fewer qualified students to work with seed and chemical industry

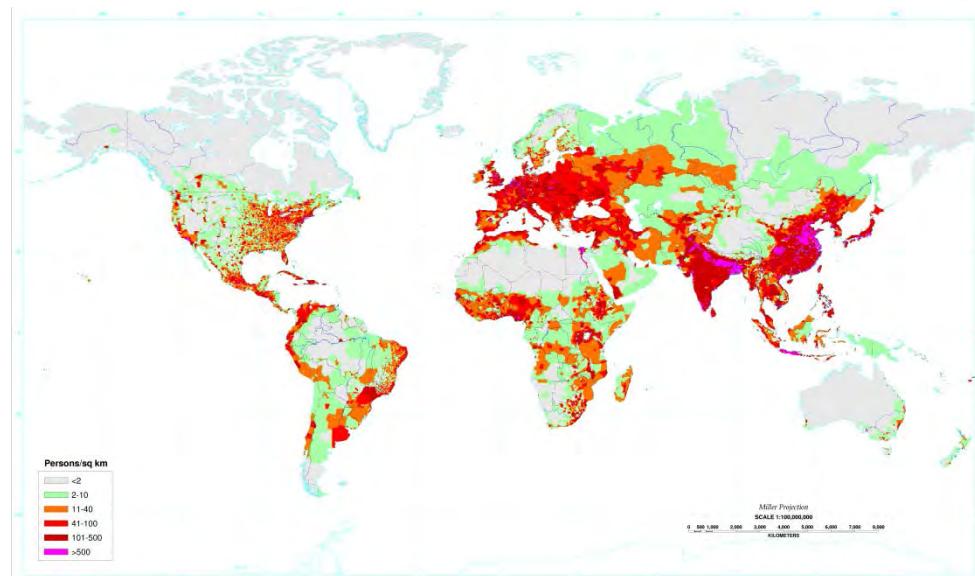
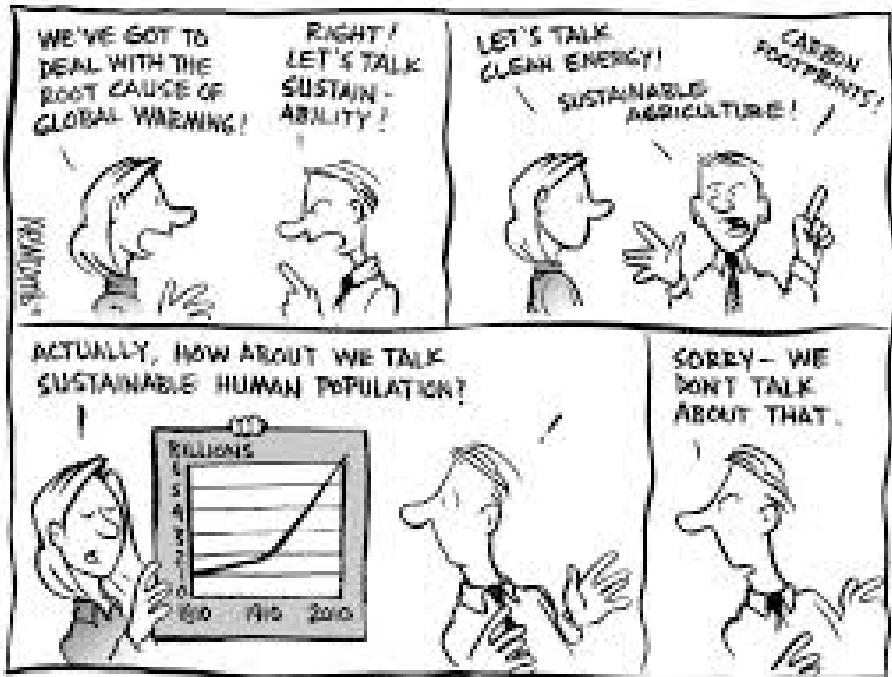
Bottom Line: Greater Ag and Farm Vulnerability

Let's Change the Level of Our Focus

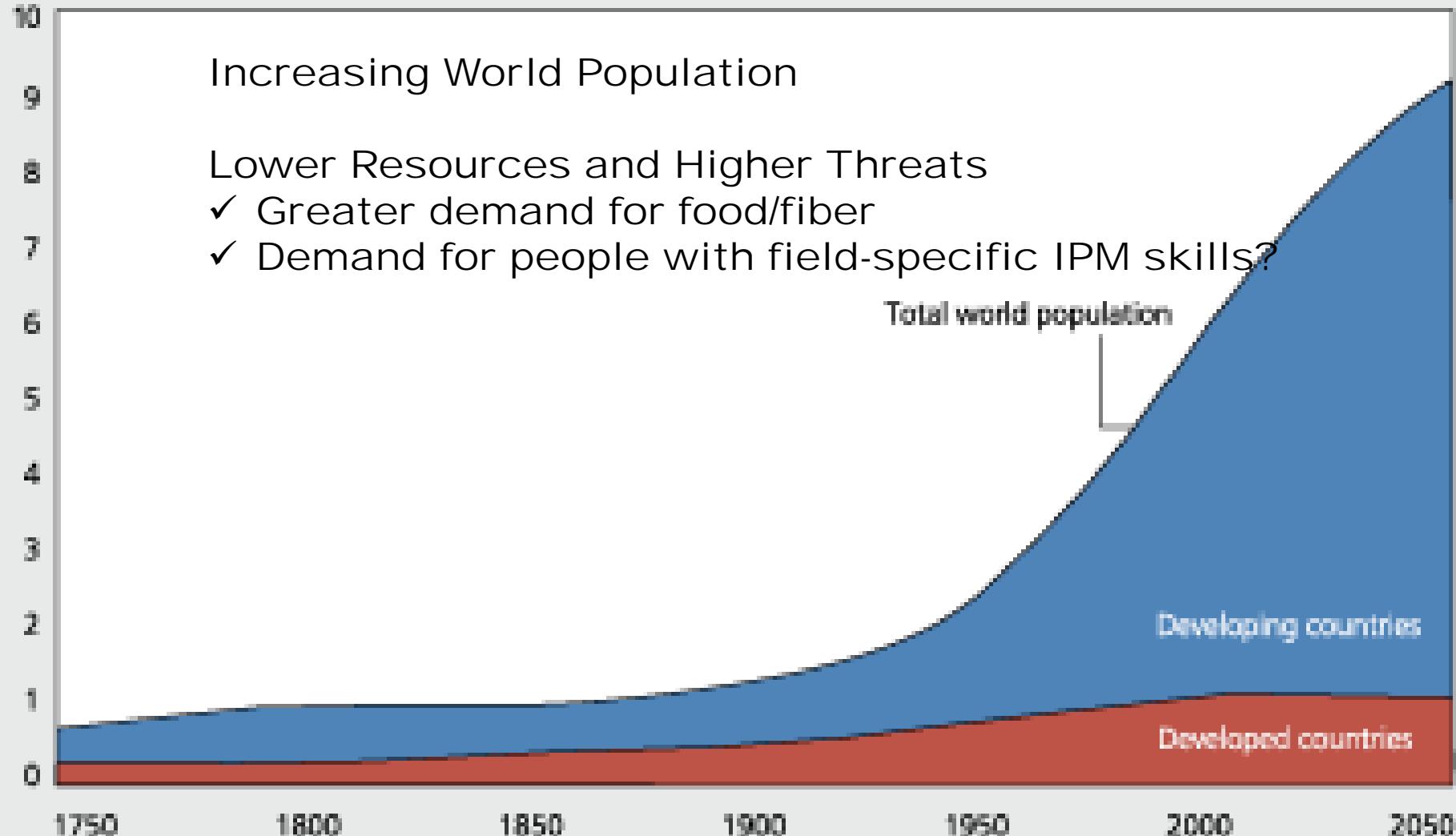


## Population Growth

- ✓ Our greatest environmental issue
- ✓ Will there be enough?
  - ✓ food
  - ✓ fiber
  - ✓ fuel
  - ✓ housing
- ✓ Demand for food will increase
- ✓ Agricultural productivity – must be high



Billions



Increasing World Population

Lower Resources and Higher Threats

- ✓ Greater demand for food/fiber
- ✓ Demand for people with field-specific IPM skills?

Total world population

Developing countries

Developed countries



# Will we be ready?

The stakes will be very high if we are not!

## *Thank You!*

## Questions?