Pest Risk Analysis (PRA)
Stage 2: Pest Risk Assessment
(Potential Economic Consequences)

Pest Risk Analysis training

IPPC

CAHFSA
CARIBBEAN AGRICULTURAL HEALTH & FOOD SAFETY AGENCY
AN INSTITUTION OF THE CARIBBEAN COMMUNITY

Introduction

Remember the Pest Risk Formula

Pest Risk

↓

Probability of Introduction X Magnitude of Impact

IPPC

CAHFSA
CARIBBEAN AGRICULTURAL HEALTH & FOOD SAFETY AGENCY
AN INSTITUTION OF THE CARIBBEAN COMMUNITY

Introduction

Magnitude of Impact

Economic Impact +Environmental Impact + Social Impact

IPPC

CAHFSA
CARIBBEAN AGRICULTURAL HEALTH & FOOD SAFETY AGENCY
AN INSTITUTION OF THE CARIBBEAN COMMUNITY

Stages

- Stage 1: Initiation
- **Stage 2: Pest Risk Assessment**
  - Step 1: Pest Categorization
  - Step 2: Assessment of the Probability of Introduction and Spread
  - **Step 3: Impacts**
  - Step 4: Overall Assessment of Risk
  - Step 5: Uncertainty
- Stage 3: Pest Risk Management

IPPC

CAHFSA
CARIBBEAN AGRICULTURAL HEALTH & FOOD SAFETY AGENCY
AN INSTITUTION OF THE CARIBBEAN COMMUNITY

Assessing potential economic consequences

- Determine pest impact in regions where pest occurs already
  - note whether the pest causes major, minor or no damage
  - whether the pest causes damage frequently or infrequently
  - relate this, if possible, to biotic and abiotic effects

IPPC

CAHFSA
CARIBBEAN AGRICULTURAL HEALTH & FOOD SAFETY AGENCY
AN INSTITUTION OF THE CARIBBEAN COMMUNITY

Assessing potential economic impact

- Use information from where pest occurs and compare with that in the PRA area
- Assess potential for economic importance
  - Qualitative, expert judgement
  - Quantitative, biological & economic techniques/ models

IPPC

CAHFSA
CARIBBEAN AGRICULTURAL HEALTH & FOOD SAFETY AGENCY
AN INSTITUTION OF THE CARIBBEAN COMMUNITY

Assessing potential economic consequences

- If a pest has no potential economic importance in the PRA area, then it does not satisfy the definition of a quarantine pest (or a RNQP) and the PRA for the pest stops

IPPC

CAHFSA
CARIBBEAN AGRICULTURAL HEALTH & FOOD SAFETY AGENCY
AN INSTITUTION OF THE CARIBBEAN COMMUNITY

Identifying pest effects

- Direct effects
  - the initial immediate effects caused by the pest on the host and that will probably cause a loss in yield or a loss in quality

- Indirect effects
  - Market effects, environmental effects and social effects
  - loss of habitat due to an invasive plant

IPPC

CAHFSA
CARIBBEAN AGRICULTURAL HEALTH & FOOD SAFETY AGENCY
AN INSTITUTION OF THE CARIBBEAN COMMUNITY

Assessing Direct pest effects

- Value of the known or potential host plants in PRA area
- Types, amount and frequency of damage reported in areas where pest is present
- Crop losses reported in areas where pest is present
- Biotic factors affecting damage and losses

IPPC

CAHFSA
CARIBBEAN AGRICULTURAL HEALTH & FOOD SAFETY AGENCY
AN INSTITUTION OF THE CARIBBEAN COMMUNITY

Direct pest effects

- Abiotic factors affecting damage and losses
- Rate of spread
- Rate of reproduction
- Control measures, their efficacy and cost
- Effect of existing production practices
- Environmental effects

IPPC

CAHFSA
CARIBBEAN AGRICULTURAL HEALTH & FOOD SAFETY AGENCY
AN INSTITUTION OF THE CARIBBEAN COMMUNITY

Assessing Indirect pest effects

- Effects on domestic and export markets, including effects on export market access
- Changes to producer costs or input demands
- Changes to domestic or foreign consumer demand for a product resulting from quality changes
- Environmental and other undesired effect of control measures

IPPC

CAHFSA
CARIBBEAN AGRICULTURAL HEALTH & FOOD SAFETY AGENCY
AN INSTITUTION OF THE CARIBBEAN COMMUNITY

Assessing Indirect pest effects

- Capacity to act as a vector for other pests
- Feasibility and cost of eradication and containment
- Resources needed for additional research and advice
- Environmental effects
- Social and other effects

IPPC

CAHFSA
CARIBBEAN AGRICULTURAL HEALTH & FOOD SAFETY AGENCY
AN INSTITUTION OF THE CARIBBEAN COMMUNITY

Economic impact matrix

	Market Impacts	Non-Market Impacts
Direct Pest Effects	• Reduction in yield, quality and longevity of commercial crops, need to adopt new practices	• Reduction or elimination of keystone or endangered species in an ecosystem
Indirect Pest Effects	• Feasibility and eradication costs • Changes in control costs • Environmental effect of control costs • Social effects	• Impacts in vulnerable or protected areas • Fire hazard • Water/nutrient cycle • Cost of environmental restoration

IPPC

CAHFSA
CARIBBEAN AGRICULTURAL HEALTH & FOOD SAFETY AGENCY
AN INSTITUTION OF THE CARIBBEAN COMMUNITY

Analysis of economic consequences

- Time and place factors
- Analysis of commercial consequences
- Environmental and social consequences

IPPC

CAHFSA
CARIBBEAN AGRICULTURAL HEALTH & FOOD SAFETY AGENCY
AN INSTITUTION OF THE CARIBBEAN COMMUNITY

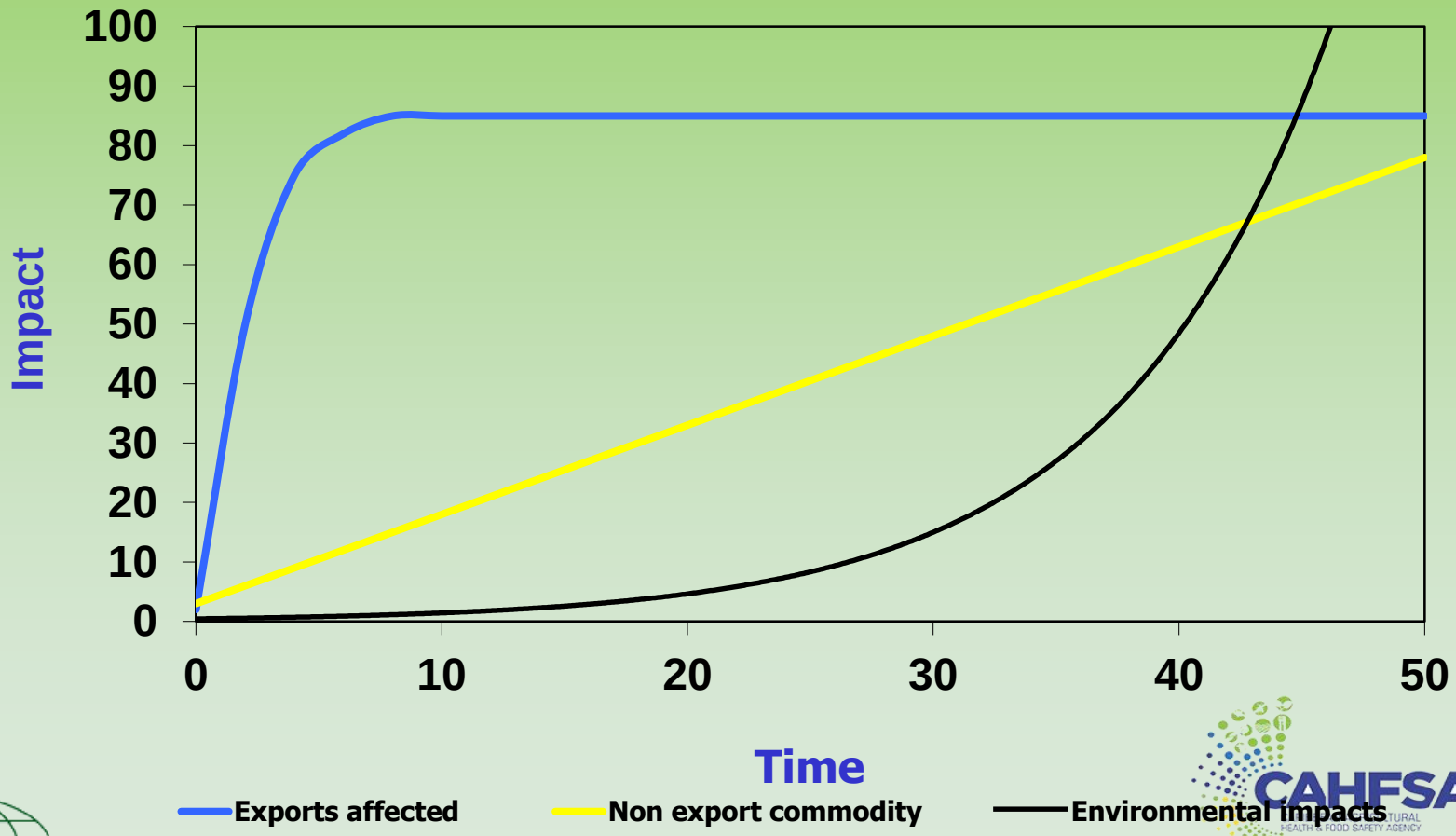
Time and place factors

- Economic consequences are expressed over a period of time - possible lag between establishment and expression of consequences
- Consequences can change over time
- Distribution of pest occurrences
- The rate and manner of spread
- May use expert judgment and estimations

IPPC

CAHFSA
CARIBBEAN AGRICULTURAL HEALTH & FOOD SAFETY AGENCY
AN INSTITUTION OF THE CARIBBEAN COMMUNITY

Impacts over time



IPPC

CAHFSA
CARIBBEAN AGRICULTURAL HEALTH & FOOD SAFETY AGENCY
AN INSTITUTION OF THE CARIBBEAN COMMUNITY

Analysis of commercial consequences

- Important to consider effect of pest-induced changes on:
  - Producer profits resulting from changes in production costs, yields and prices
  - Crop losses or crop failure resulting in loss of customers
  - Quantities demanded or prices paid for commodities by domestic and international customers

IPPC

CAHFSA
CARIBBEAN AGRICULTURAL HEALTH & FOOD SAFETY AGENCY
AN INSTITUTION OF THE CARIBBEAN COMMUNITY

Environmental impacts

- Direct environmental effects
  - Loss of keystone species
  - Loss of threatened/endangered species
  - Decrease in range/viability of keystone species
  - Decrease in range/viability of threatened/endangered species

IPPC

CAHFSA
CARIBBEAN AGRICULTURAL HEALTH & FOOD SAFETY AGENCY
AN INSTITUTION OF THE CARIBBEAN COMMUNITY

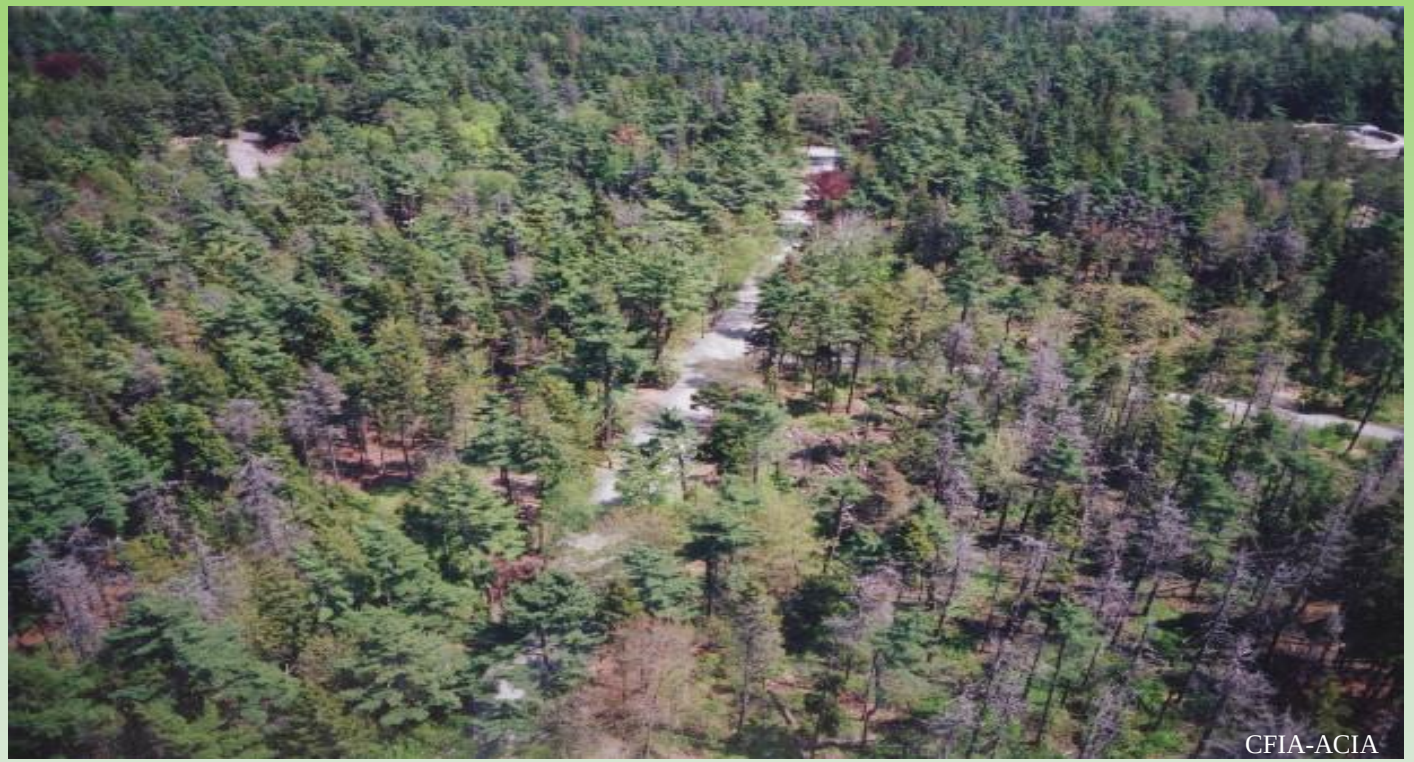
Environmental impacts

- Indirect environmental effects
  - Changes in habitat composition
  - Loss of habitat or nourishment for wildlife
  - Changes in soil structure or water table
  - Changes in ecosystem processes
  - Impacts of risk management options

IPPC

CAHFSA
CARIBBEAN AGRICULTURAL HEALTH & FOOD SAFETY AGENCY
AN INSTITUTION OF THE CARIBBEAN COMMUNITY

Environmental impact: tree death



IPPC

CAHFSA
CARIBBEAN AGRICULTURAL HEALTH & FOOD SAFETY AGENCY
AN INSTITUTION OF THE CARIBBEAN COMMUNITY

Social consequences

- Social effects
  - Loss of employment
  - Migration
  - Reduction in property values
  - Loss of tourism
  - Reduction or loss of availability of traditional plants for cultural purposes
  - Human health risks

IPPC

CAHFSA
CARIBBEAN AGRICULTURAL HEALTH & FOOD SAFETY AGENCY
AN INSTITUTION OF THE CARIBBEAN COMMUNITY

Analytical techniques

- Partial budgeting
  - Financial impact at a small scale
  - Examine items in a budget which change due to the pest
- Partial equilibrium
  - Examine the impact of a change in supply or demand of a single good (host commodity)
  - Price changes – advanced economics technique
- General equilibrium
  - More complex than partial equilibrium
  - Examines the impact of changes in supply or demand of goods linked to host (e.g. substitute goods)
  - Very few examples in quarantine

IPPC

CAHFSA
CARIBBEAN AGRICULTURAL HEALTH & FOOD SAFETY AGENCY
AN INSTITUTION OF THE CARIBBEAN COMMUNITY

Partial budgeting

- Gross margin budgets
- Single producer
- Details sales (revenue)
- Variable Costs
- Gross profit
  - profit before fixed costs
- Trade press, allows comparison between production units

IPPC

CAHFSA
CARIBBEAN AGRICULTURAL HEALTH & FOOD SAFETY AGENCY
AN INSTITUTION OF THE CARIBBEAN COMMUNITY

Challenges

INFORMATION

- Resources
  - Biological data
  - Financial & Economic data
- Tools
  - Biological models
  - Financial & Economic models

TECHNIQUES

- Economists & biologists working together
- Assessing impacts with little information
- Quantifying environmental impacts
- Scaling up from local to national impacts
- Modelling changes in impacts over time

IPPC

CAHFSA
CARIBBEAN AGRICULTURAL HEALTH & FOOD SAFETY AGENCY
AN INSTITUTION OF THE CARIBBEAN COMMUNITY