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Including the costs of plant disease into risk analyses related to food security

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Crop losses



QUANTITY

QUALITY

Pre-harvest
Post-harvest

IN FUTURE CROPS



Crop losses – Who loses?



- ▶ **GROWERS:** Cost of control, reduced storability, limited choice of crop or cultivars, ...
- ▶ **CONSUMERS:** Lack of food, increased prices, toxic components...
- ▶ **ENVIRONMENT:** Pesticide pollution, loss of plant nutrients

- ▶ **RURAL COMMUNITY**
- ▶ **TRADE, EXPORTERS**
- ▶ **GOVERNMENT**

Estimate crop losses

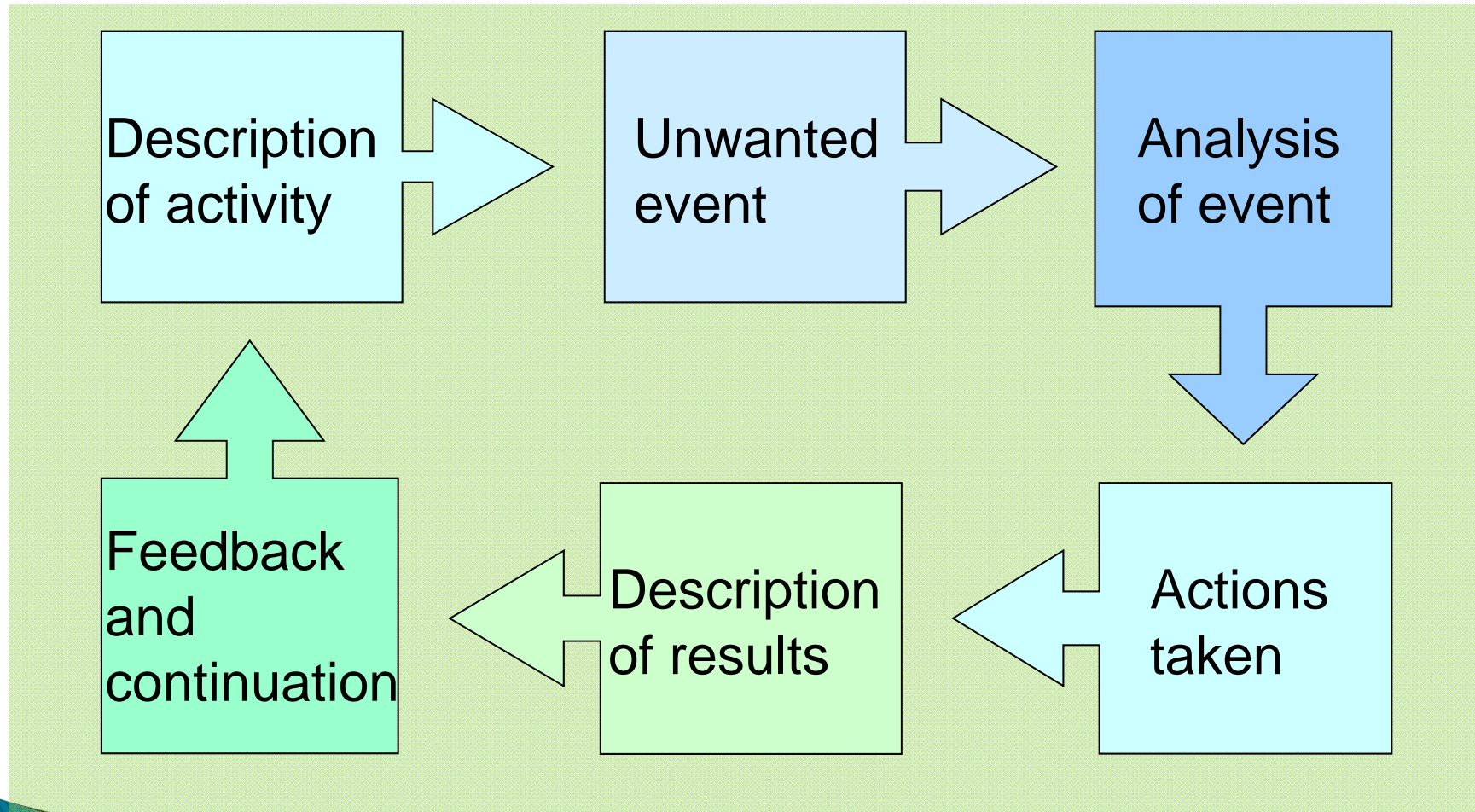
- ▶ At the farm level
- ▶ Sum of all farmer's losses (Haverkort, 2008)
- ▶ Reference yield; attainable, normal, average yield

Crop losses–effects on society

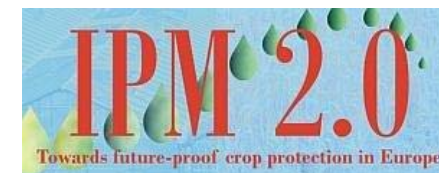
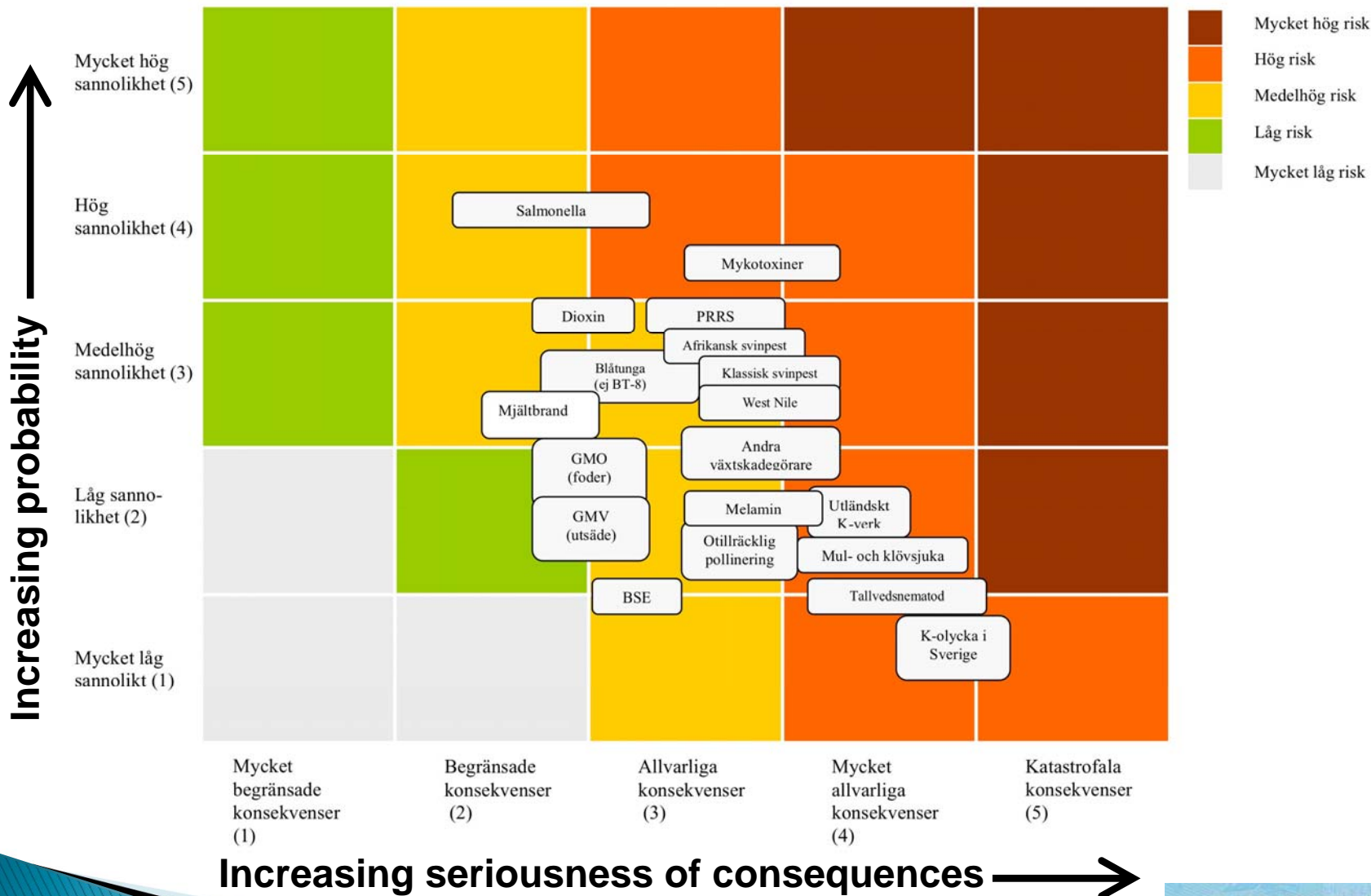


- ▶ Effects on society level
- ▶ Compensation of national losses by import
- ▶ Food security
- ▶ Risk and vulnerability analysis

A model for risk- and vulnerability analysis



Board of Agriculture Risk Matrix



Current risk– and vulnerability analysis in Sweden



Focus on traded plant products
Seedborne and soilborne pathogens

Pine-wood nematode (*Bursaphelenchus xylophilus*),
Siberian pine-tree lappet moth (*Dendrolinus pini*),
Potato wart (*Synchytrium endobioticum*),
Asian long-horn (*Anoplophora glabripennis*, *A. chinensis*)
Non-approved genetically modified plant

Responsibility for the food chain?

How do we classify diseases?



- ▶ Crop
- ▶ Pathogen
- ▶ Dispersal mode
- ▶ Focal vs. widespread
- ▶ Chronic - acute – emerging
- ▶ Classifications steer what we think is important
- ▶ What's on the radar ?

Where would you put wheat stem rust?

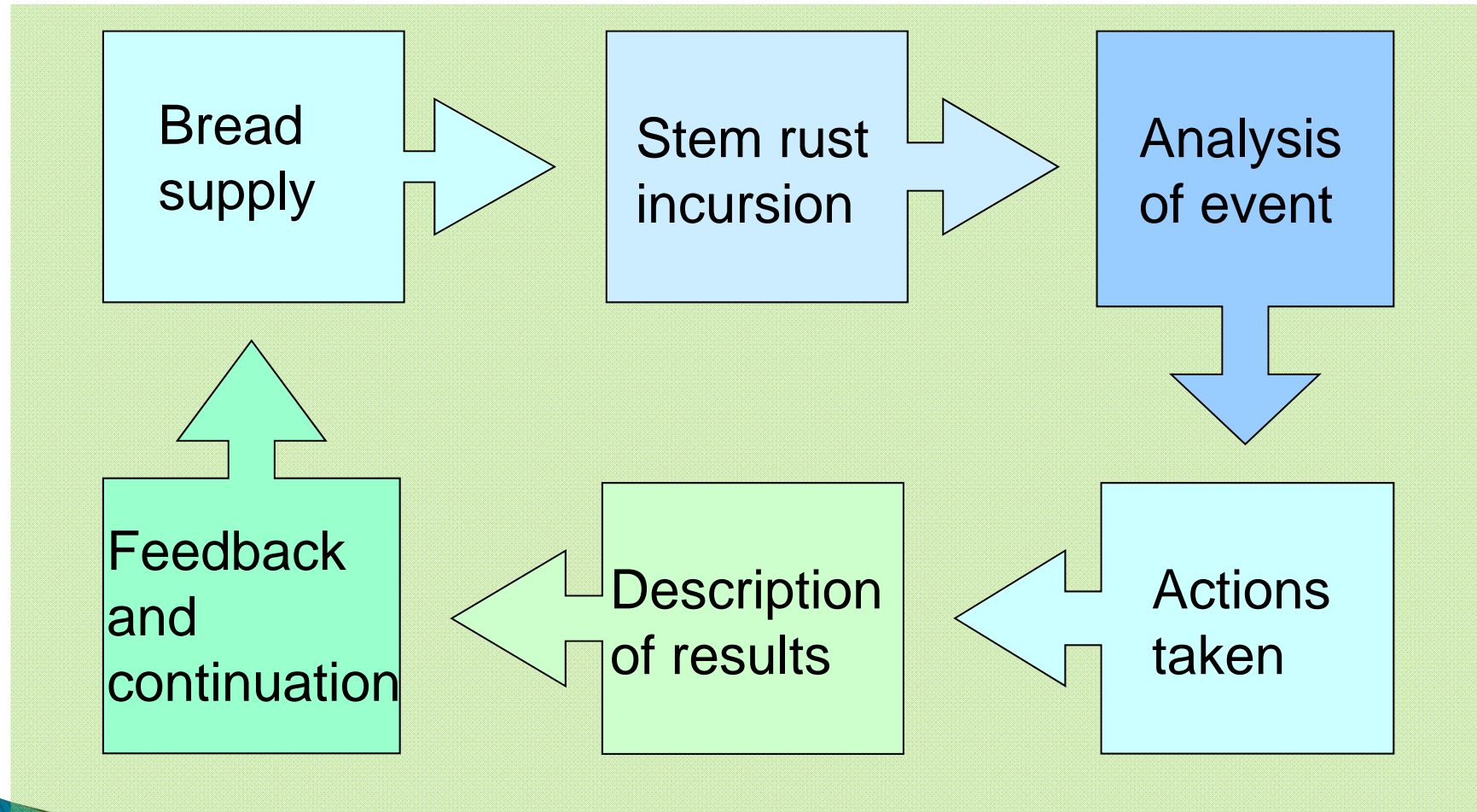


A stem rust epidemic in Sweden 1951 led to 30% yield loss

Very high probability	Green	Yellow	Orange	Dark Red	Dark Purple
	Green	Yellow	Orange	Dark Red	Dark Purple
	Green	Yellow	Yellow	Dark Red	Dark Purple
	White	Green	Yellow	Dark Red	Dark Purple
Very low probability	White	White	Yellow	Dark Red	Dark Red
	Very limited consequences		Serious consequences		Catastrophic consequences



A model for risk- and vulnerability analysis. Example: Wheat Stem rust



Analysis of a stem rust incursion



- ▶ What might happen
- ▶ How far does it spread (Sweden, Europe, Eurasia, global)
- ▶ How much loss?
- ▶ Availability to use pesticides?
- ▶ Buffering capacity of the international market

Possible actions taken (or needed?)



- ▶ Monitoring
- ▶ Scale of incursion?
- ▶ Size of reserves?
- ▶ Barberry eradication?
 - Eradication law in Sweden was repealed in 1994
- ▶ Alternate grains?
- ▶ Use of pesticides?
- ▶ Use of (new) resistant cultivars?

Who eats first?

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