



# Sea Container Pathway: Overview of Plant Health Risks

## International Symposium: Optimising Sea Container Designs

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# TOPICS

- Plant Health Risks
- Sea container Risks – No Boundaries
- Interceptions Surveys
- Species Commonly Intercepted
- Breaches, Incursions and Establishment
- Economic Consequences
- Examples of contamination



# Plant Health Risks

- The International Plant Protection Convention (IPPC) is the intergovernmental treaty that aims to protect the world's plants, agricultural products and natural resources from plant pests.

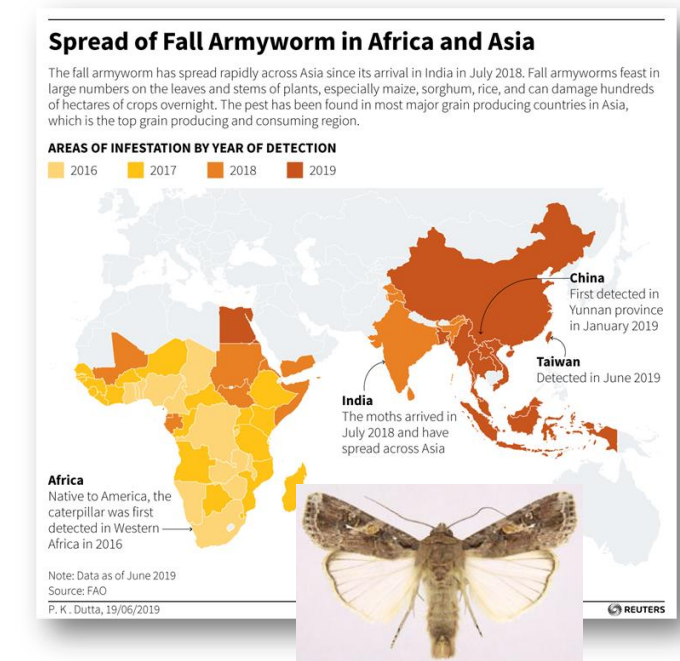
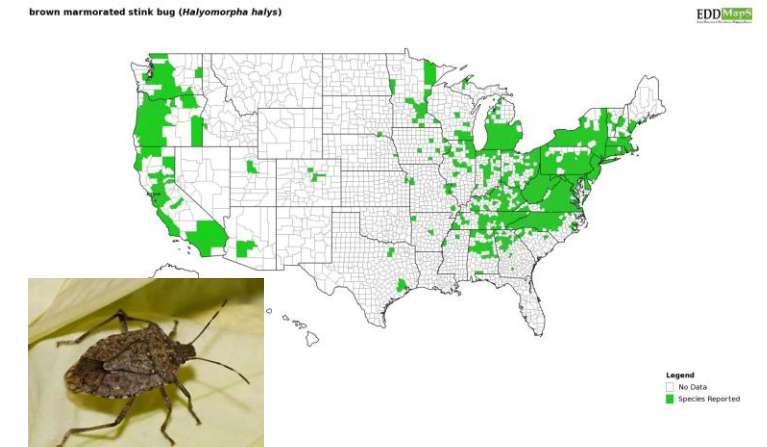
Keeping plants healthy means safeguarding global **food security**. Protecting plants and plant resources and important crops from pests will help feed an increasingly hungry world.

Facilitating the **safe trade** of goods by applying international phytosanitary standards will help mitigate the negative impacts of plant pests on the environment, economies and livelihoods.

Protecting plants and plant resources from the impact of a warming climate will mitigate the introduction and spread of invasive species, and thus helps to **protect the environment and biodiversity**.

# Plant Health Risks

- Introductions of plant pests can have devastating effects
- Phytosanitary requirements aim to minimize the introduction of a pest into a new country/area
- The NPPOs are representatives of the Contracting Parties to the IPPC, tasks include:
  - Reporting the occurrence and outbreaks of plant pests
  - Surveillance to detect plant pest
  - Issuance of Phytosanitary Certificates that are issued for exported consignments to provide assurance that the consignment meet the phytosanitary import requirements
  - Inspection of consignments of plant and plant products or other regulated items
  - Conducting pest risk analyses to determine whether an organism is a pest, whether it should be regulated, and the strength of any phytosanitary measures to be taken



# Plant Health Risks

- Although the scope of the IPPC is restricted to plant pests, it is important to note that actions that are effective against plant pests may also help reduce the risk of organisms and other contaminants that are not of phytosanitary concern.
- This includes contaminants, such as:
  - Seeds of invasive plants
  - Invasive insects
  - Other invasive pests, such snails and snakes
  - Disease agents
  - Vectors that transmit diseases to livestock and humans

# Sea Container Risks – No Boundaries

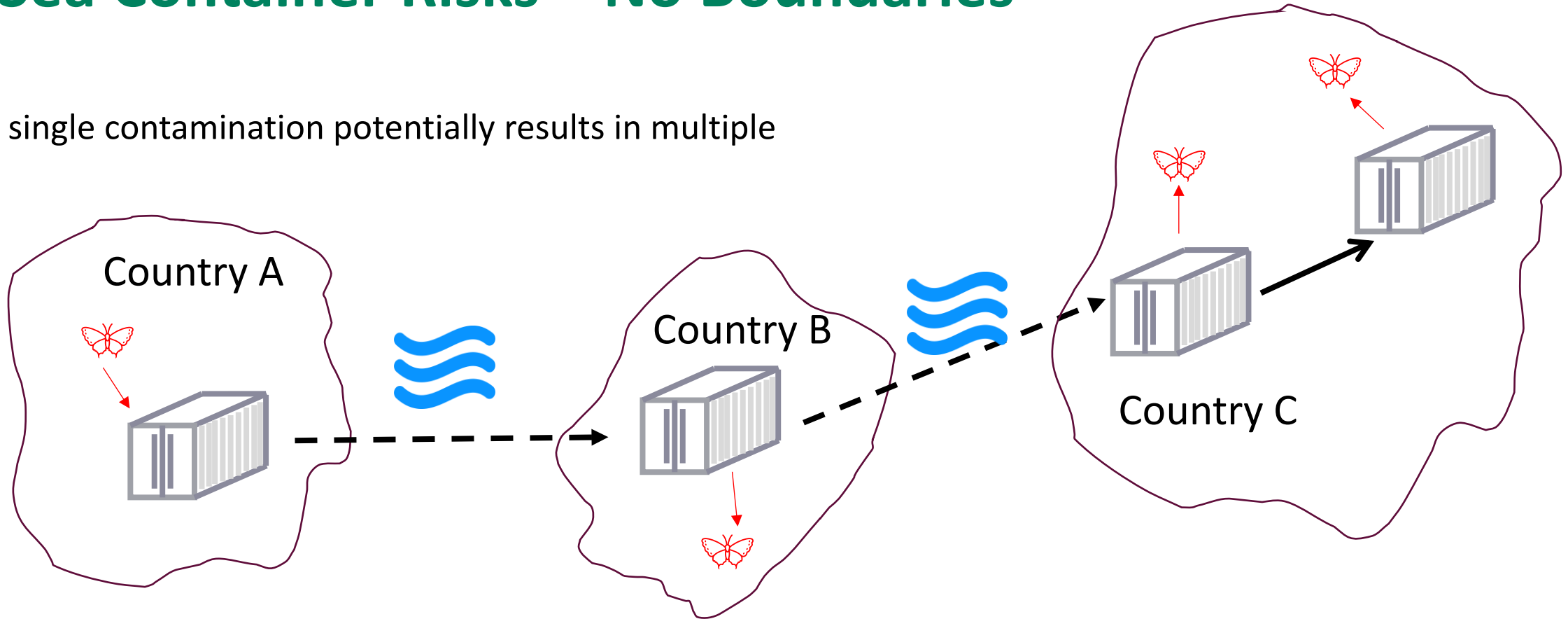
- Globally, approximately **25 million** containers are in circulation and over **250 million** container movements occur annually.
- Even a small proportion of contaminated containers can lead to international spread of pests!
- Most containers don't move between the same two countries – their movements are influenced by fluctuations in supply and demand.
- In addition to hitchhiking pests, certain pests have the ability to survive in containers for extended periods.





# Sea Container Risks – No Boundaries

A single contamination potentially results in multiple



# Interception Surveys

## Interception

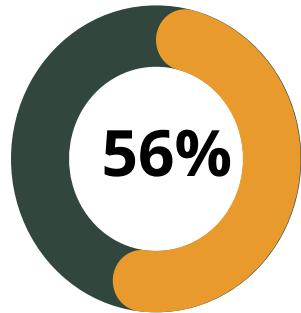
The detection of a pest during inspection or testing of an imported consignment



# Interception Surveys

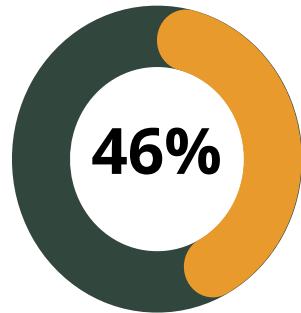
Surveys from across the globe demonstrate that contamination is regularly detected during the global movement of sea containers.

Kenya  
reported that:



of 789 sea containers they inspected from 2019-2022 were **contaminated**. Contamination was both external and internal.

China  
reported that:



of 264,482 loaded containers & 33% of 428,616 repositioned containers inspected in 2017 were **contaminated with plant pests**.

Australia  
reported that:



of 126,689 containers from high-risk countries inspected from 2019-2022 were **externally contaminated**.

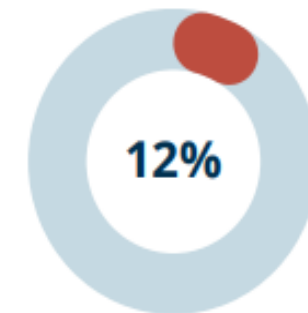
New Zealand  
reported that:



of 116,701 empty sea containers inspected from 2010-2015 were **contaminated with hitchhiker pests**. Contamination was both external and internal.

## Khapra Approach Rate Trial

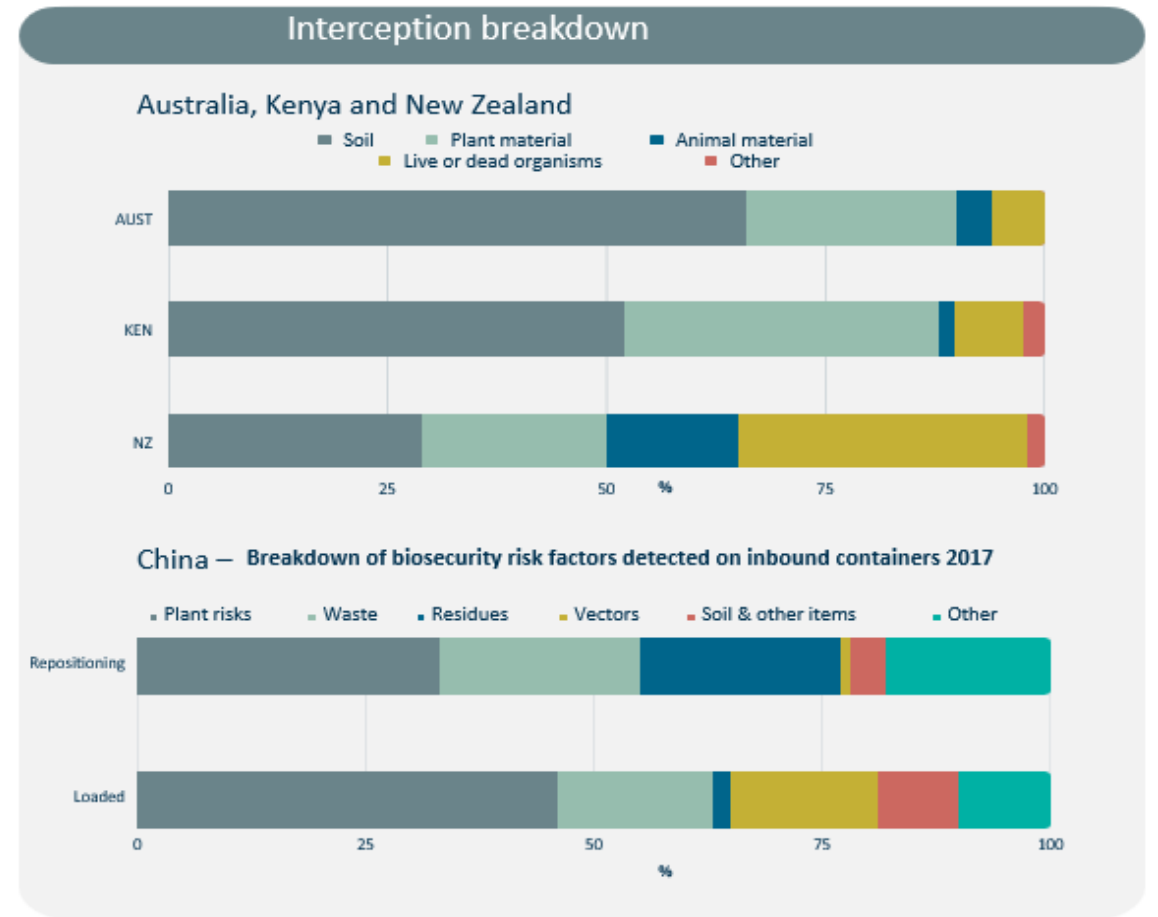
Australia  
reported that:



of 2,000 randomly selected containers surveyed in 2021 12% had **evidence of khapra beetle** (11% indicated previous presence of the pest, and 1% indicated active presence of the pest).

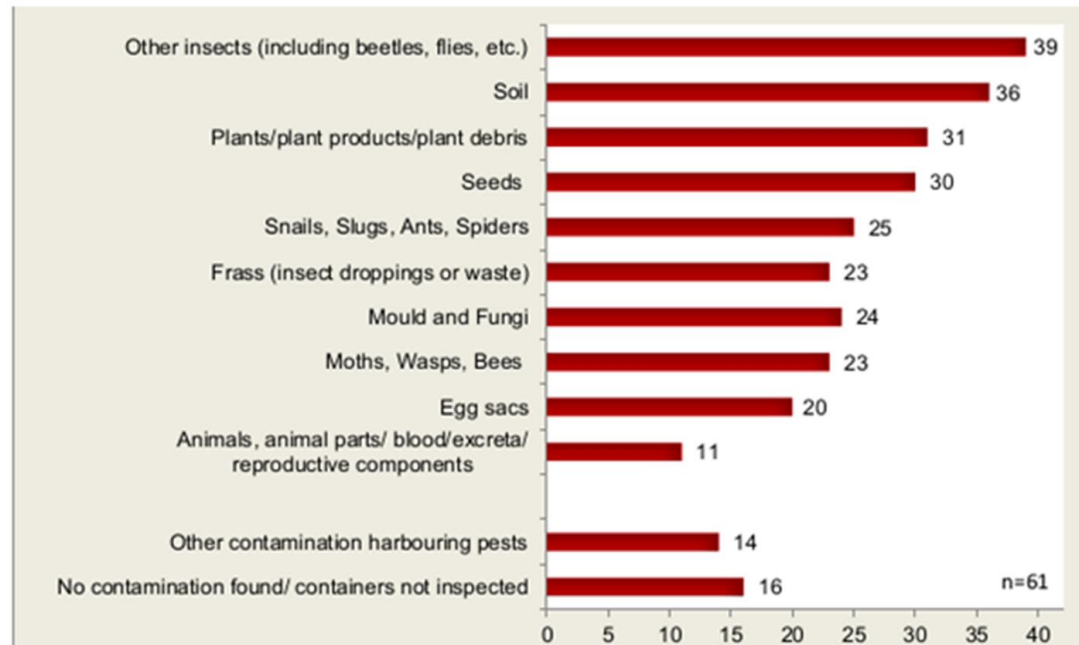
# Interception Surveys

- In **Australia, Kenya and New Zealand**, the **most common contaminant** detected on sea containers was **soil**.
- Soil is a known source for carrying several plant pests (including nematodes, bacteria, fungi, and insects) and weed seeds.
- In 2000, a study found that 4% of soil samples collected from sea containers contained plant parasitic nematodes and 83% contained fungi of genera known to contain pathogenic species.



# Interception Surveys (SCTF Report)

Questions	# countries
<b>Are containers and their cargo seen as a risk for spreading pests?</b>	<b>68</b>
Yes, regardless of the type of cargo	47
Yes, but only if carrying regulated articles	18
No	3



# Species Commonly Intercepted



- Asian longhorn beetle
- Yellow crazy ant
- Giant African snail
- Cane toad
- Spongy moth
- Big-headed ant / Brown house-ant
- Apple snail
- Red imported fire ant
- Khapra beetle

These are listed in 100 of the World's Worst Invasive Species list in the Global Invasive Species Database.



# Breaches, Incursions and Establishment

## Interception

The detection of a pest during inspection or testing of an imported consignment

## Border breaches

Occur when organisms are detected post border in original host material and then eradicated before they spread to local host populations and cause an actual incursion.

## Incursions

Are where an isolated population of a pest recently detected in an area, not known to be established, but expected to survive for the immediate future.

## Establishment

Encompasses the perpetuation, for the foreseeable future, of a pest within an area after entry.

## Examples

### Khapra beetle has breached the Australian border via sea containers:

- 3 times in 2007, 2016 and 2018
- 2 times in 2020

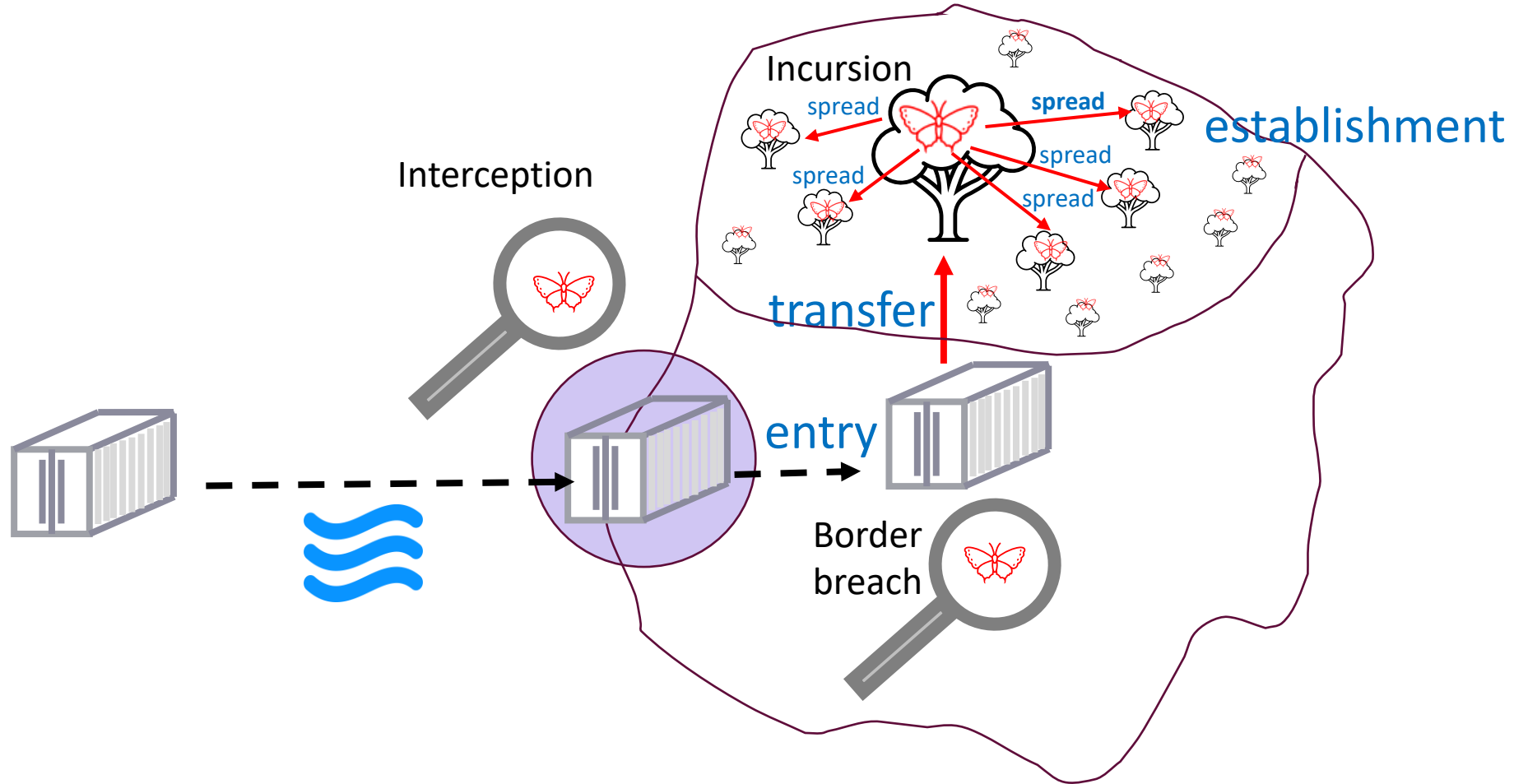
### Europe alien insect species

- In 2009, there were around 1,300 alien insect species.
- In 2019, there were around 2,500 alien insect species.
- Such invasions are mainly attributed to an increase in international trade.

### Sea container contamination has resulted in:

- Worldwide spread of Red imported fire ant
- Tropical fire ant in NZ
- Three Eurasian land snails in North America
- Brown Marmorated Stink Bug in the USA.

# Breaches, Incursions and Establishment





# Estimated economic impact

(if established in Australia)



Hitchhiker pests have the potential to inflict significant damage

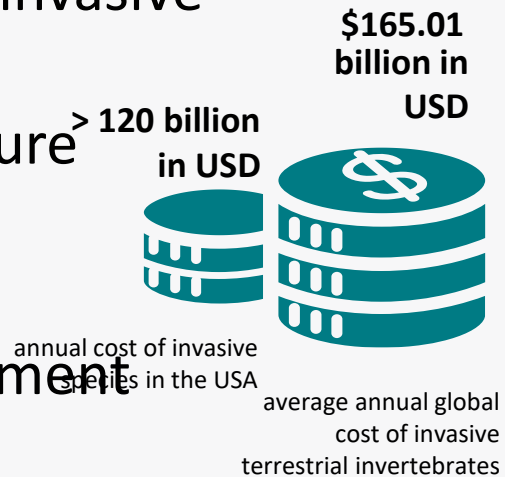


# Consequences Of Pest Establishment



Economic impacts of invasive species can include the cost of introduced invasive species on:

- agriculture
- forestry
- fishery
- environment
- tourism



## Economic consequences of introduced and established pests



USD \$890 million for the Emerald ash borer, reported by the US.



USD \$200 million for the Spongy moth, reported by the US.



NZD \$318 million/annum for the Red imported fire ant if established, reported by NZ.

# External contamination - examples



Soil contamination on external surface



Soil on rails under the container



Plant material caught on the underside



Seed contamination on container underside



Giant African Snail on external surface



Dead khapra on underside of container



Hive on underside of container



Germinating seed above twist lock



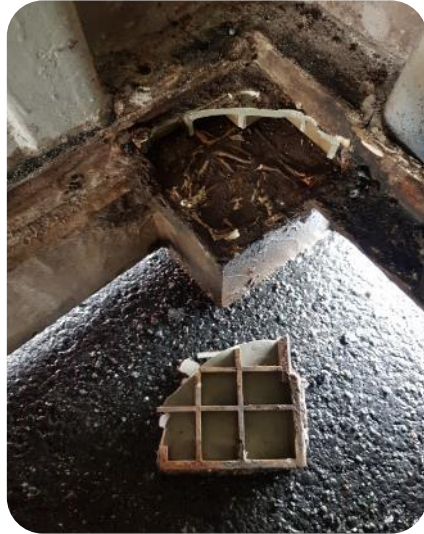
Cotton seed in twist lock and underside



# Internal contamination - examples



Khapra beetle larvae and cast skins in corner of container after floor removal



Sub-floor corner block



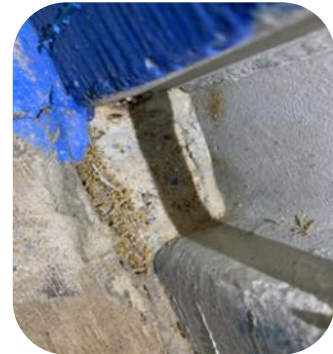
Seeds and debris on interface between floor and wall



Khapra beetle infestation from underfloor area



Seed caught in interface between wall and floor



Insects inside a container



BMSB on container floor after fumigation



# Summary

- Introductions of plant pests can have devastating effects
- Sea containers can be a pathway for introduction of plant pests (and other contaminants)
- Contamination of sea containers occurs regularly
- Pest establishment may have a considerable economic impact



# Thank you

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