



# Pest threats to potato in Europe

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# Potato pests and plant quarantine

19th century

Emergence of potato late blight in Europe and its disastrous consequences: famine in Ireland in 1846, death of more than 1m and migration of more than 1.5 m.



THE FAMINE IN IRELAND.— FUNERAL AT SKIBBEREEN.— FROM A SKETCH BY MR. H. SMITH, CORK.



THE EMBARKATION, WATERLOO DOCKS LIVERPOOL.



***Phytophthora infestans***

# Colorado beetle

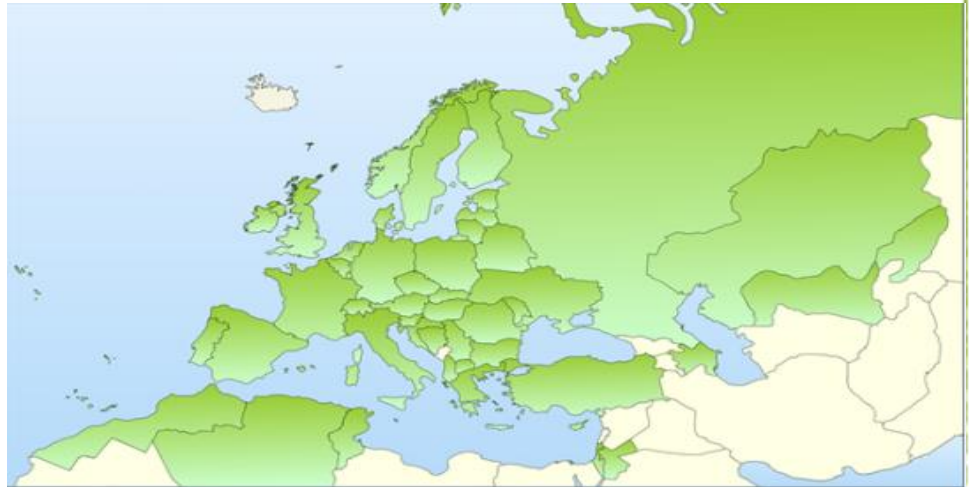


*Leptinotarsa  
decemlineata*

*EPPO region in 2014*

20th century

After world war II, potato production threatened by introduction of Colorado beetle. EPPO created in 1951 to control this pest more efficiently.



# Emerging pests, horizon scanning, early warning



# What are emerging plant pests?

- Pests whose incidence is increasing
- Pests whose geographical range is increasing
- New pests described by science



What is the problem?



## Possible causes

Intensification and diversification of trade

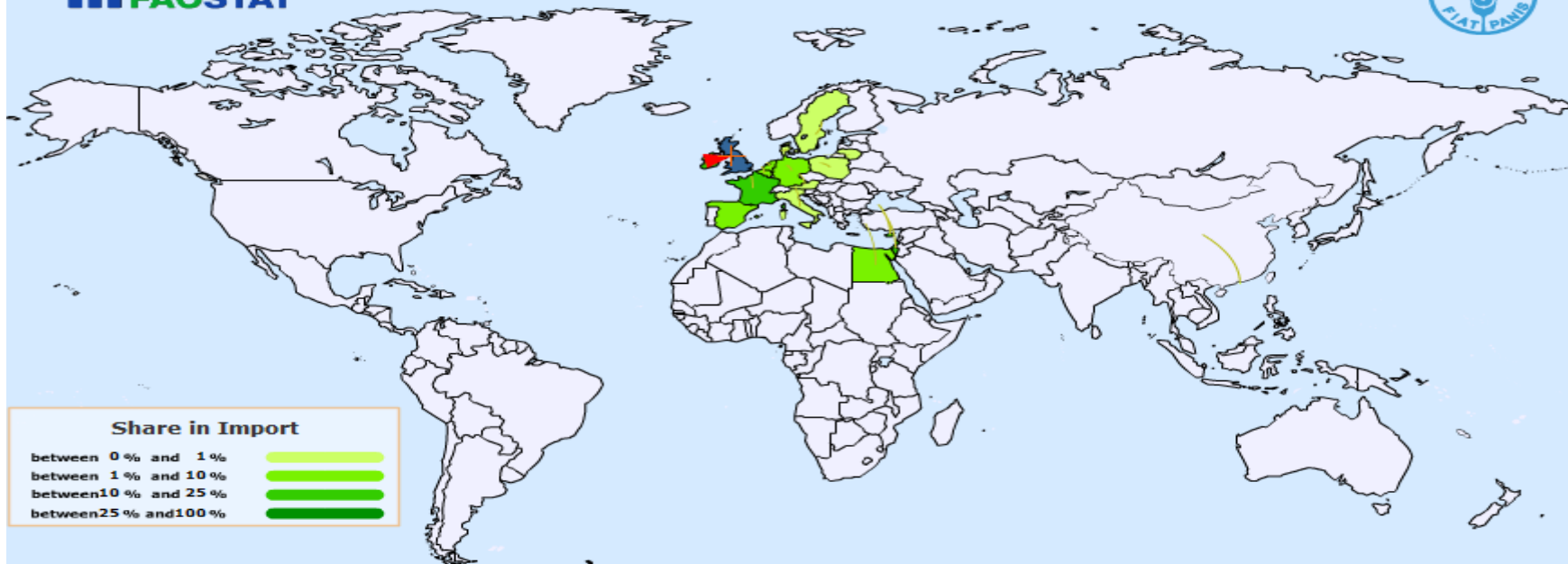
Spread of insect vectors

Modifications of environment

(cultural practice, climatic change)

Progress in science (identification of new pests)

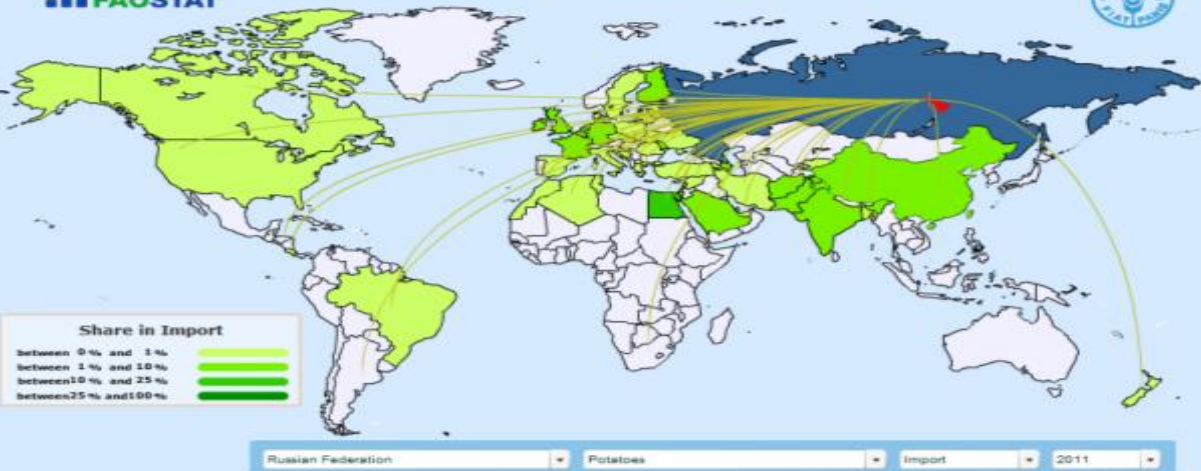




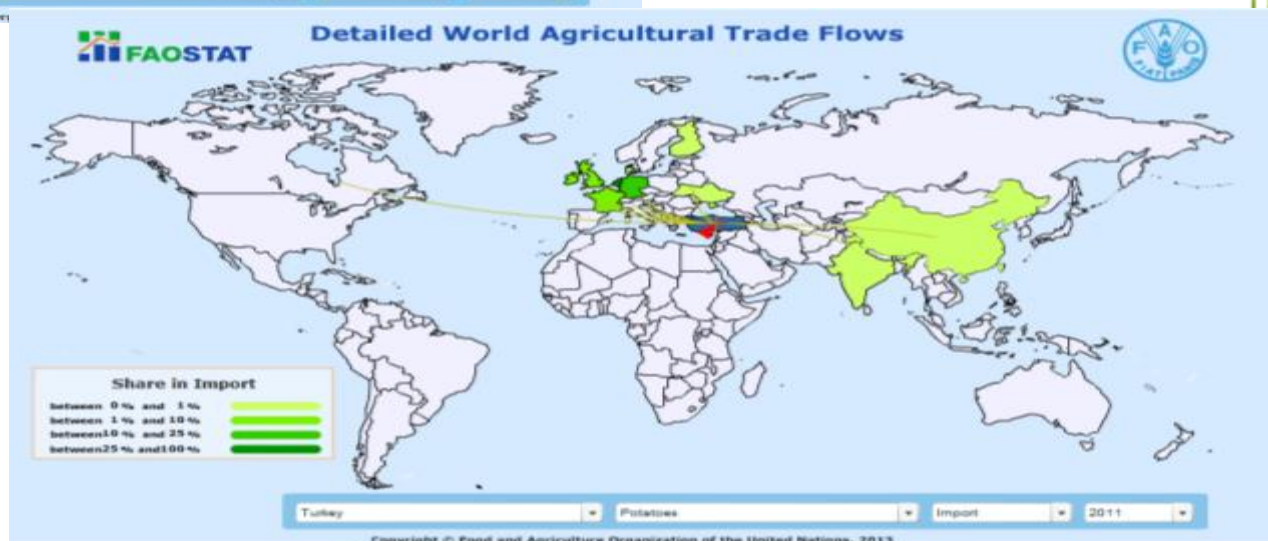
**Share in Import**

- between 0 % and 1 %
- between 1 % and 10 %
- between 10 % and 25 %
- between 25 % and 100 %

# Import of potato in 2011 for Russia and Turkey



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# Emerging Pests: EPPPO strategy

- Manage an early warning system (EPPPO Alert List) and database (distribution, host plants, datasheets, diagnostic protocols, pictures, ...)
- Evaluate possible risks (Pest Risk Assessment)
- Make recommendations on pests which should be regulated in Europe (Pest Risk Management) as plant quarantine can be a useful tool to prevent entry and spread in certain cases





# Zebra chip disease





Photos: Joe Munyaneza  
USDA-ARS

# Zebra chip: new disease of potatoes



'Psyllid yellows'  
in North America



'Zebra chip' in USA, or  
'Papa manchada' in Mexico  
and Guatemala



Identification of a new  
pathogen: '*Candidatus*  
*Liberibacter solanacearum*'



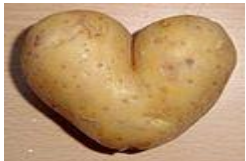
Unknown disease on  
tomato (and pepper) in  
New-Zealand

# Candidatus *Liberibacter solanacearum*

Haplotypes A and B – vectored by potato/tomato psyllid

Host plants:

- Potato
- Tomato (*Solanum lycopersicum*)
- Capsicum (pepper and chilli – *Capsicum annuum*)
- Aubergine (*Solanum melongena*)
- Other Solanaceae: *Solanum betaceum* (tamarillo), *Physalis peruviana* (Cape gooseberry), *Nicotiana tabacum* (tobacco)





# Symptoms



**Brown to pinkish  
(collapsed) stolons**







Internal  
symptoms in  
potato tubers



Upon frying or cooking,  
symptoms more pronounced





Adults



Nymphs

UC Statewide IPM Project  
Regents, University of California



Eggs

UC Statewide IPM Project  
© 2000 Regents, University of California

The potato psyllid is native to North America and is distributed in western US and Mexico. It is a damaging pest and has been introduced into New Zealand

# *Bactericera cockerelli* – Hosts

- Preferred hosts - Potato, Tomato, Aubergine, Capsicum
- Wide host range (many species in 20 plant families)
- NOT carrot or celeriac
- Pest is a good flier and spreads long distances on wind



# *Bactericera cockerelli* - Distribution

- **EPPO region:** absent
- **North America:** **Canada, USA, Mexico**
- **Central America:** Guatemala, Honduras
- **Oceania:** New Zealand





# Pathways of Entry

## Main risk - introduction of bacterium with vector into the EU

- **Fruit of Solanaceae:** main risk when packaging of imported fruit occurs in close proximity to where solanaceous hosts are grown. Vine tomatoes present a higher risk of introduction.
- **Plants for planting of Solanaceae:** (including potatoes) closed for the EU (*but imported into other European countries*)
- **Plants for planting of other species:** *Micromeria* spp., *Mentha* spp., *Ipomoea batatas* : minimal volumes but not regulated

# Impact

- Severe damage in potato, tomato and peppers in countries where both pests are present
- *B. cockerelli* also damaging alone (psyllid yellows)
- **Losses in yield and quality.** For potato, modification of sugar content and specific gravity.
- **Increased cost for pest management** (vector)
- In New-Zealand, losses in potato for the 2008-2009 growing season was estimated to be up to NZD 47 million (approx. EUR 25 million). Yield reduction in potato estimated to be 25-40%.

# Ca *L. solanacearum* in Europe

- 2007: detected in carrot crops in Finland (then Norway, Sweden)
- Vector: carrot psyllid (*Trioza apicalis*)
- Potato is not a good host for the carrot psyllid
- 2009: Detected in carrot and celery crops in Canary Islands and mainland Spain.
- Vectored by 3 other psyllid species (*Bactericera* spp.)
- Different haplotypes of Cls to potato.

# Carrots in Finland 2007



Photo A. Nissinen (MTT Agrifood Research Finland)

# Epitrix species





# History of the finding



- In Portugal, unusual damage to potato crops (superficial lesions on tubers) first observed in 2004 (near Porto)
- In the following years, symptoms reported further south but causal agent remained unknown.
- *Epitrix cucumeris* and *Epitrix similaris* identified in 2008
- *E. similaris* also found in Spain (Galicia)

# *Epitrix* species damaging potato tubers

- *E. cucumeris*, *E. similaris*, *E. subcrinita*, *E. tuberis*
- In North America, most damaging species are:  
*E. tuberis*, *E. cucumeris*
- In Portugal: *E. similaris*
- Difficulties to identify species



# Host plants

- Main hosts: Potato, tomato, aubergine - not sweet pepper
- Solanaceous weeds
- Adults feed on a wide variety of non-solanaceous plants

*Solanum nigra*

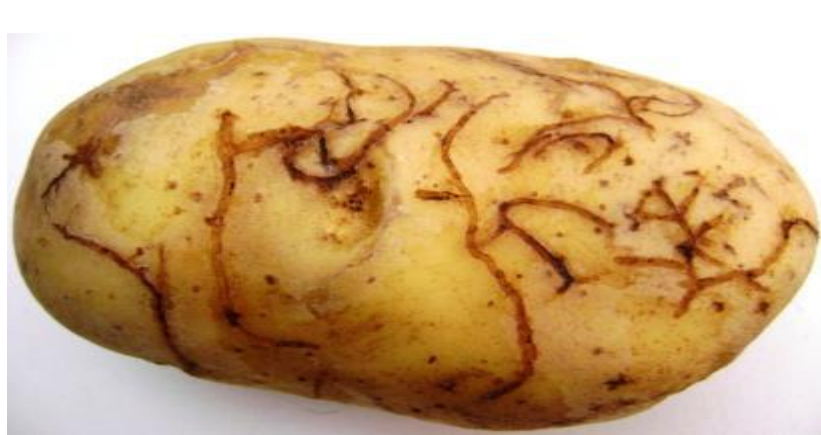


*Datura stramonium*



# Damage

- Damage mainly due to larval feeding
- Cosmetic damage but also holes up to 1 cm into tuber flesh
- Can cause crop rejection
- Increase in control costs



# Pathways of Entry

Movement from infested areas of adults, pupae (& larvae?)

## Highest risk

- Seed potatoes [and farm saved seed] with soil attached
- Ware potatoes with soil attached





# Emergency Decision for Epitrix (2012/270/EU)

- **Survey requirement by EU member states**
- **Potato from Canada, Portugal and Spain**
  - Pest Free Area production or
  - Brushing and/or washing to remove soil and pest
- **Outbreaks - establishment of demarcated areas**

# Regulated pests and diseases



# Potato cyst nematodes

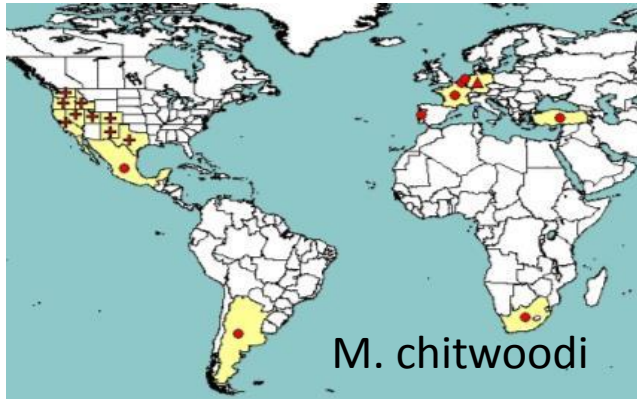
## (*Globodera rostochiensis* & *G. pallida*)



- EU Control Directive helps limit the spread of PCN within the EU but not easy to implement.
- Current regulation prevent entry of new populations of PCN which could be more damaging
- Relatively recently found in Canada and USA
- *G. pallida* recently found in Hungary (2001) Croatia (2003), Slovenia (2011).
- Introduction linked to import of ware potatoes for processing (soil attached to tubers), or soil on machinery

# Root-knot nematodes

## (*Meloidogyne chitwoodi* & *M. fallax*)



- Regulated in EU
- Polyphagous
- Distribution not well known.
- Present in BE, NL
- *M. chitwoodi* recorded in France 2008
- *M. fallax* recorded in UK in 2011



- Some outbreaks related to the import of root vegetables for processing
- Other *Meloidogyne* spp. (*M. enterolobii*, *M. ethiopica*) also recently reported in Europe



# Potato ring rot and brown rot

(*Clavibacter michiganensis* subsp. *sepedonicus*  
and *Ralstonia solanacearum*)



- **Examples of pests which are not emerging thanks to regulation?**
- EU Control Directives in place helps limit their spread
- Mandatory testing of seed potatoes
- Outbreaks occur but eradication achieved in several countries



# Unknown risks



- Strong regulation on potatoes and solanaceous plants for planting limit the risk of entry of new pests **but**
- New trades (e.g. potatoes imported from US to Russia)
- recent examples show potato pests may enter with other commodities:
  - Soil attached to other root vegetables
  - Non regulated host plants (e.g. yam nematode)
  - Non regulated commodities (e.g. tomato fruit) whose trade from abroad is increasing

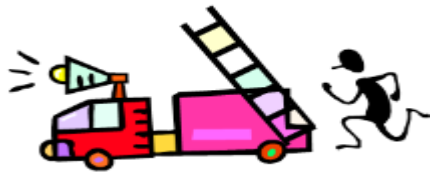
**Need to raise awareness on risk, and develop good practice with industry**

# Risk communication

# Risk mitigation







# Early warning needed

NPPOs need to define their strategies in advance to:

- Initiate Pest Risk Assessment activities
- Draft contingency plans
- Elaborate surveillance programmes, diagnostic tools
- Implement eradication/containment programmes
- Implement prohibitions/restrictions on plant movements
- Prepare communication material for stakeholders

# EPPO and potato pests

- EPPO mainly communicate with National Plant Protection Organisations
- EPPO have a panel on Phytosanitary Measures for Potato
- EPPO Pest Risk Analysis
- EPPO Standards on Diagnostic Protocols to identify pests
- EPPO Standards describing measures for official control and contingency planning

# Communication with a wider public?

- EPPO workshops
- Training (BTSF)
- EPPO Bulletin
- EPPO website ([www.eppo.int](http://www.eppo.int)),
- EPPO databases (<http://gd.eppo.int/>)
- e-magazines (scoopit)
- twitter (@epponews), facebook
- ... and participation in conferences!





**Thank you for your attention**