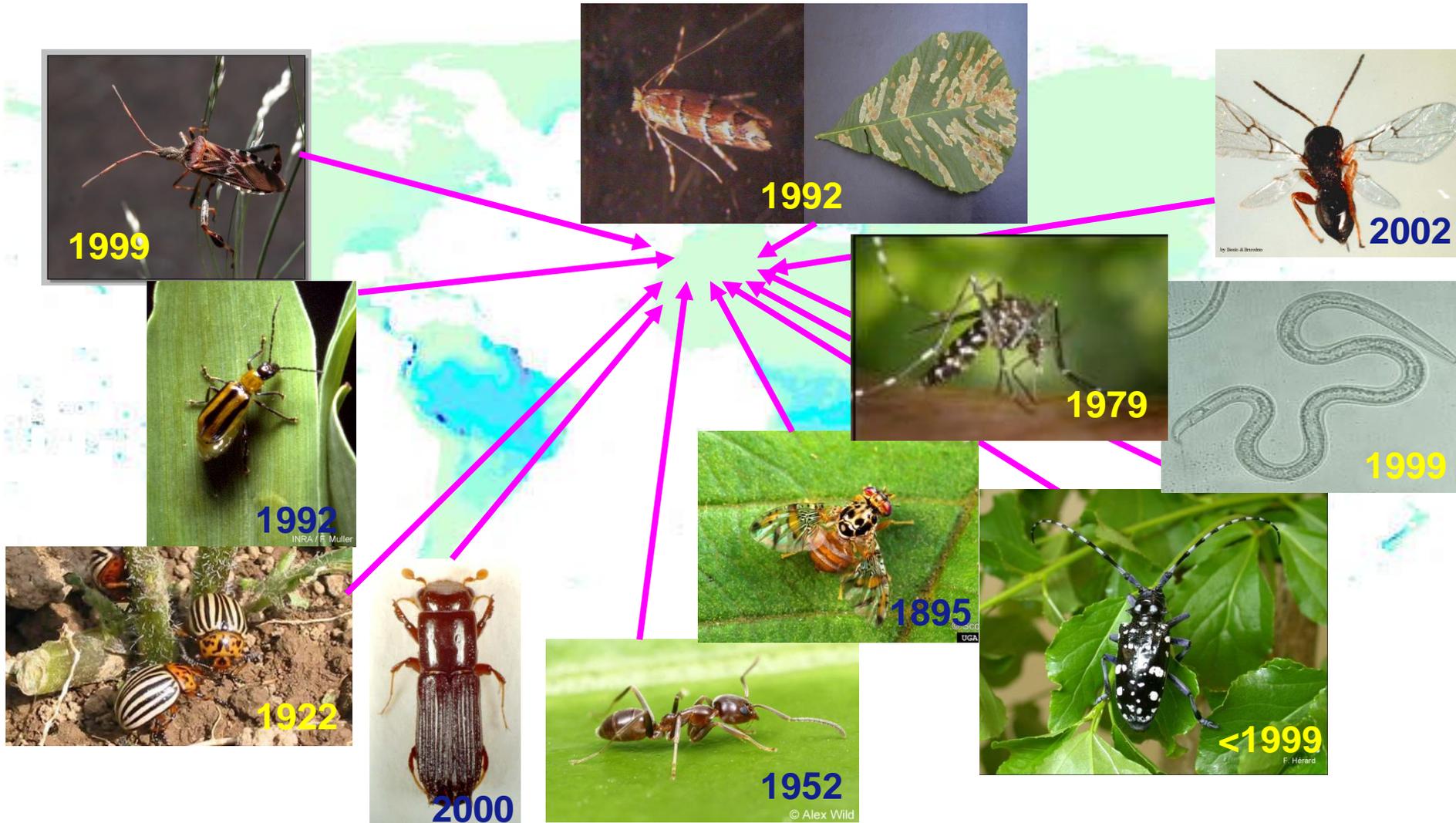


2. Invasive alien species

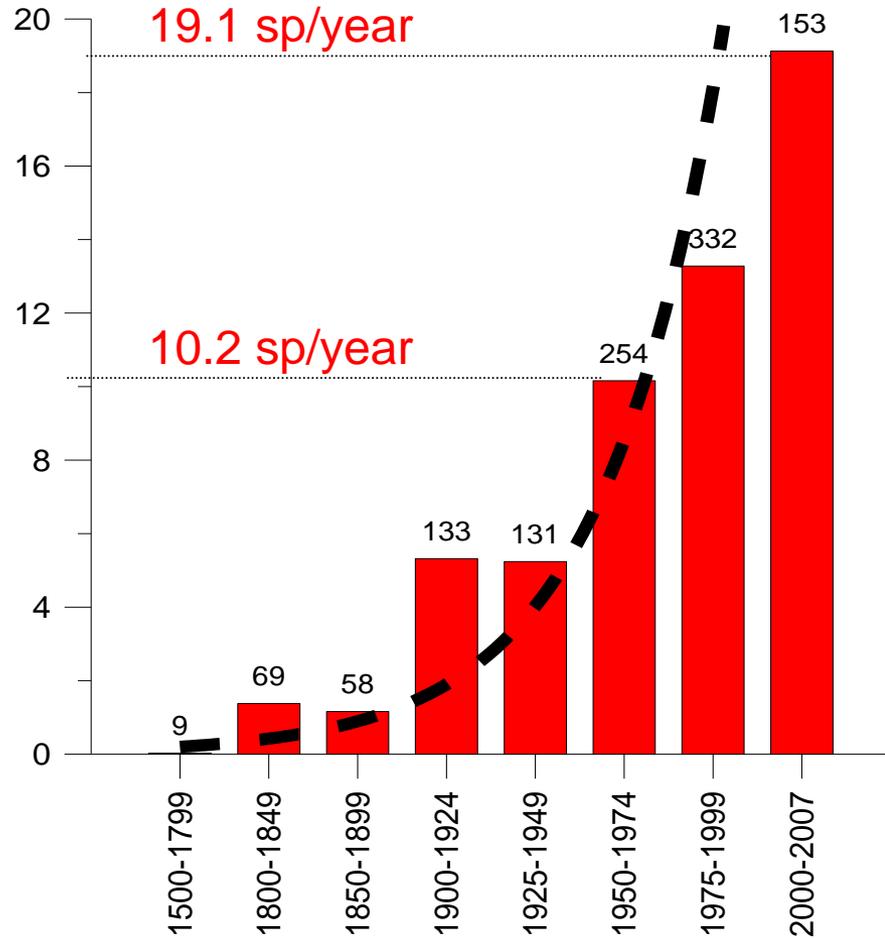
Species whose arrival is mediated directly or indirectly by man



Exponential increase with globalization

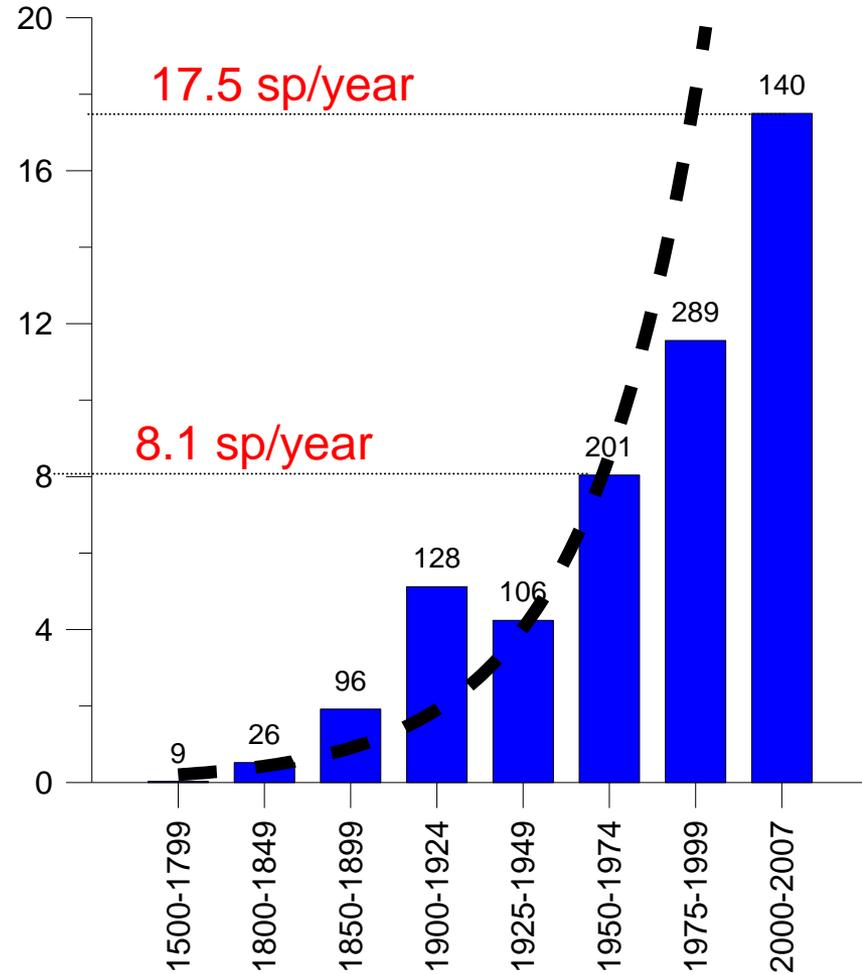
All invertebrates

Average number of exotic invertebrates newly recorded per year in Europe

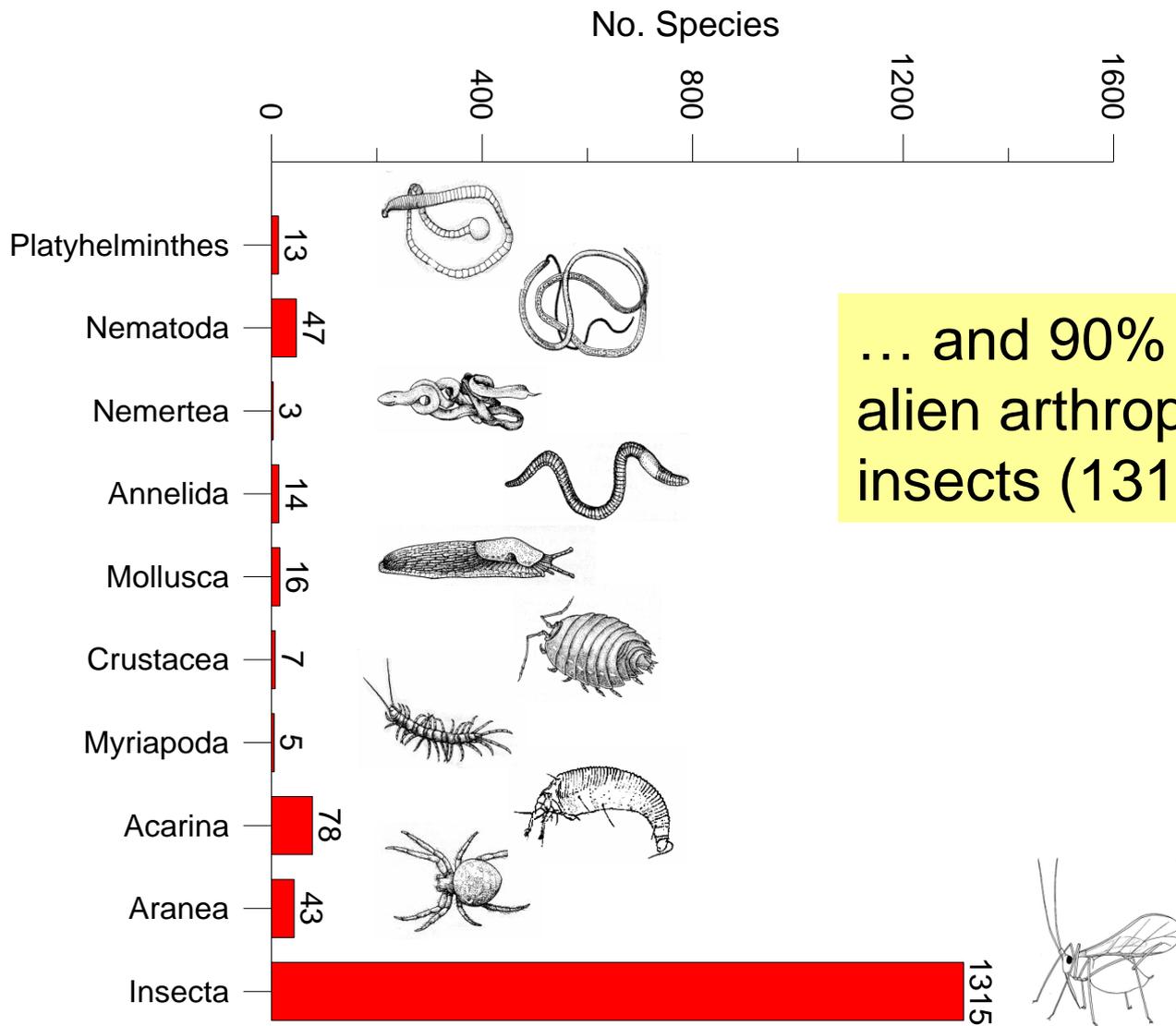


Insects

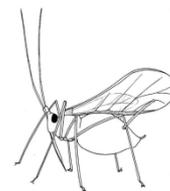
Average number of exotic insects newly recorded per year in Europe



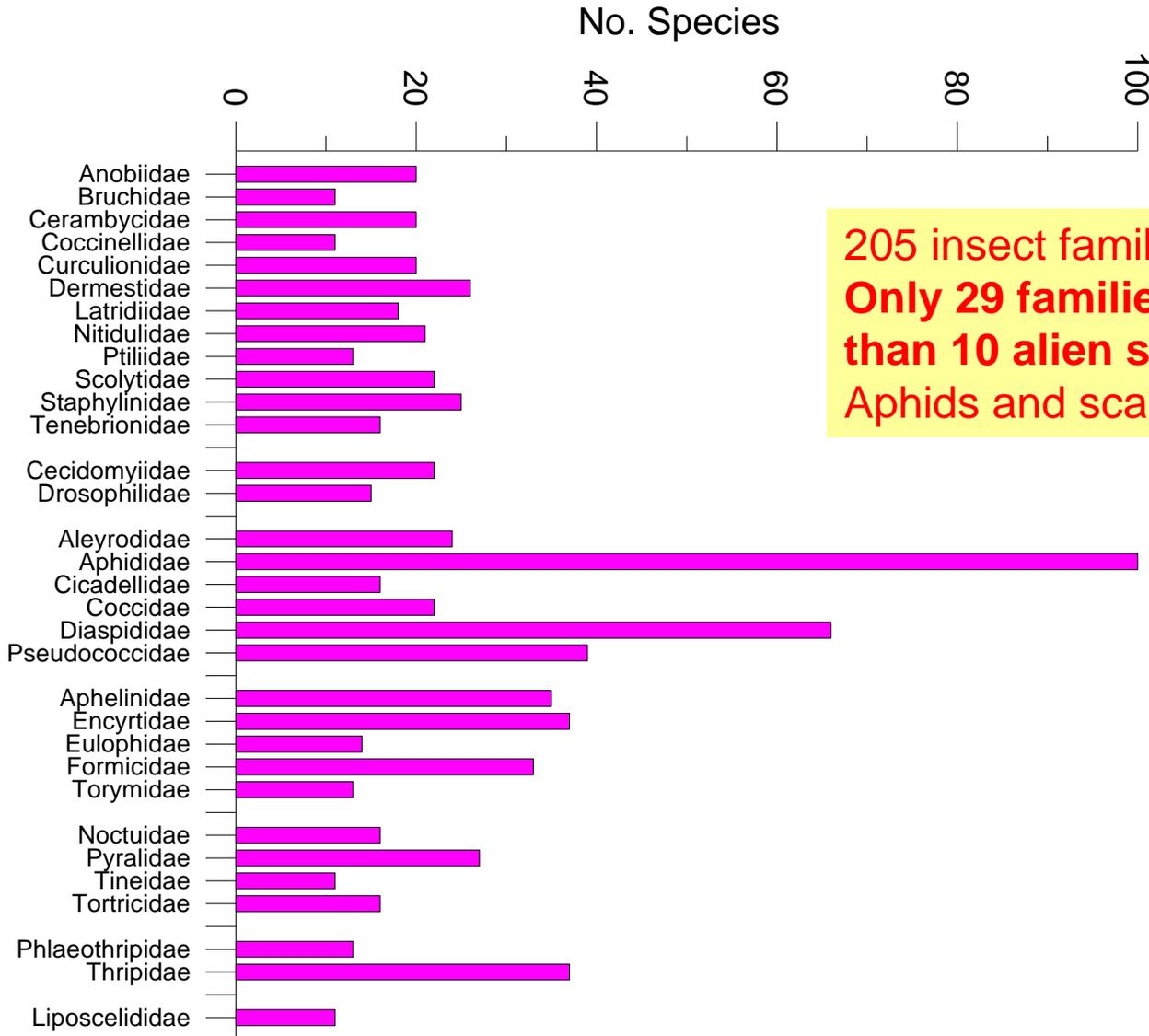
1541 species of alien invertebrates already present in Europe ! 94% are arthropods



... and 90% of the alien arthropods are insects (1315)



Large diversity in alien insect families but aphids and scales are the major invaders

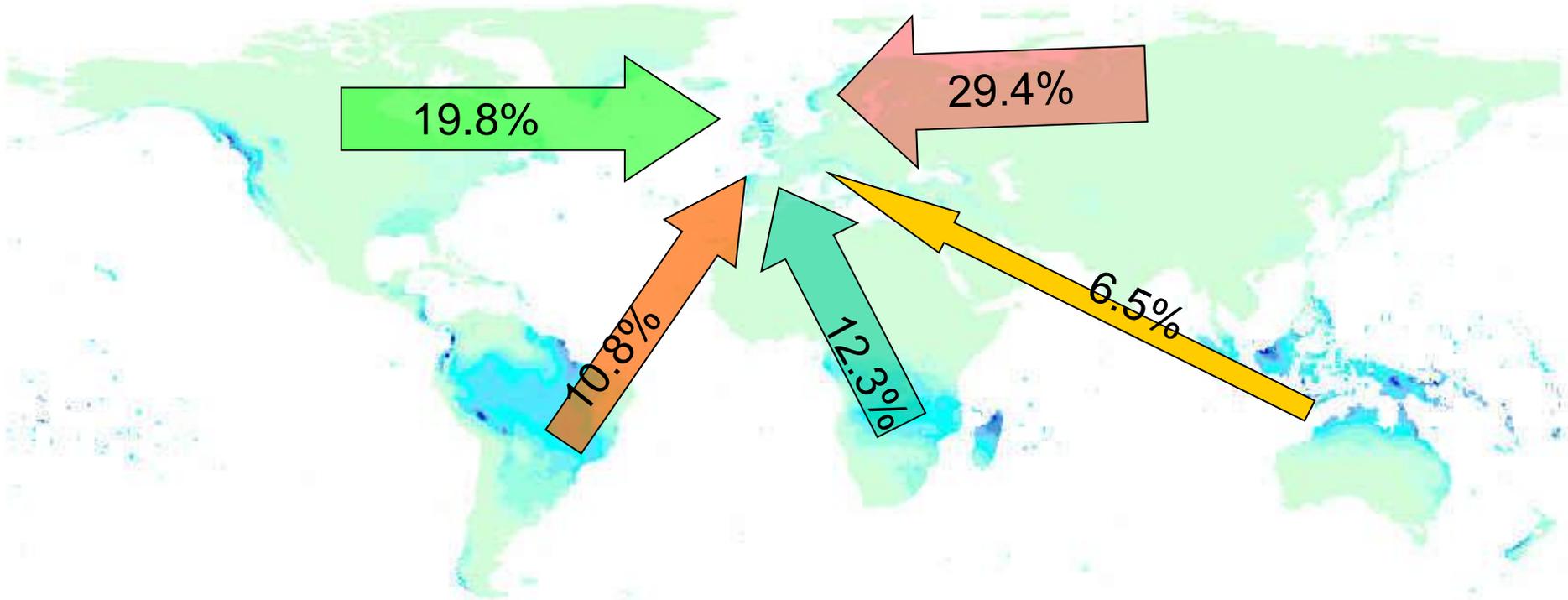


205 insect families involved
Only 29 families contribute for more than 10 alien species
 Aphids and scales predominant



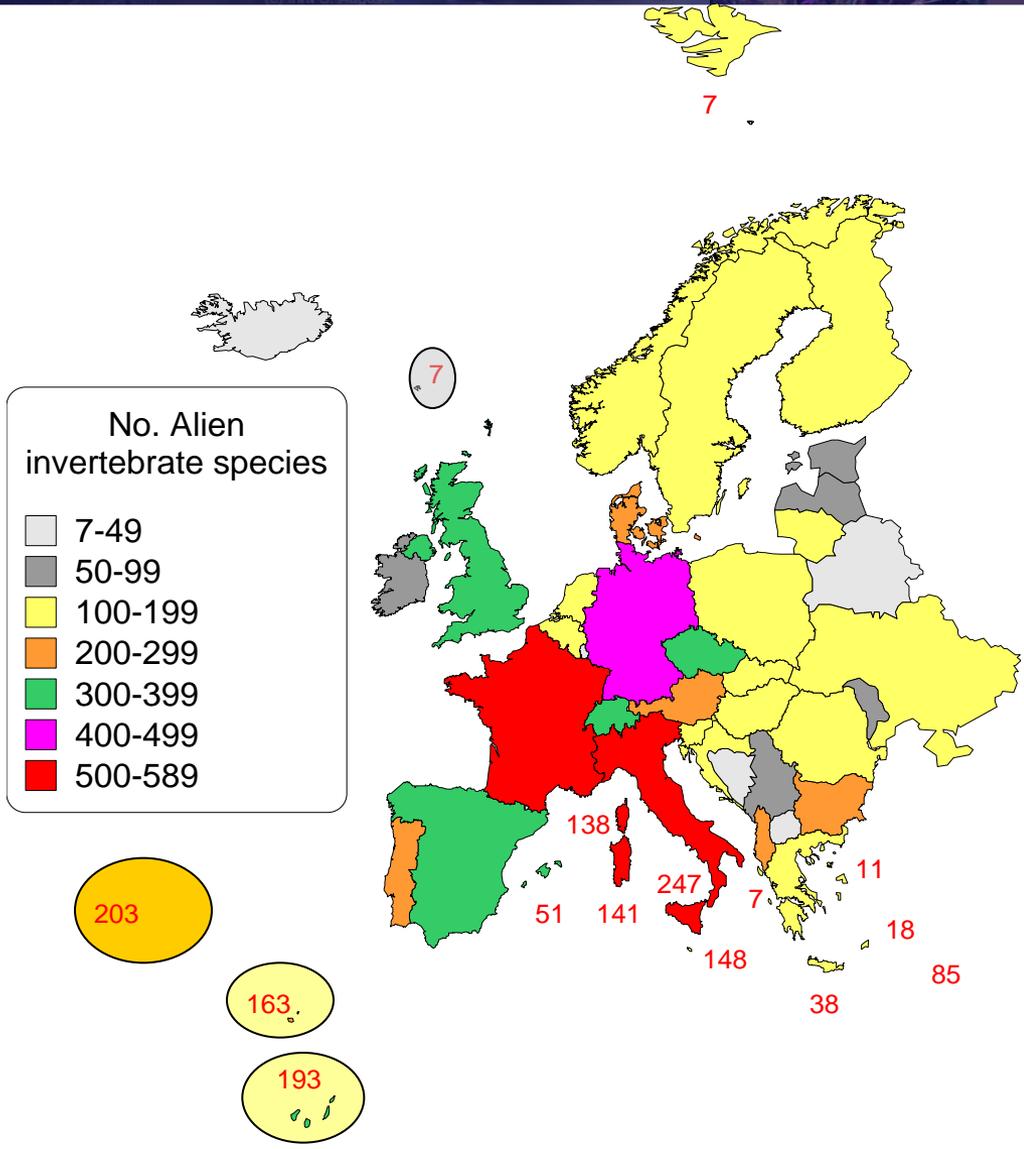
Asia became the major supplier of alien invertebrates

6.7% tropical/ subtropical
14.5% cryptogenic



Contribution of tropical and subtropical areas up to 37% !

European countries largely differ in the number of alien invertebrates “rich” Western countries the most colonized



Sampling efforts ?
Taxonomic expertise ?

Invasive species: main issues

1. Pathways of introduction

Many and very different according to organisms. For forest insects, we focus on

- Wood packing material: Asian longhorn beetles
- Plants for planting: chestnut gall wasp

2. Economic impacts

How much they cost to human society

3. Ecological impacts

How deep they modify the ecosystems

4. Management measures

How to deal with them before, during, and after the arrival

Invasive species: Asian longhorn beetle

Anoplophora glabripennis (Coleoptera Cerambycidae)

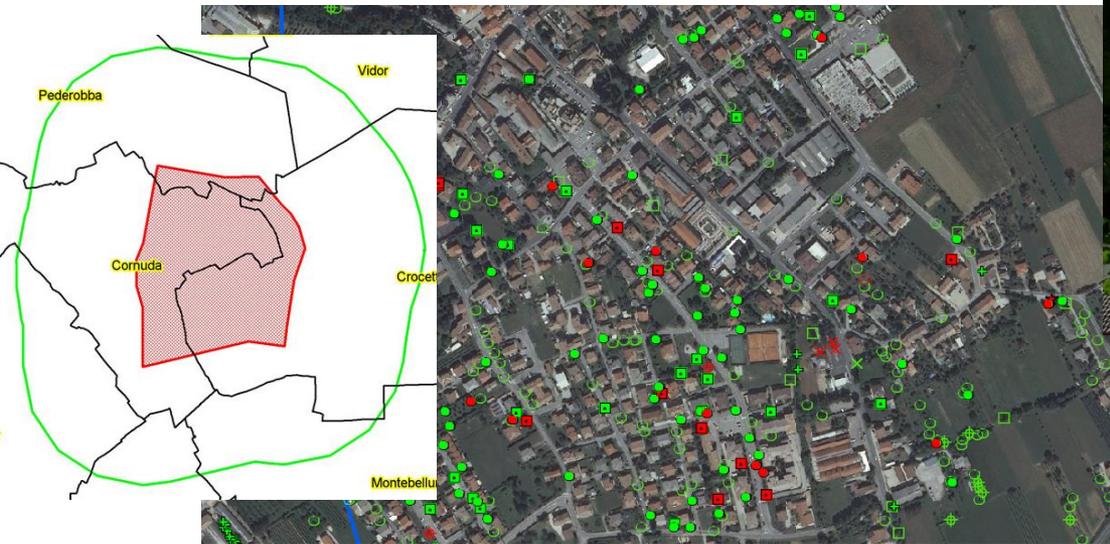
1. Pathway of introduction



Invasive species: Asian longhorn beetle

2. Economic impacts

How much they cost to human society

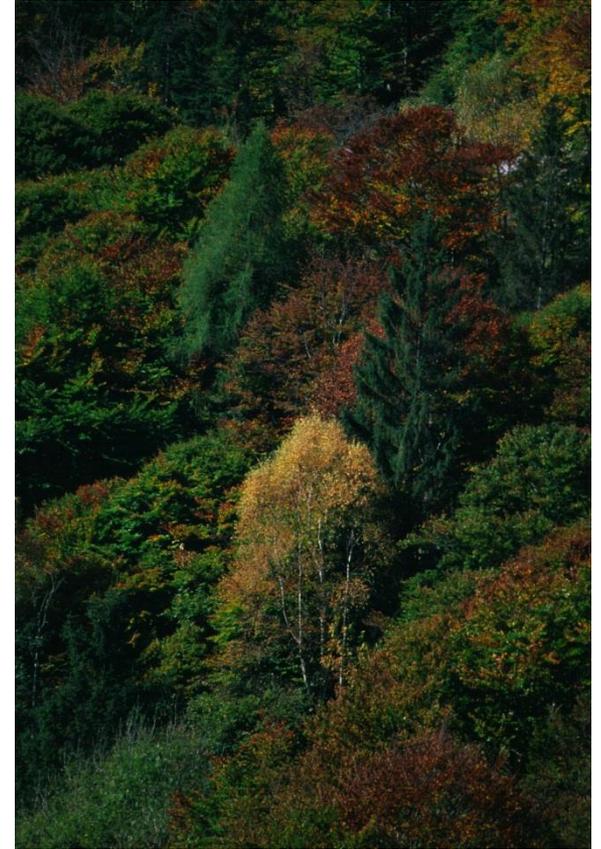


Invasive species: Asian longhorn beetle

3. Ecological impacts

How deep they modify the ecosystems

Alter tree composition of forest stands



Affect indirectly the community of insects associated with trees:
to be demonstrated

Invasive species: Asian longhorn beetle

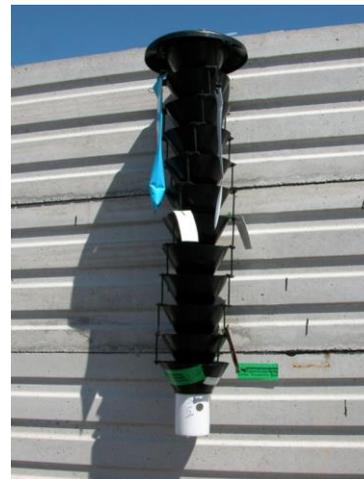
4. Management measures

How to deal with them before, during, and after the arrival

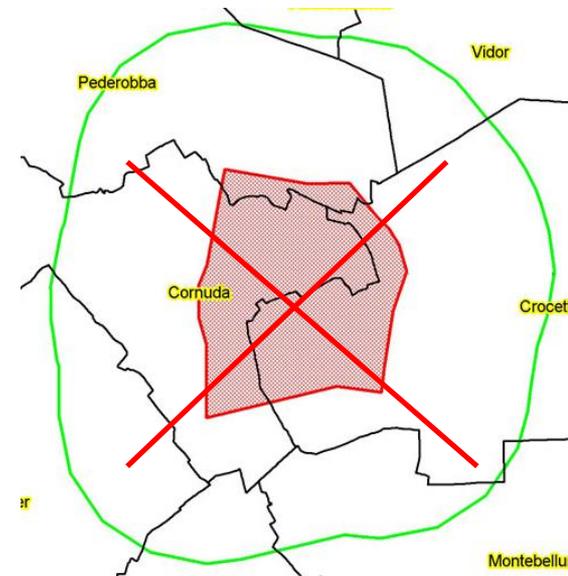
FAO ISPM 15



Surveillance: inspection
trapping



Eradication: removal of infested trees



Invasive species: chestnut gall wasp

Dryocosmus kuriphilus (Hymenoptera Cynipidae)

1. Pathways of introduction

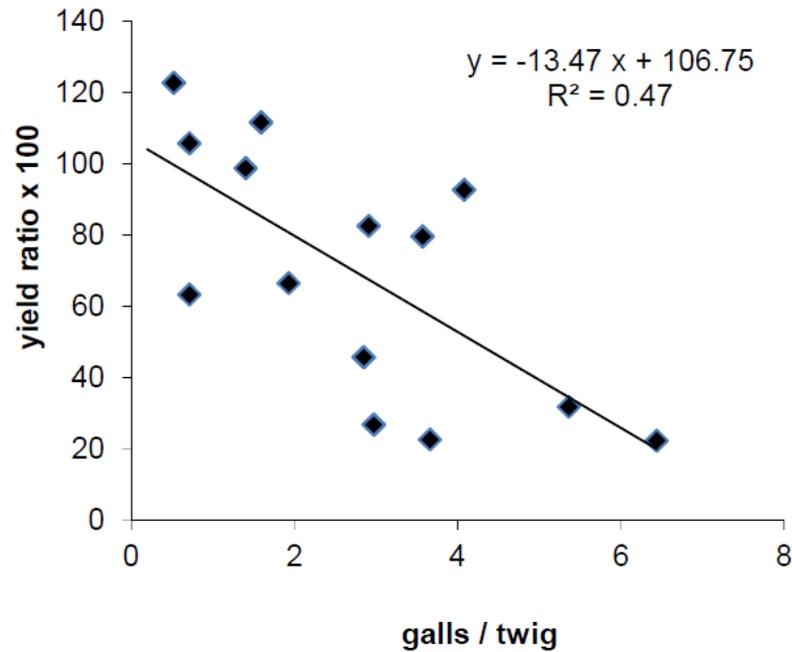
- Plants for planting



Invasive species: chestnut gall wasp

2. Economic impacts

How much they cost to human society: nut yield reduction in relation to gall density

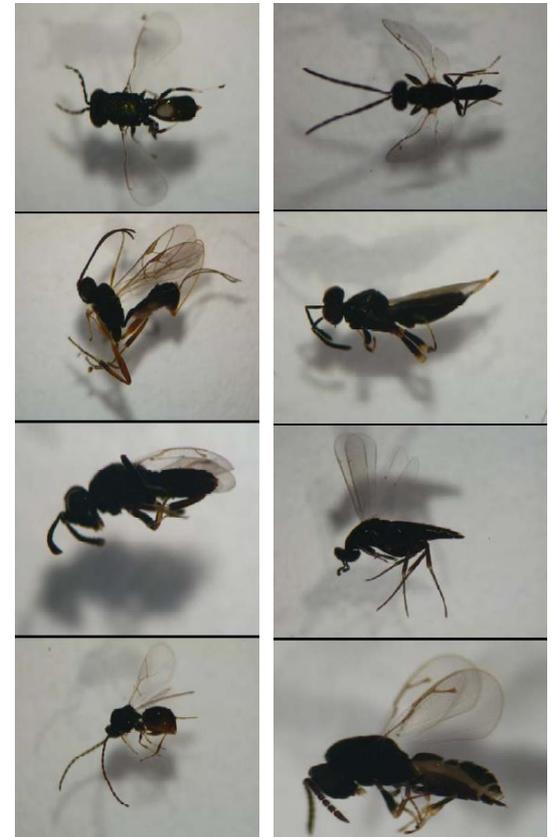


Invasive species: chestnut gall wasp

3. Ecological impacts

How deep they modify the ecosystems

Suspected impact on the community of parasitoids associated with gall wasps on oak (*Quercus* spp.)



Invasive species: chestnut gall wasp

4. Management measures

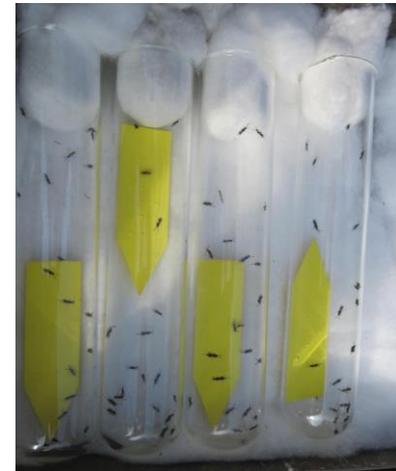
How to deal with them before, during, and after the arrival

FAO ISPM 10 pest free production area

Surveillance: molecular test

Eradication not possible → Biological control

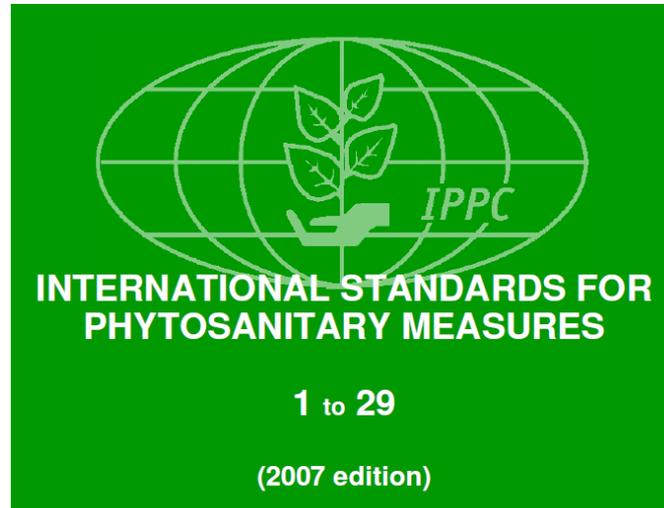
Torymus sinensis



Invasive species: Pest Risk Assessment

Process addressed to identify the risk before the arrival of the pest (quarantine lists) and to review measures to limit the risk

FAO ISPM 11



EPPO scheme

EFSA scheme

PRATIQUÉ



CAPRA - Computer Assisted Pest Risk Analysis

CAPRA is a software developed by the European and Mediterranean Plant Protection Organization in the Framework of the European Union 7th Framework Programme project PRATIQUÉ (Grant Agreement No. 212459).

It is intended to assist pest risk analysts in running the EPPO decision-support scheme for Pest Risk Analysis (PRA), and the decision support scheme for generating contingency plans and prioritizing action during outbreaks.

Invasive species: Surveillance network for early detection

