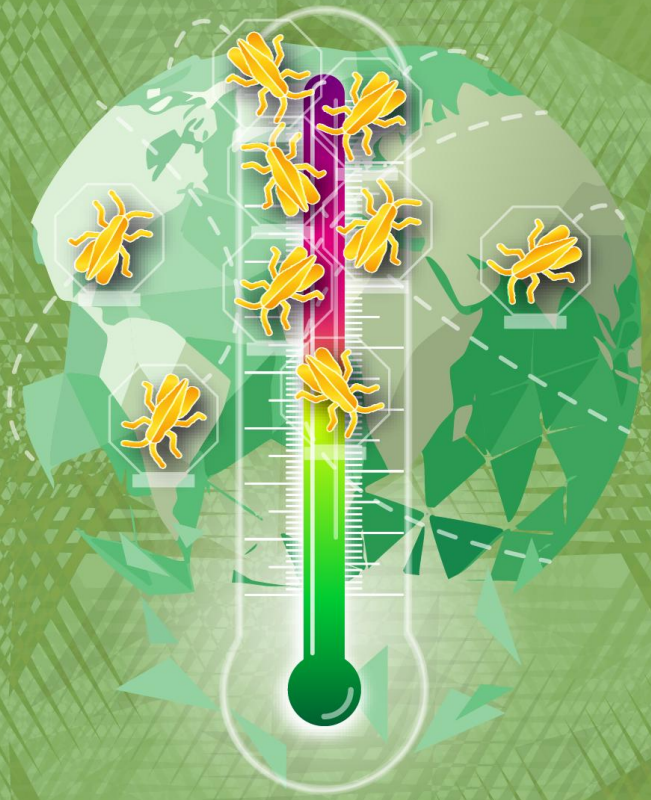
IPPC Webinar Series

Climate Change and Phytosanitary Issues

1–2 October 2025 | 14:00–16:00 CET



Impact of climate change on plant pests and pest risk assessment

Dr Maria Chiara Rosace

EFSA Individual Scientific Advisor (ISA)

Outline

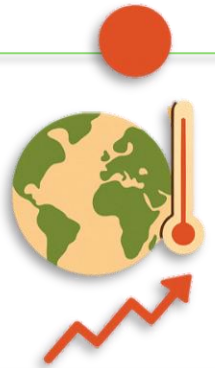
Introduction

- Definition of pest and climate change
- Climate change and pest risk

Pest risk assessment

- Steps of pest risk assessment
- Methods to assess climate suitability
- Including climate change in pest risk assessment

Conclusions



- Challenges
- Key messages

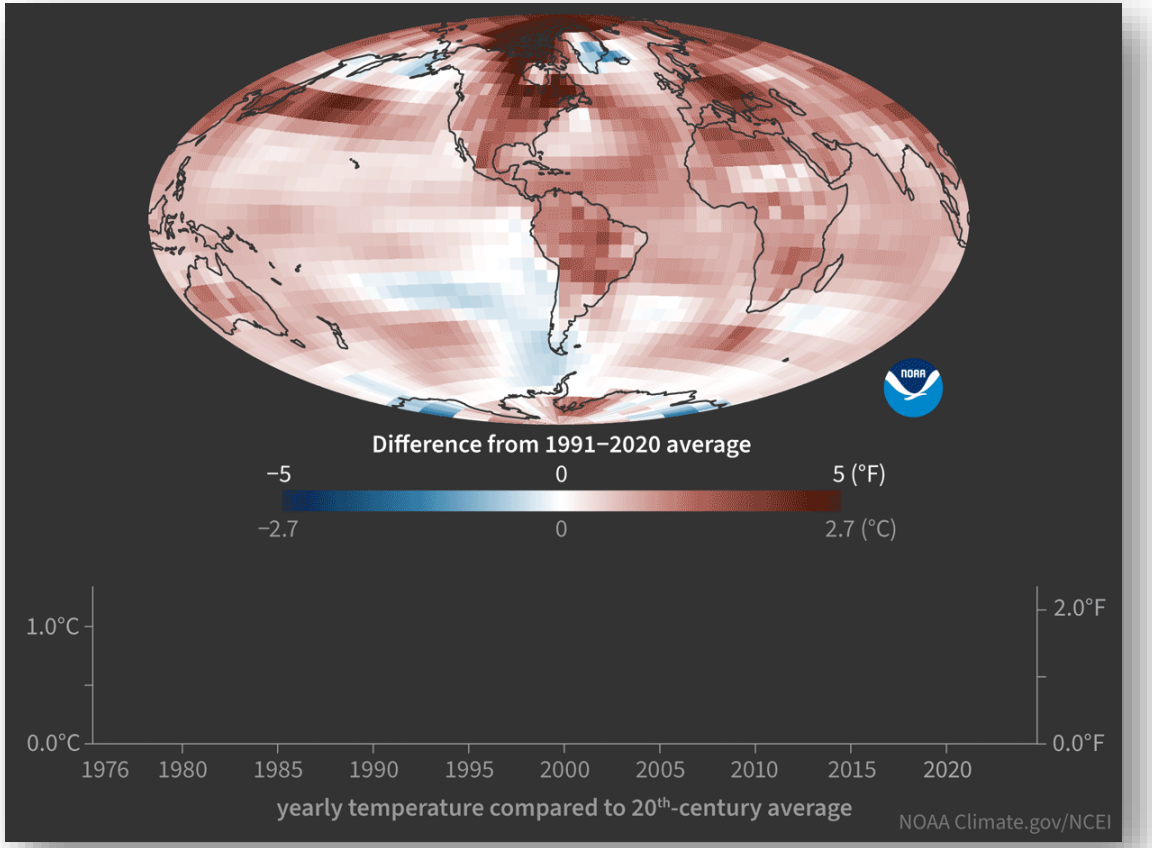
Definition of pest

"Any species, strain or biotype of plant, animal or pathogenic agent injurious to plants or plant products" (ISPM 5 - IPPC Secretariat, 2024).

Definition of climate and climate change

"Climate is the term given to describe the expected weather patterns globally, regionally or locally, based on records of the long-term average weather patterns experienced in that specific area. **Climate change refers to long-term shifts in those weather patterns**" (Bradshaw et al., 2024).

Map of temperature anomalies and bar chart of yearly anomalies from 1976-2024

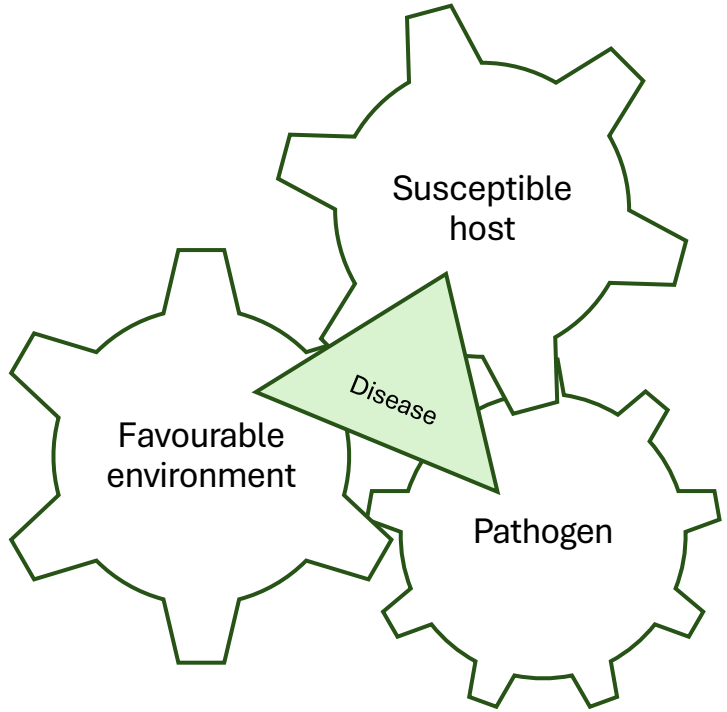


Extreme weather—like heatwaves, droughts, heavy rains, and cyclones—has become more frequent and severe, causing some irreversible damage to ecosystems and communities as they struggle to adapt (IPCC, 2022).

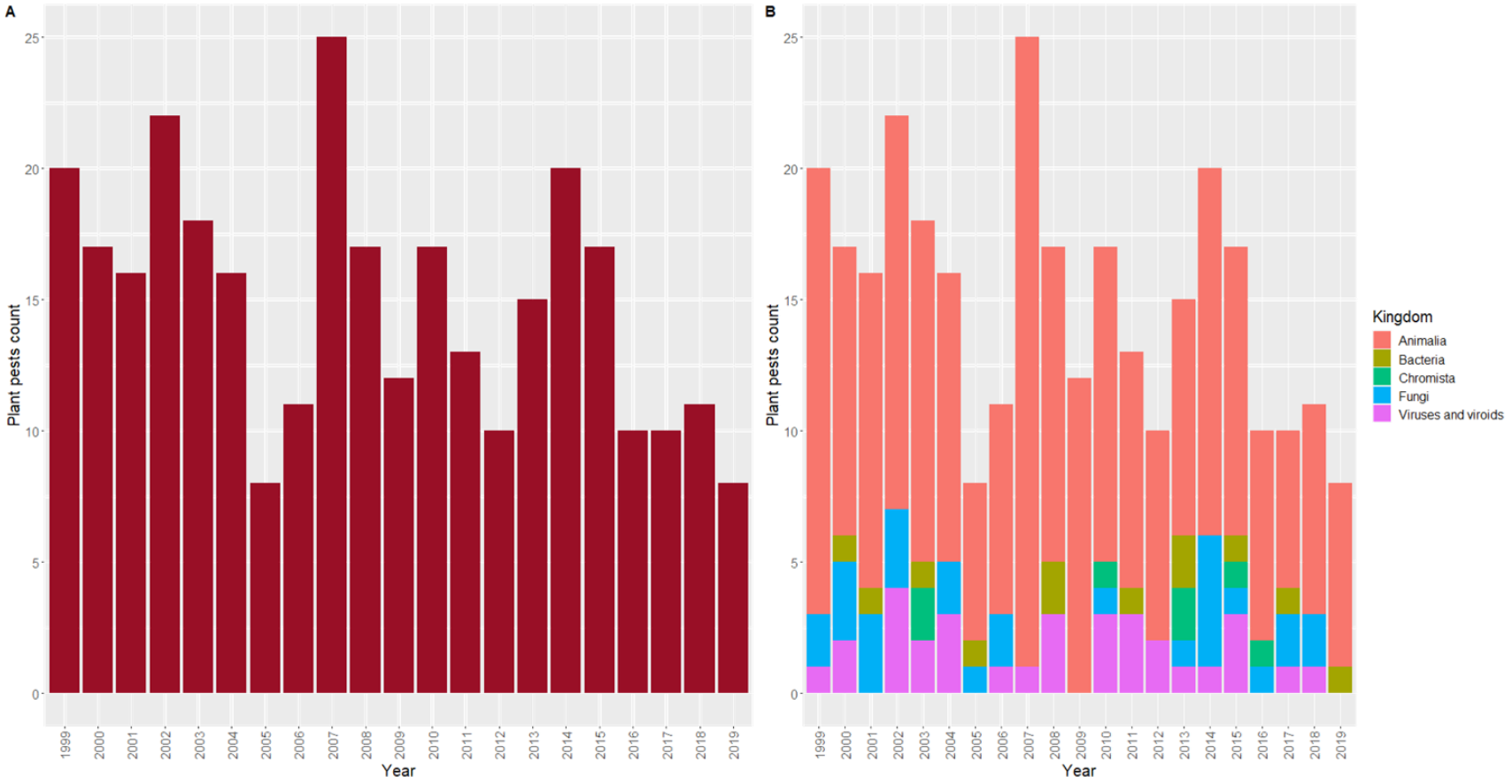
Climate change and pest risk

- Temperature
- Precipitation
- Humidity
- CO_2 concentration

Impact on species' life cycles



Plant pests introductions in the EU between 1999 and 2019



Annual average temperature

Annual average precipitation

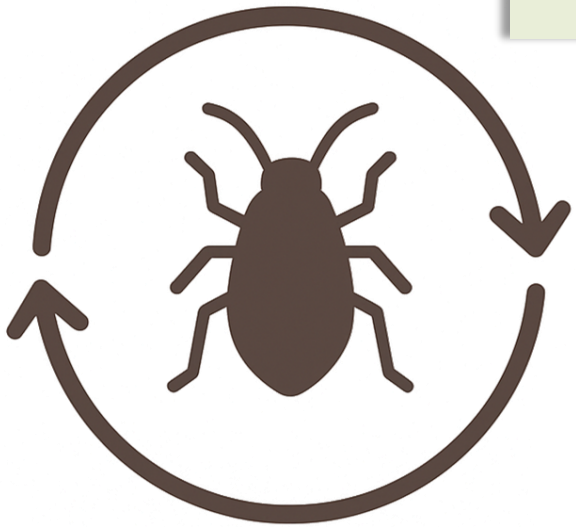
Human population density

Rosace et al., 2023, 2025

Climate change and pest risk

Temperature

Overwintering survival



Generation

Geographic expansion

Phenological mismatch

Compound effects: Climate change and globalisation

Climate change, combined with increasing global trade and movement of people, provides pests with a greater number of pathways and opportunities to invade and establish in new areas

Steps of pest risk assessment

Entry

- The movement of a pest **into an area** where it is not yet present

(ISPM5)

Establishment

- **Perpetuation**, for the foreseeable future, of a pest within an area after entry

(ISPM5)

Spread

- Expansion of the geographical distribution of a pest within an area

(ISPM5)

Impact

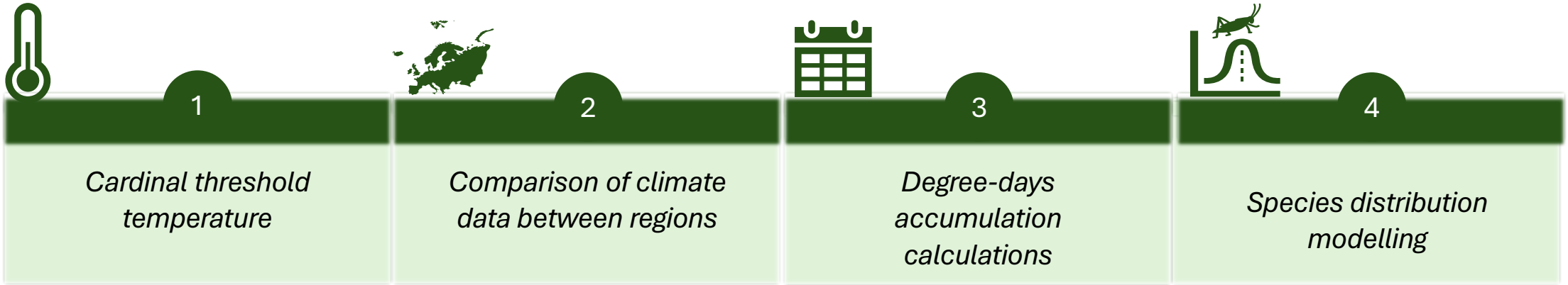
- The damage caused by a pest on the crop output and quality and/or on the environment

Climate change can influence each step

Methods to assess climate suitability

There are numerous methods available to evaluate and model the climate suitability for pest establishment and spread. More details on these can be found in Kriticos et al. (2024).

Venette (2015) and Eyre et al. (2012) have also provided recommendations and guidance on the selection of the most appropriate method, from the large number available, for climate suitability analysis.



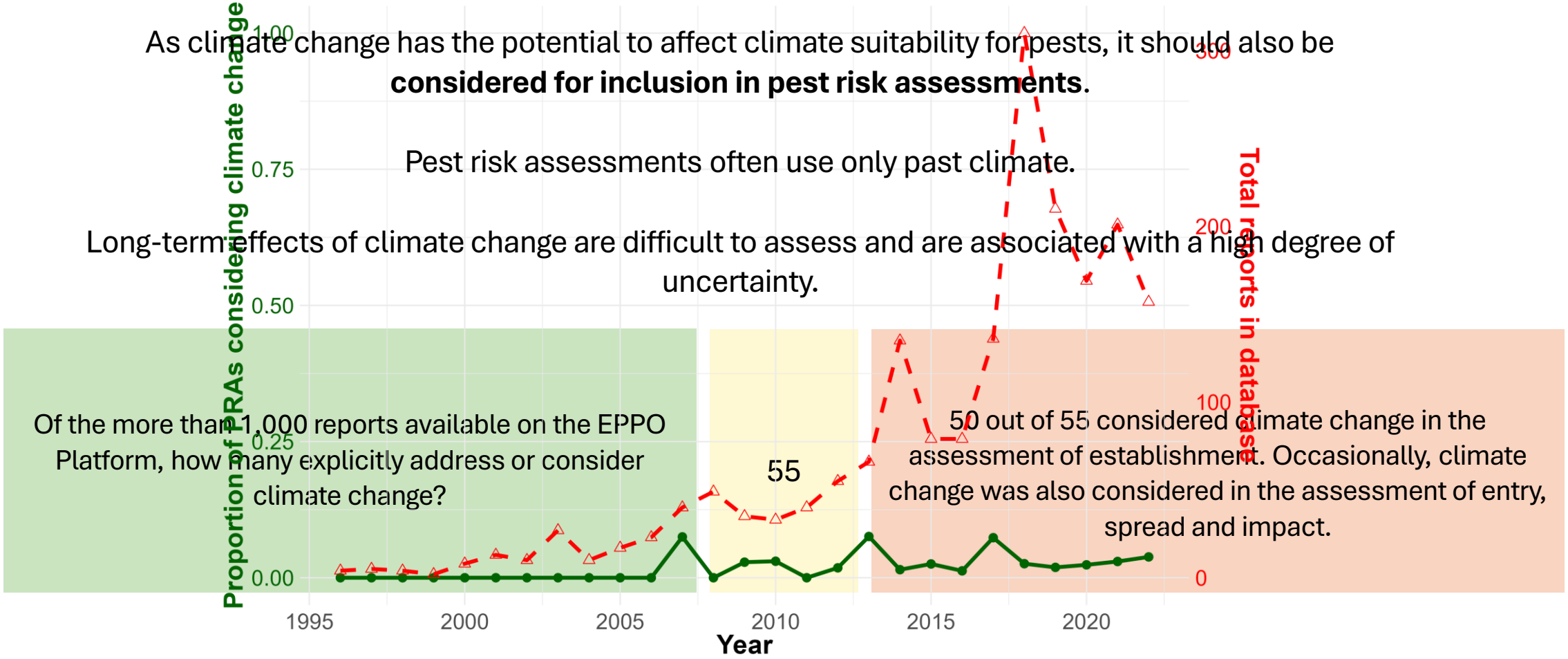
Climate change in pest risk assessment

As climate change has the potential to affect climate suitability for pests, it should also be **considered for inclusion in pest risk assessments**.

Pest risk assessments often use only past climate.

Long-term effects of climate change are difficult to assess and are associated with a high degree of uncertainty.

Of the more than 1,000 reports available on the EPPO Platform, how many explicitly address or consider climate change?



50 out of 55 considered climate change in the assessment of establishment. Occasionally, climate change was also considered in the assessment of entry, spread and impact.

What about the inclusion of climate change?

The modelling methods most used in pest risk assessments reviewed were SDMs, but other modelling tools such as CLIMEX and Köppen–Geiger climate classification have also been used.

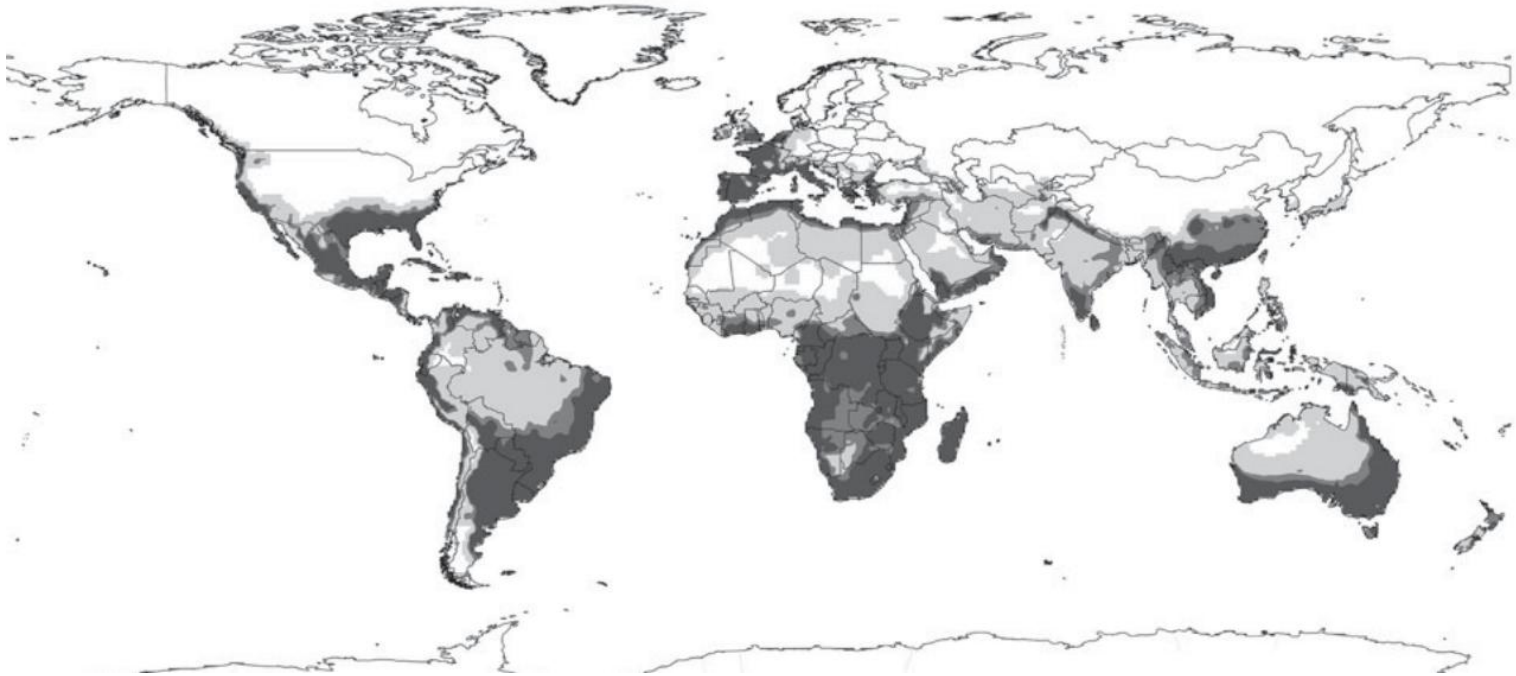
1. *Time horizons*
2. *Temperature increase*

Including climate change in pest risk assessment: an example

CLIMEX model was used for the assessment of the response of *B. zonata* to current climate and for the predicted climate for the 2070s.

Relevant expansion of the pest will occur in areas currently too cold for its establishment.

Potential distribution of *Bactrocera zonata*



Ni et al., 2012

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EUROPEAN AND MEDITERRANEAN PLANT PROTECTION ORGANIZATION
ORGANISATION EUROPEENNE ET MEDITERRANEENNE POUR LA PROTECTION DES PLANTES

20-25807

Pest Risk Analysis for

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Pest Risk Analysis f

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Canadian Council of Forest Ministers
Conseil canadien des ministres des forêts

Risk assessment of the threat of mountain pine beetle to Canada's boreal and eastern pine forests

efsa JOURNAL

SCIENTIFIC OPINION

ADOPTED: 24 October 2022

doi: 10.2903/j.efsa.2022.7641

Risk assessment of *Xanthomo*

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EFSA Panel on Pl
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Abstract
Following a request from the European Commission, the EFSA Panel on Plant Health

Inclusion of climate change in pest risk assessment

🕑 **Step 1: Choose a time horizon / global warming level (short-, mid-, long-term)**

🌍 **Step 2: Determine importance of climate change in the pest risk assessment**

📊 **Step 3: Identify pest risk assessment sections for climate change (entry, establishment, spread, impact)**

🔎 **Step 4: Include climate change analysis in selected sections**

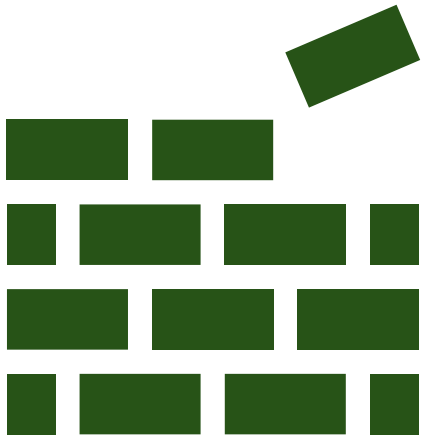
✅ **Step 5: Present results of analysis for each pest risk assessment section**

Rosace et al., 2025

Challenges

Uncertainty of projections
Climate models differ in outcomes → difficult to quantify risks

Time horizon selection
Short-, mid-, or long-term scenarios might change results significantly



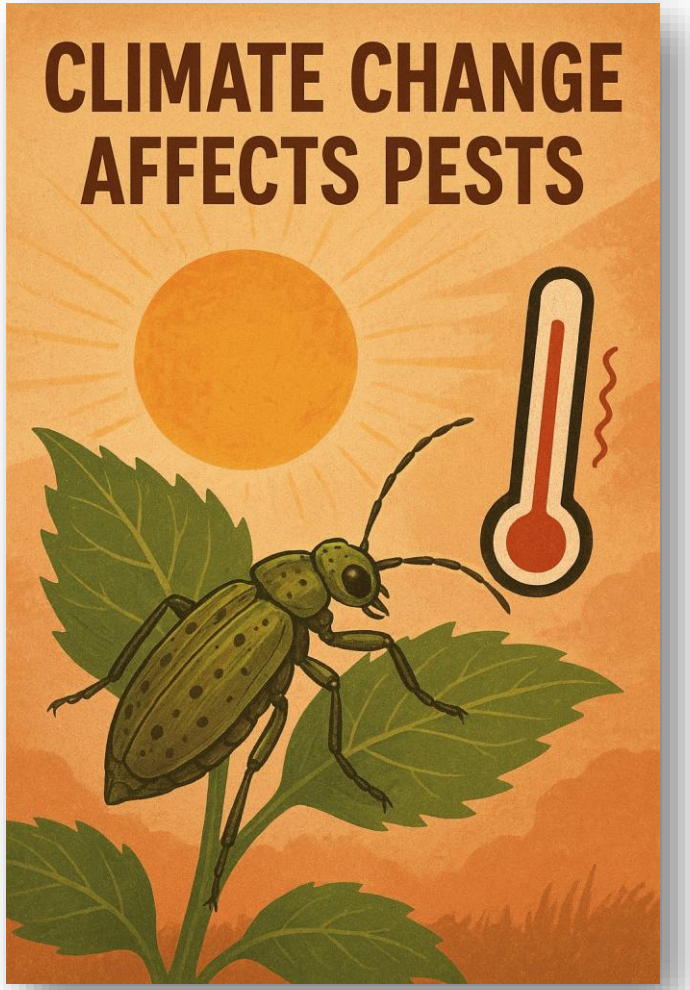
Data and resource limitations
Lack of detailed pest biology, distribution, and climate sensitivity data
Limited expertise and financial/human resources

Lack of harmonized guidance
No standardised international framework for including climate change in PRAs

Complex interactions
Climate × trade × host × pest dynamics are difficult to model

Key messages

- Climate change significantly alters pest risks
- Pest risk assessments must evolve (and are already evolving) to include climate change
- Requires international coordination and resources



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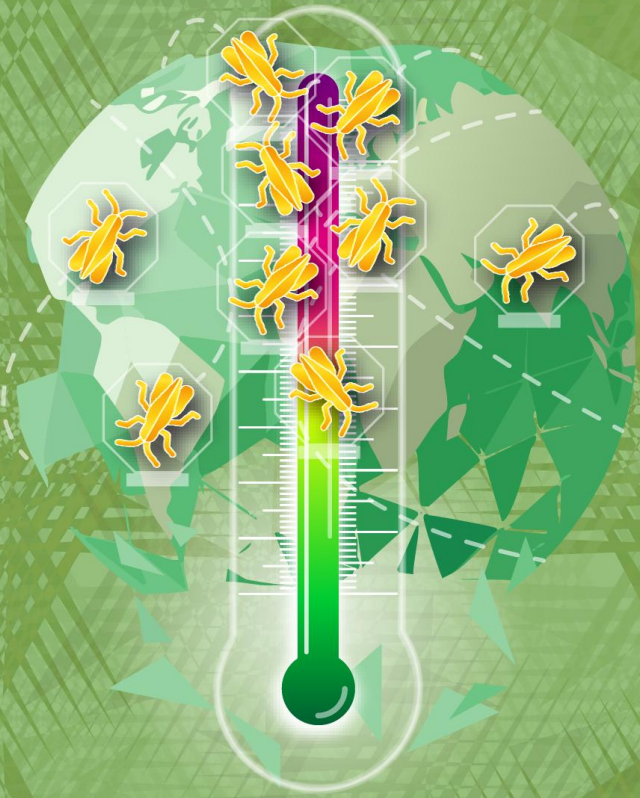

Thank you

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