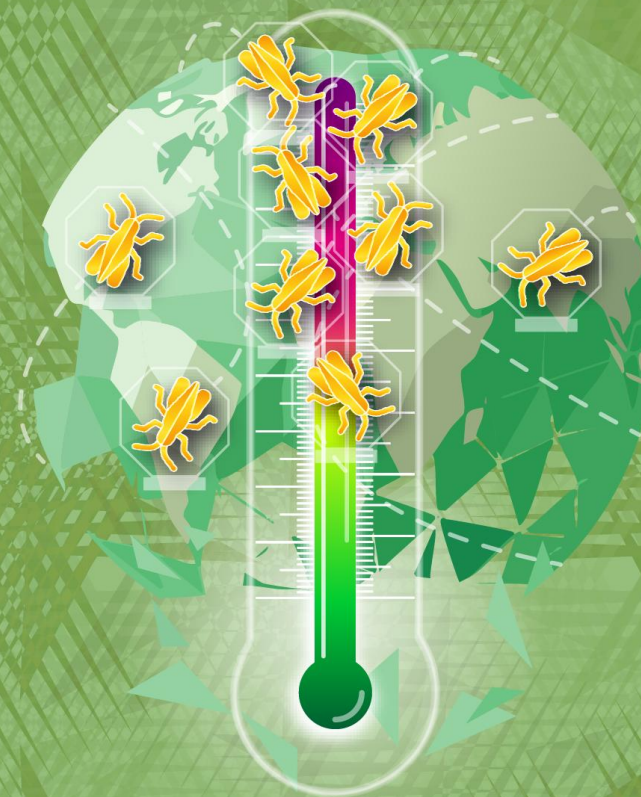


IPPC Webinar Series

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



Outline

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



- Challenges
- Key messages

Introduction

Pest risk assessment

Conclusions



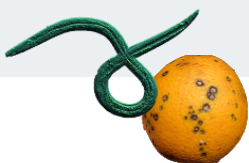
- Steps of pest risk assessment
- Methods to assess climate suitability
- Including climate change in pest risk assessment



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).



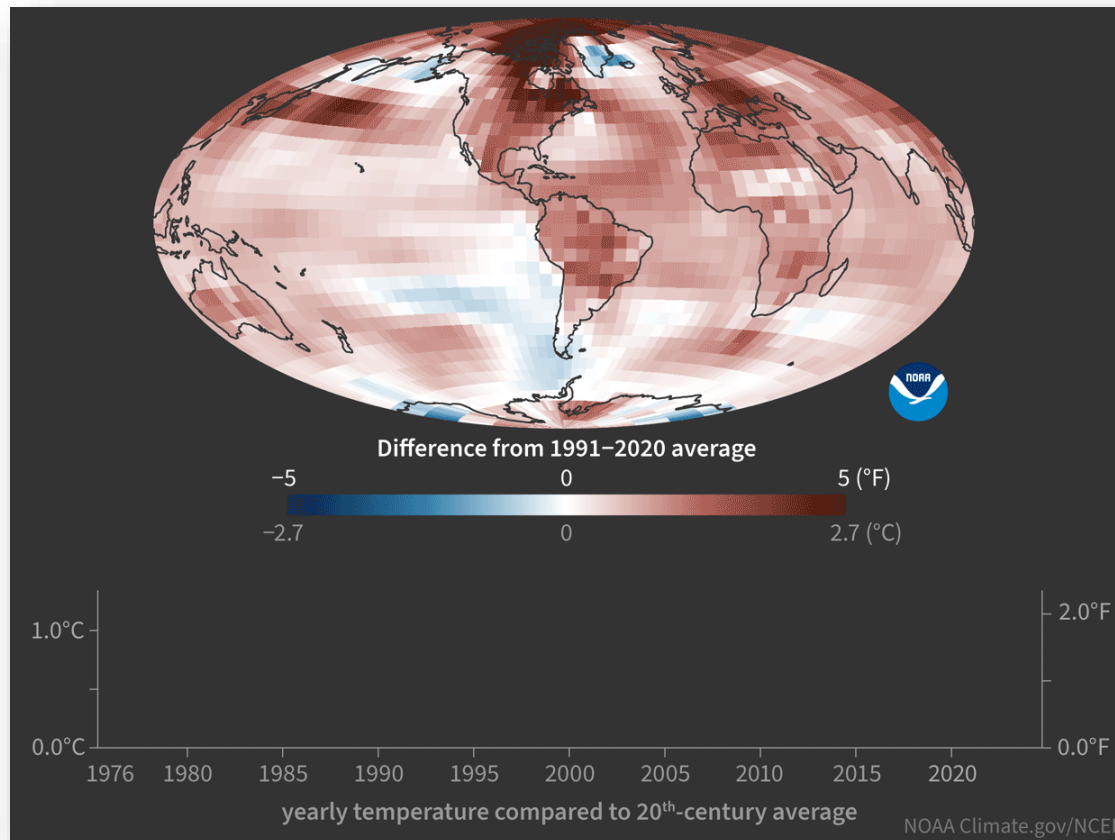
Definition of climate and climate change

“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



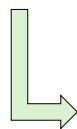
Extreme weather—like heatwaves, droughts, heavy rains, and cyclones—has become more frequent and severe, causing some irreversible damage to ecosystems and communities as they struggle to adapt (IPCC, 2022).



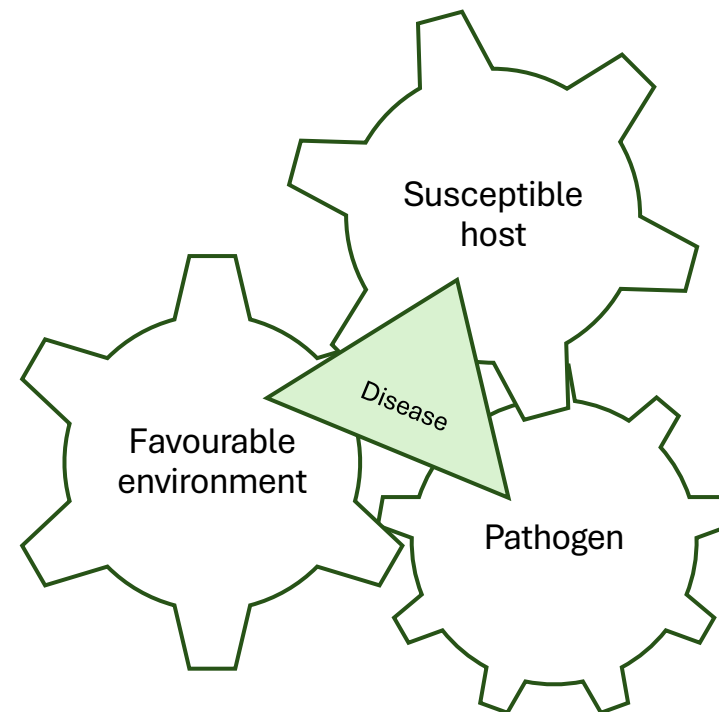
Climate change and pest risk



- Temperature
- Precipitation
- Humidity
- CO₂ concentration

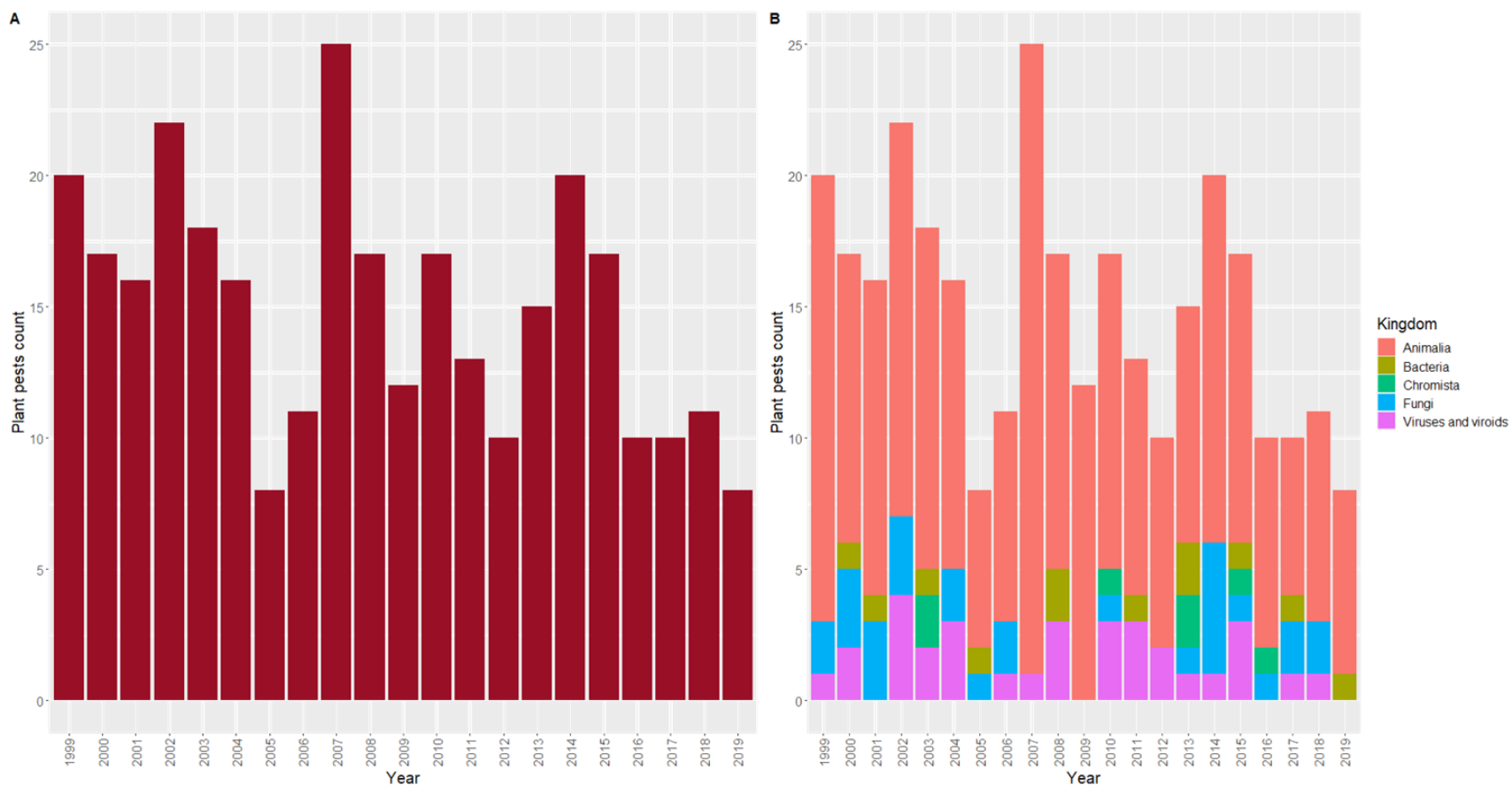


Impact on
species' life cycles





Plant pests introductions in the EU between 1999 and 2019



Annual average
temperature



Annual average
precipitation



Human population
density



IPPC Webinar Series

Climate Change and Phytosanitary Issues

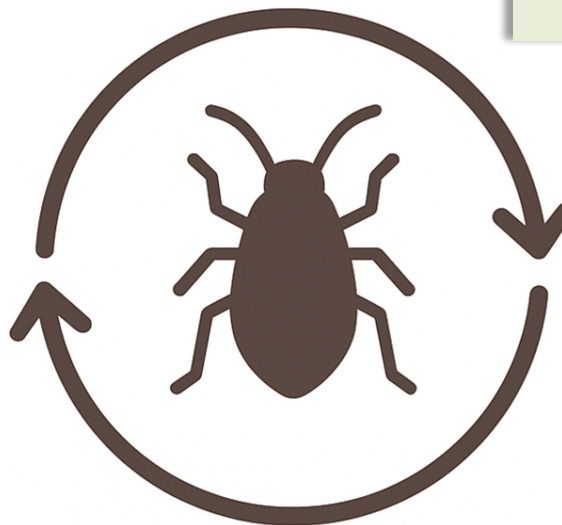
Climate change and pest risk



Temperature



Generation



Overwintering
survival



Geographic
expansion

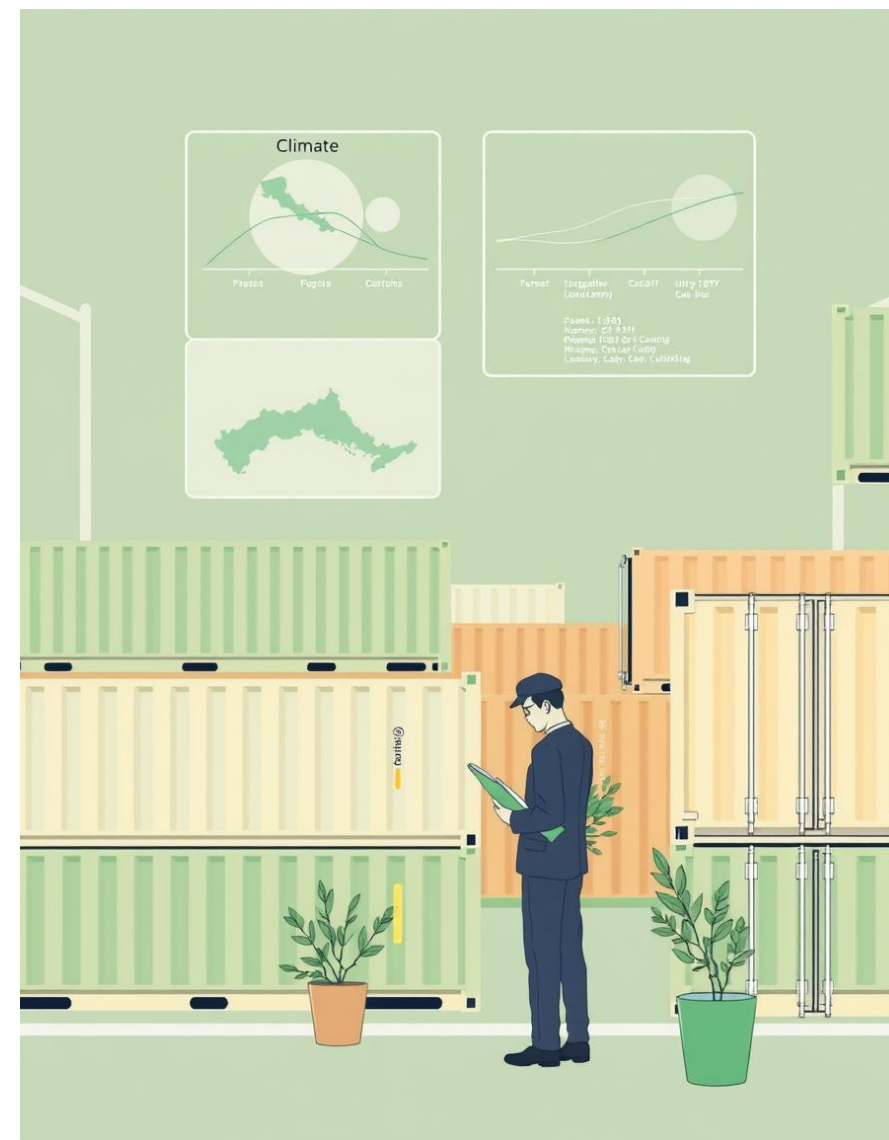


Phenological
mismatch



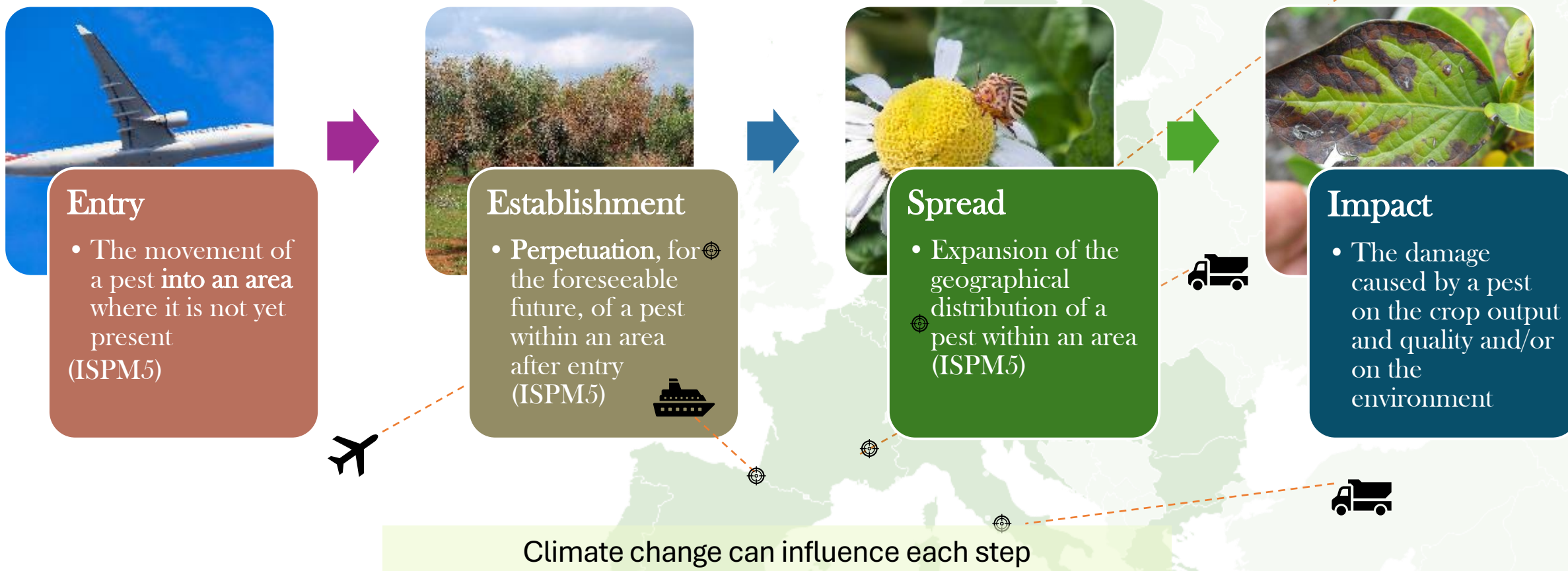
Compound effects: Climate change and globalisation

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

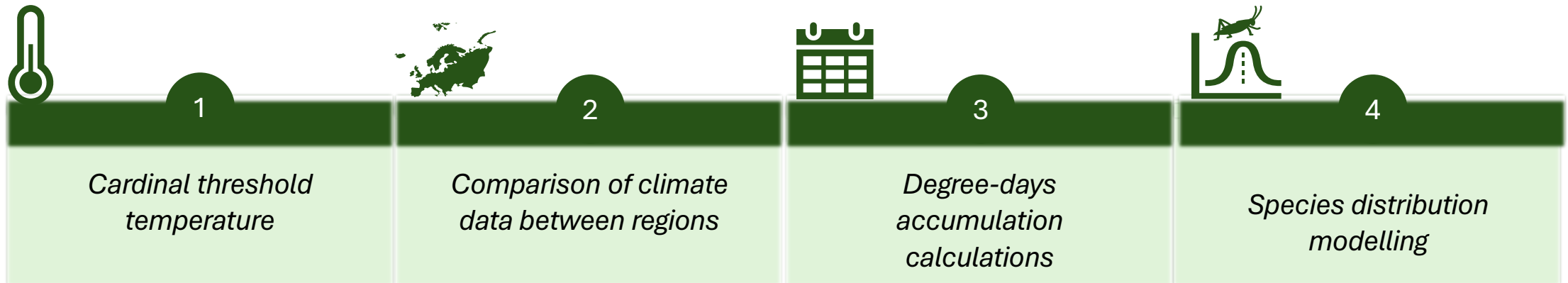




Methods to assess climate suitability

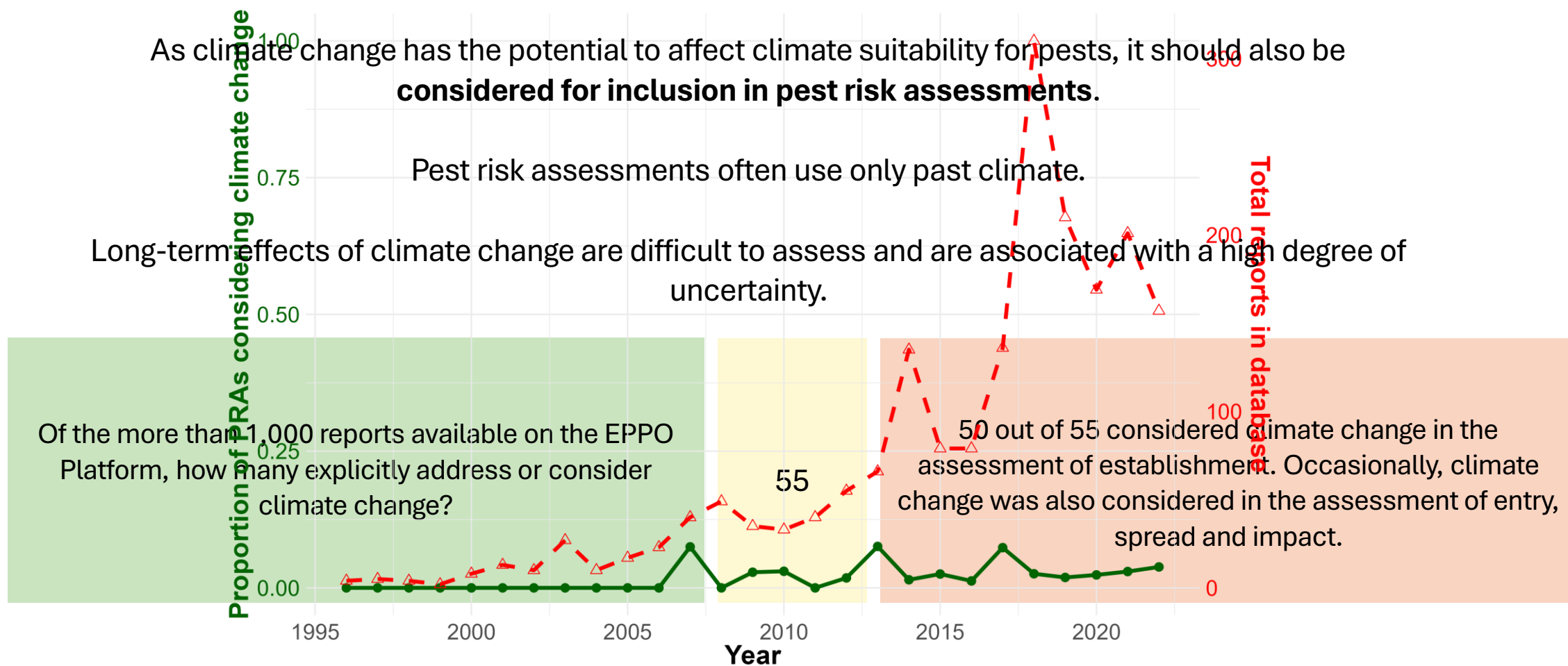
There are numerous methods available to evaluate and model the climate suitability for pest establishment and spread. More details on these can be found in Kriticos et al. (2024).

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





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*



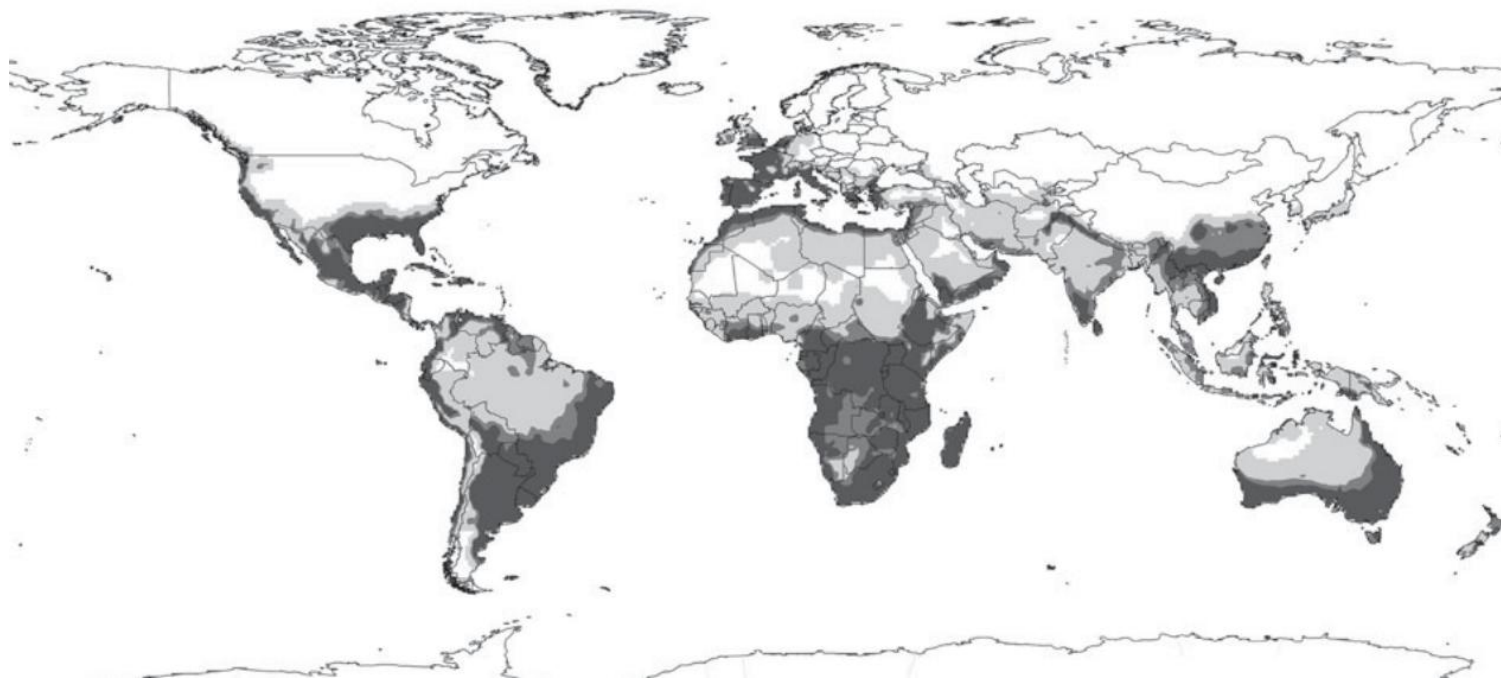


Including climate change in pest risk assessment: an example

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



IPPC Webinar Series

Climate Change and Phytosanitary Issues



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

20-25807



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

Pest Risk Analysis of

Alternanthera philoxera

Canadian Council
of Forest
Ministers



Conseil canadien
des ministres
des forêts

Pest Risk Analysis for

SCIENTIFIC OPINION

ADOPTED: 24 October 2022

doi: 10.2903/j.efsa.2022.7641

Risk assessment of *Xanthomonas*

EFSA Panel on Plant Health
Claude Bragard, Paola Baptista, Elisavet Chatzivassiliou, Josep Anton Jaques Miret, Annemarie Fejer Justesen, Christen Sven Magnusson, Panagiotis Milonas, Roel Potting, Philippe Lucien Reignault, Wopke van der Werf, Jonathan Yuen, Lucia Zappalà, Jaime Cubero, Gianni Giloi, David Makowski, Alexander Mastin, Andrea Maiorano, Olaf Mosbach-Schulz, Marco Pautasso, Sara Tramontini and Antonio Vicent Civera

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



EFSA JOURNAL

Des orbonalis for the European

Paula Baptista | Elisavet Chatzivassiliou |
n Jaques Miret | Annemarie Fejer Justesen |
giotis Milonas | Juan A. Navas-Cortes |
Reignault | Emilio Stefani |
Jonathan Yuen | Lucia Zappalà |
i | Júlia López Mercadal | Andrea Maiorano |
Olaf Mosbach-Schulz | Marco Pautasso | Eugenio Rossi | Giuseppe Stancanelli |

Sara Tramontini | Wopke Van der Werf


Correspondence: plants@efsa.europa.eu


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



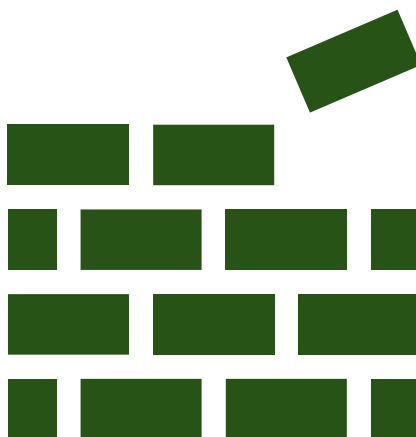
Uncertainty of projections

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



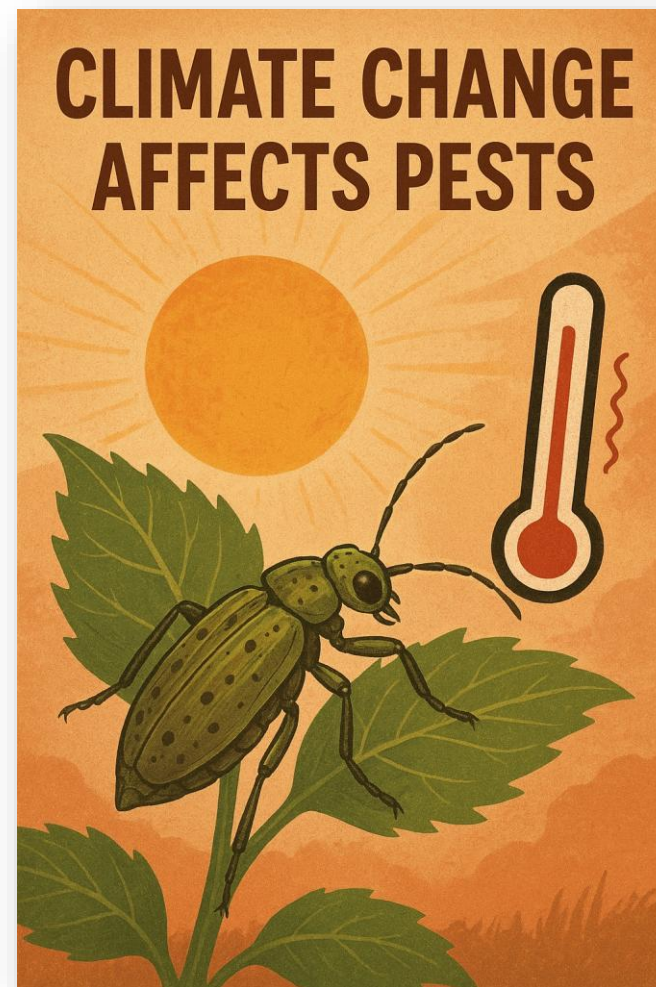
Climate change significantly alters pest risks



Pest risk assessments must evolve (and are already evolving) to include climate change



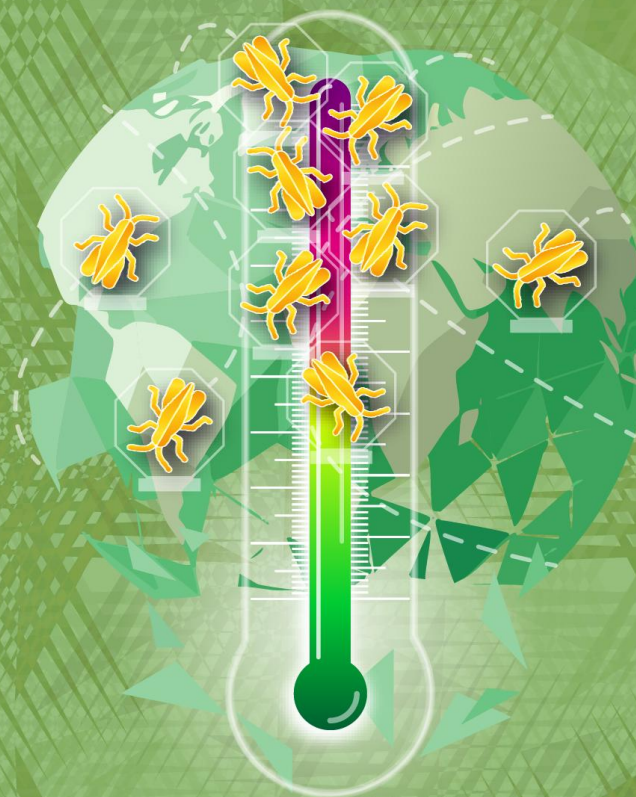
Requires international coordination and resources



IPPC Webinar Series


Climate Change and Phytosanitary Issues


1–2 October 2025 | 14:00–16:00 CET




Thank you



 Contact person: Dr Maria Chiara Rosace

 mariachiararosace@gmail.com

 [LinkedIn Profile](#)

 [@Chiara_spark](#)



References

- Bradshaw S, Eyre D, Korycinska A, Li C, Steynor A, Kriticos D (2024) Climate change in pest risk assessment: Interpretation and communication of uncertainties. *EPPO Bulletin*, 54(Suppl. 1), 4–19. Available from: <https://doi.org/10.1111/epp.12985>
- Eyre D, Baker RHA, Brunel S, Dupin M, Jarošík V, Kriticos DJ, Makowski D, Pergl J, Reynaud P, Robinet C & Worner S (2012) Rating and mapping the suitability of the climate for pest risk analysis. *EPPO Bulletin*, 42, 48-55. <https://doi.org/10.1111/j.1365-2338.2012.02549.x>
- IPCC. (2022). Summary for policymakers. H.-O. Pörtner, D.C. Roberts, E.S., Poloczanska, K. Mintenbeck, M. Tignor, A. Alegría, M. Craig *et al.*, eds. In: H.-O. Pörtner, D.C. Roberts, M. Tignor, E.S. Poloczanska, K. Mintenbeck, A. Alegría, M. Craig *et al.*, eds. *Climate change 2022 – Impacts, adaptation and vulnerability*, pp. 3–33. Contribution of Working Group II to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change. Cambridge, UK and New York, USA, Cambridge University Press. 3056 pp. doi.org/10.1017/9781009325844.001
- Kriticos D, Szyniszewska A, Bradshaw C, Li C, Verykoui E, Yonow T, Duffy C (2024) Modelling tools for including climate change in pest risk assessments, *EPPO Bulletin*, 54, 38–51.
- Ni WL, Li ZH, Chen HJ, Wan FH, Qu WW, Zhang Z & Kriticos DJ (2012) Including climate change in pest risk assessment: the peach fruit fly, *Bactrocera zonata* (Diptera: Tephritidae). *Bulletin of Entomological Research* 102(2), pp.173-183.
- Rosace, M.C., Conesa, D.V., López-Quílez, A. et al. (2025) Hotspot mapping of pest introductions in the EU: A regional analysis of environmental, anthropogenic and spatial effects. *Biol Invasions* 27, 18. <https://doi.org/10.1007/s10530-024-03461-9>
- Rosace, M.C., Björklund, N., Boberg, J., Bradshaw, C.D., Camac, J., Damus, M. et al. (2024) Including climate change in pest risk assessment: Current practices and perspectives for future implementation. *EPPO Bulletin*, 54(Suppl. 1), 52–72. Available from: <https://doi.org/10.1111/epp.12989>
- Rosace, M.C., Cendoya, M., Mattion, G. et al. (2023) A spatio-temporal dataset of plant pests' first introductions across the EU and potential entry pathways. *Sci Data* 10, 731. <https://doi.org/10.1038/s41597-023-02643-9>
- Venette (2015) (ed.) *Pest risk modelling and mapping for invasive alien species*. CABI, Wallingford, U.K.