



Food and Agriculture
Organization of the
United Nations



International
Plant Protection
Convention

Climate impacts on plants and pests in tropical areas

Francislene Angelotti

Petrolina - Brazil, September 2024



MINISTÉRIO DA
AGRICULTURA E
PECUÁRIA



CHALLENGES

01

Increase in world population

02

Availability of area for agricultural production

03

20% to 40% of global agricultural production is lost to diseases and pests



New geography of agricultural production

Impacts



Cassava



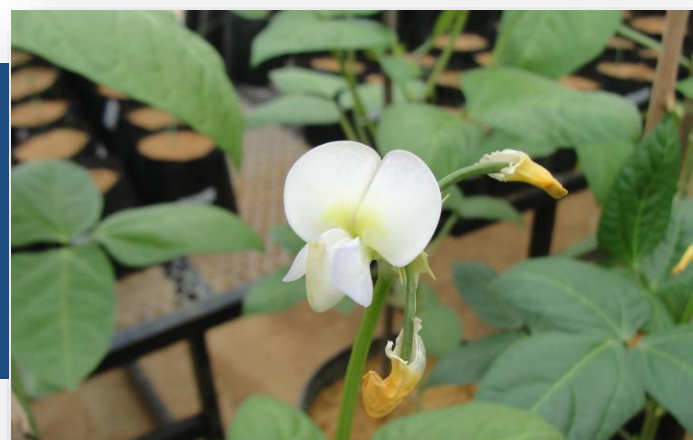
Sugarcane



Corn, rice, bean
cotton and
sunflower



Cowpea



Reduction in the production of seeds of cowpea cultivars with an increase of 4,8 °C in air temperature in Brazilian Semiarid

Carijó
- 40%



Itaim
- 25%



Pujante
- 96%



Rouxinol
- 81%

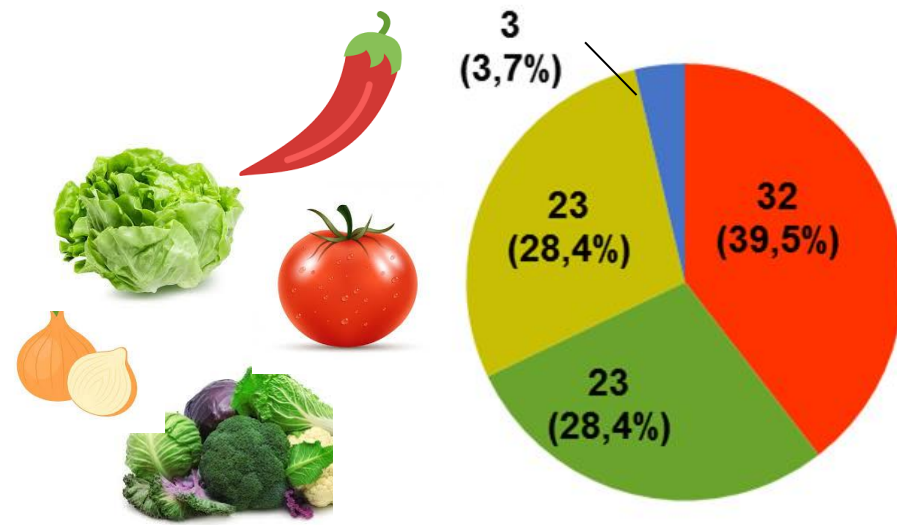


Tapahium
- 55%

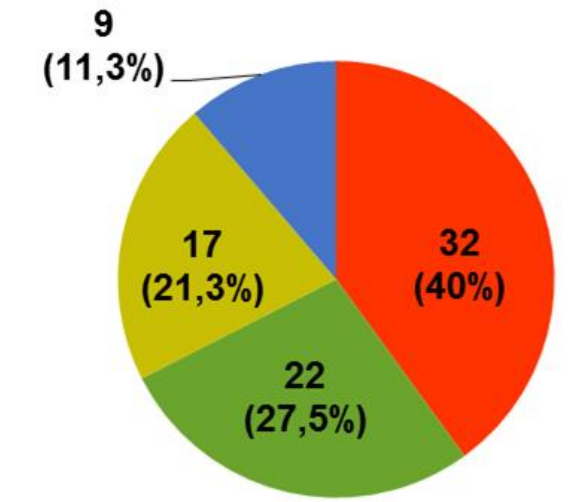


304 pathosystems

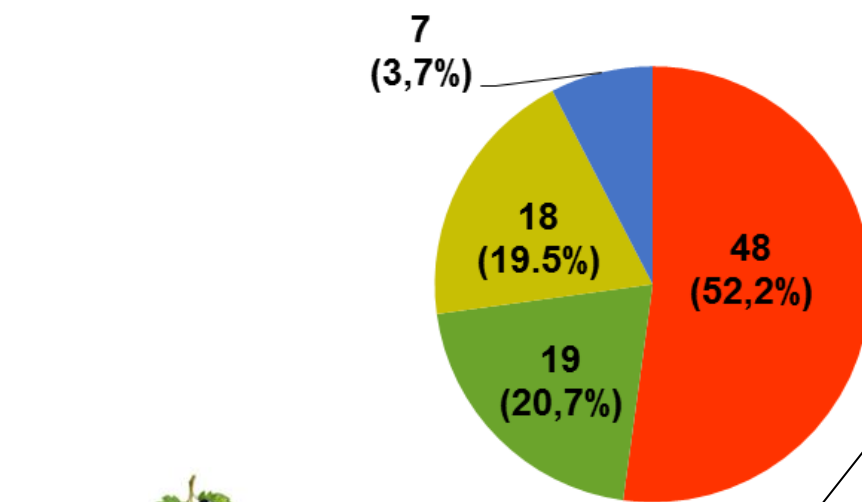
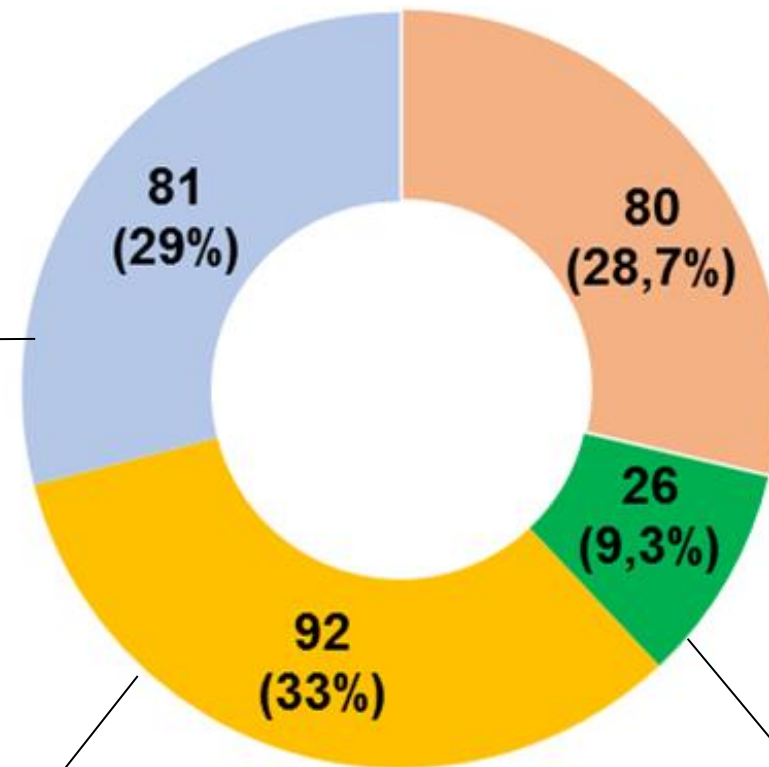
32 crops



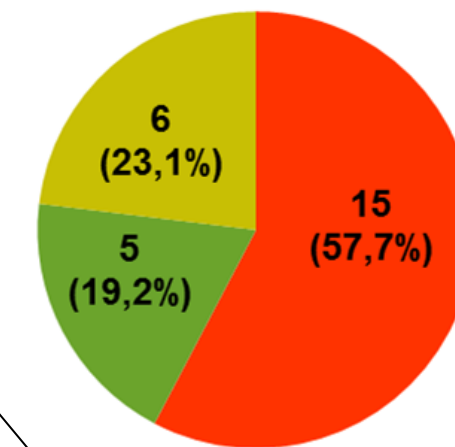
Vegetables



Crops and plantation crops



Fruits



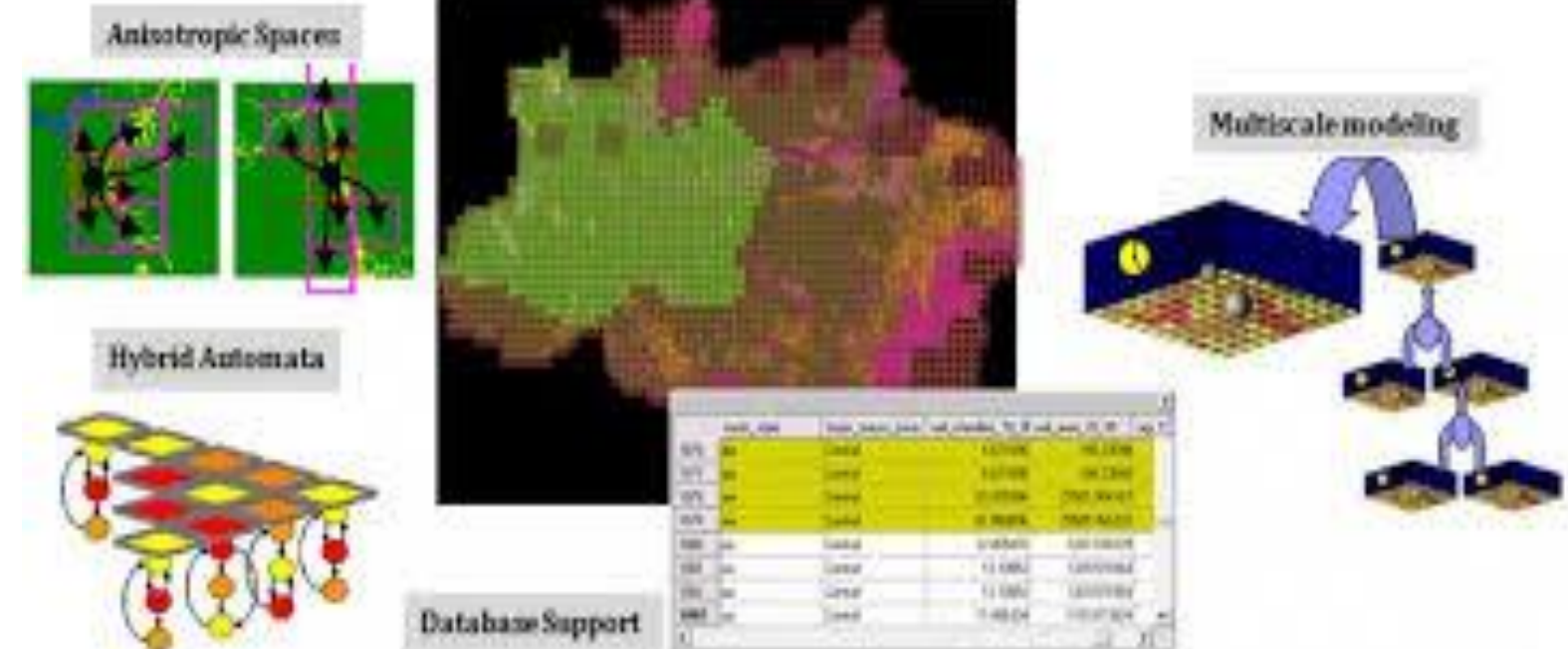
Forest

■ Increase
 ■ Reduce
 ■ Remain
 ■ By Region



Modelin

How are the impacts on plant diseases being assessed?



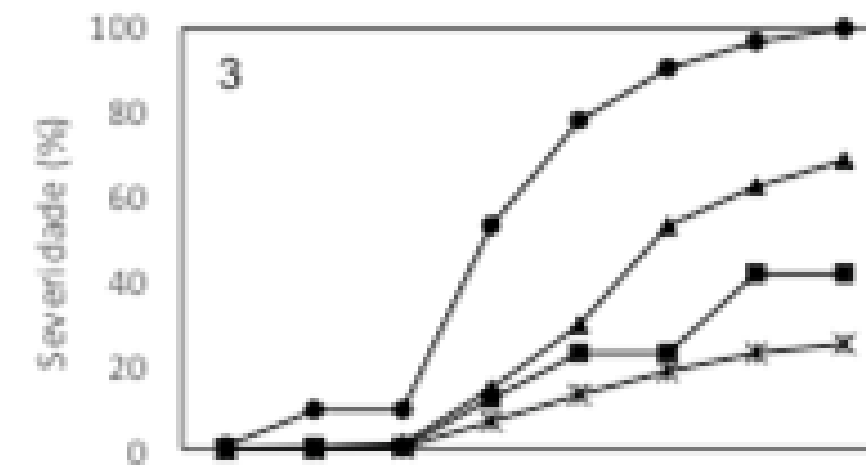
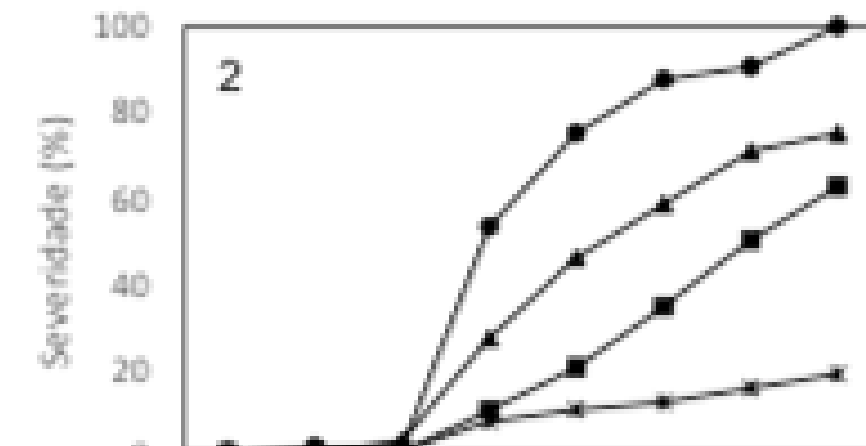
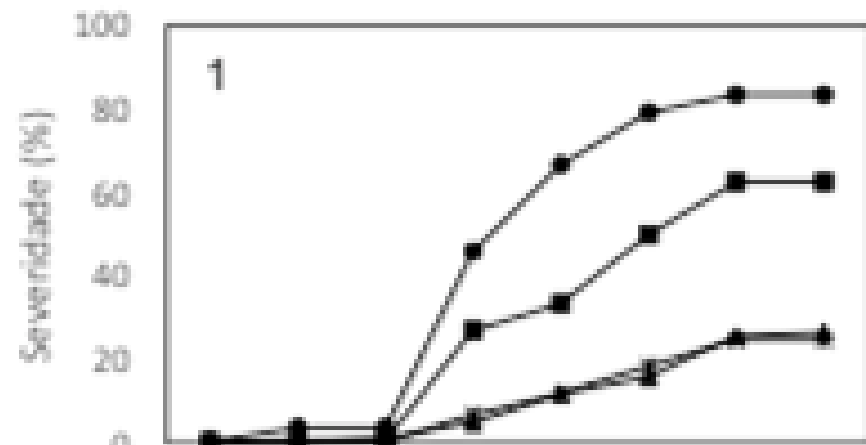
Experimentation



Powdery mildew - *Oidium* sp Melon

Increasing: temperature X CO₂

● 410 ppm (20-26-33 °C) ■ 410 ppm (24-30-37 °C) ▲ 770 ppm (20-26-33 °C) * 770 ppm (24-30-37 °C)



- Reduces severity
- Reduces sporulation
- Increase incubation period
- High susceptibility

Cultivares: 1. Araguaia, 2. Eldorado, 3. Gold (Araújo, 2019).



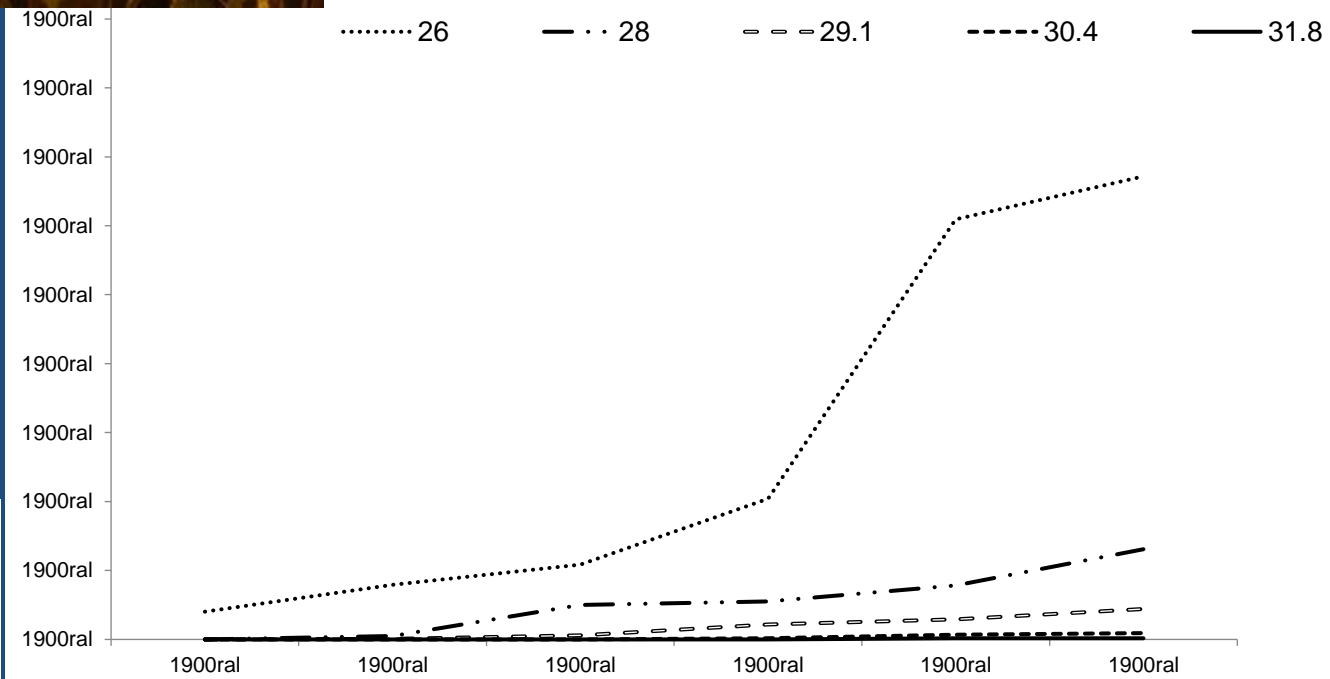
brazilian cultivars



Climatic favorability for the grapevine downy mildew



Increased latente period
5 to 9 days



Grapevine downy mildew (*Plasmopara viticola*) progress according to days after inoculation and temperatures

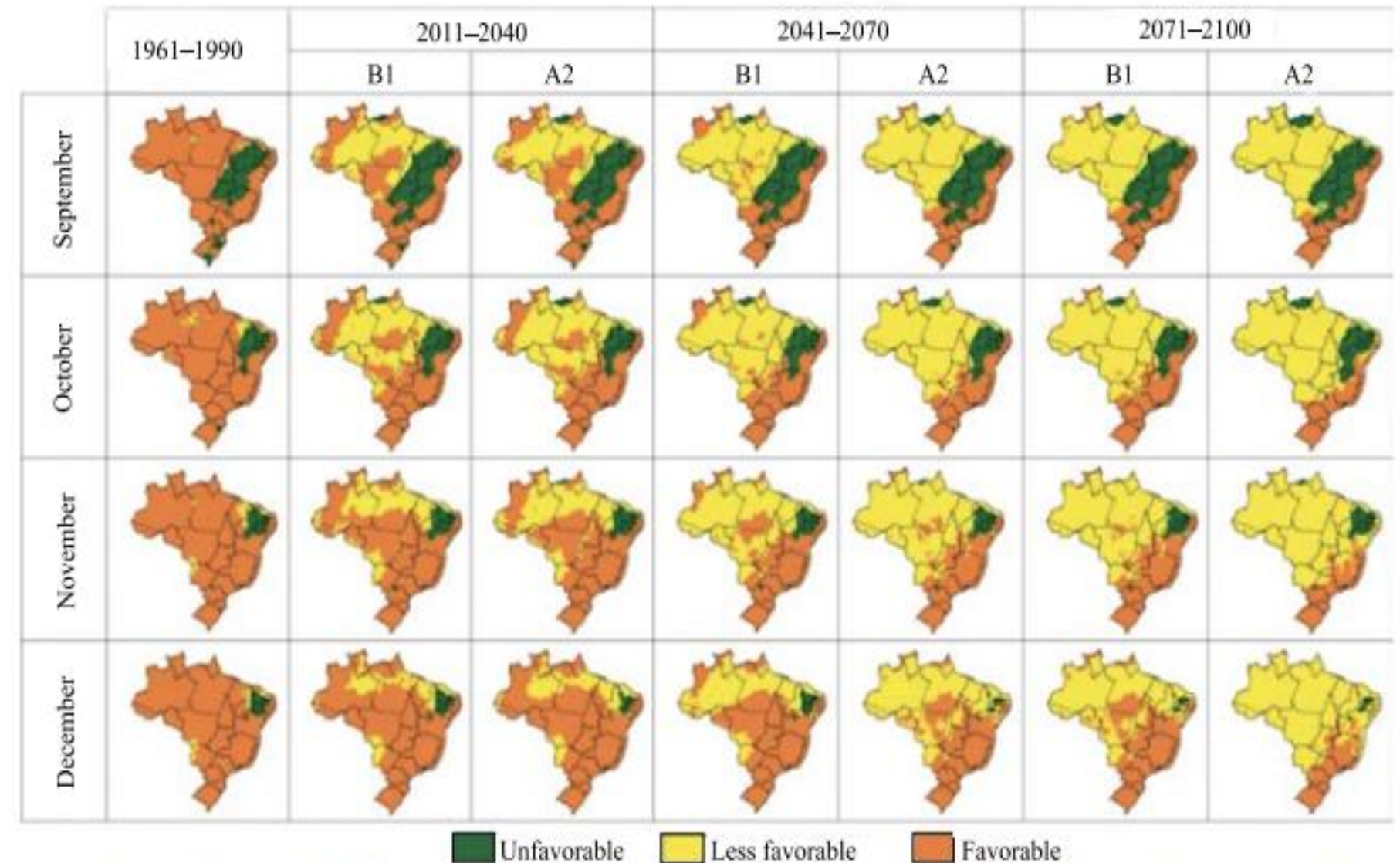
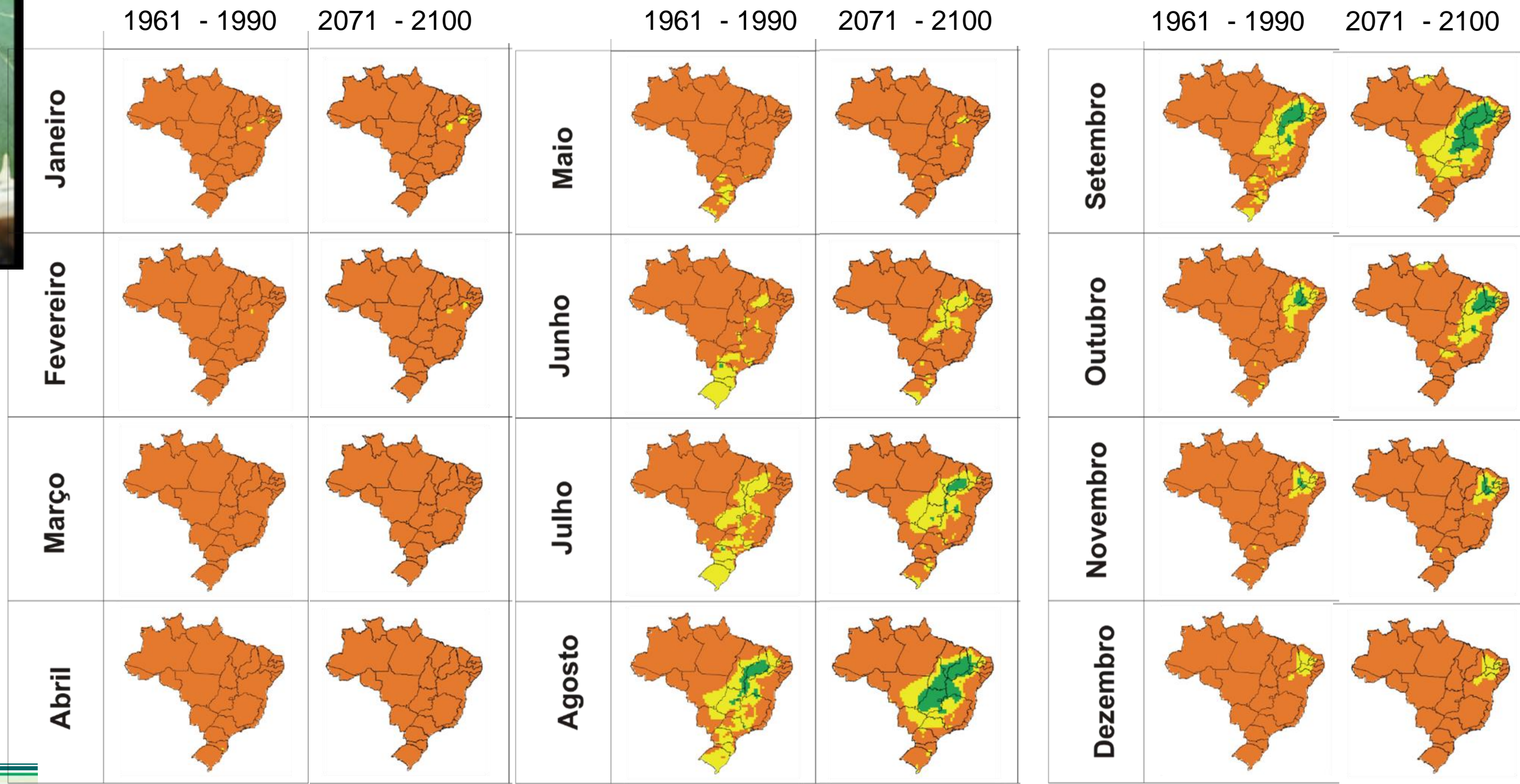


Figure 4. Climatic favorability for the grapevine downy mildew (*Plasmopara viticola*) in Brazil from September to December for the climate normal (1961–1990) and future climates (2011–2040, 2041–2070, and 2071–2100) in the B1 and

Angelotti et al., 2017



Future outlook on the geographic distribution of bacterial canker - *Xanthomonas campestris* pv. *viticola*



Angelotti et al., 2017



Angelotti et al., 2017



Seeds native plants of the Caatinga

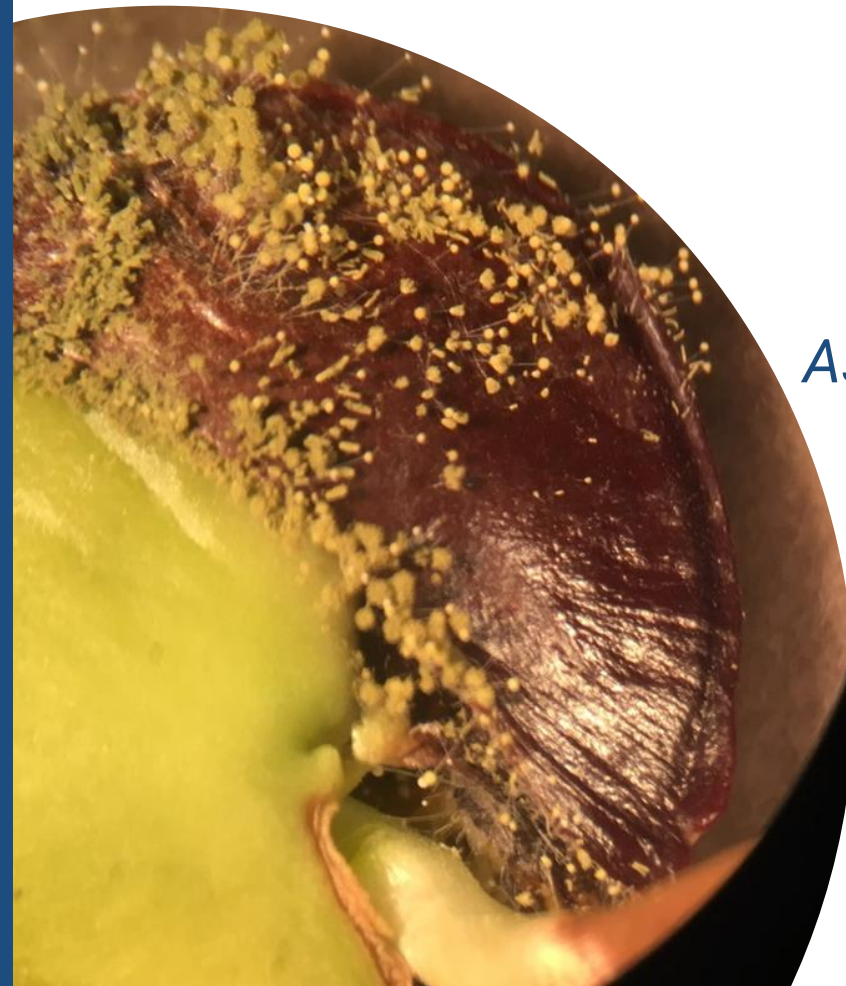


Angico
Anadenanthera colubrina (Vell.) Brenan



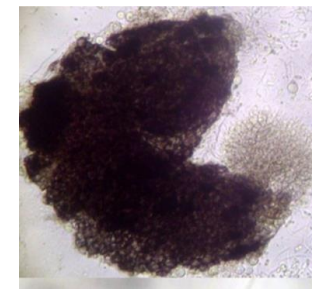
Macrophomina sp.

30 e 35 °C



Aroeira

Astronium urundeuva



Phomopsis sp



Alternaria sp.

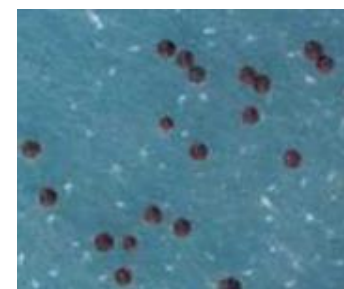


Curvularia sp.

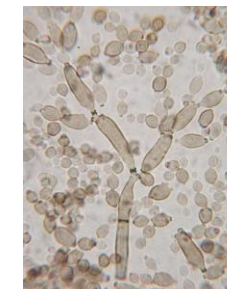
30 °C



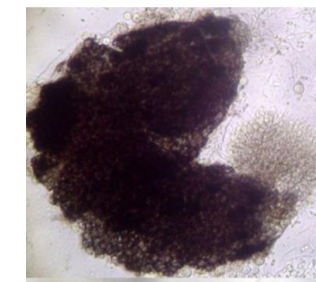
Pereiro



Sclerotium sp.



Cladosporium sp.



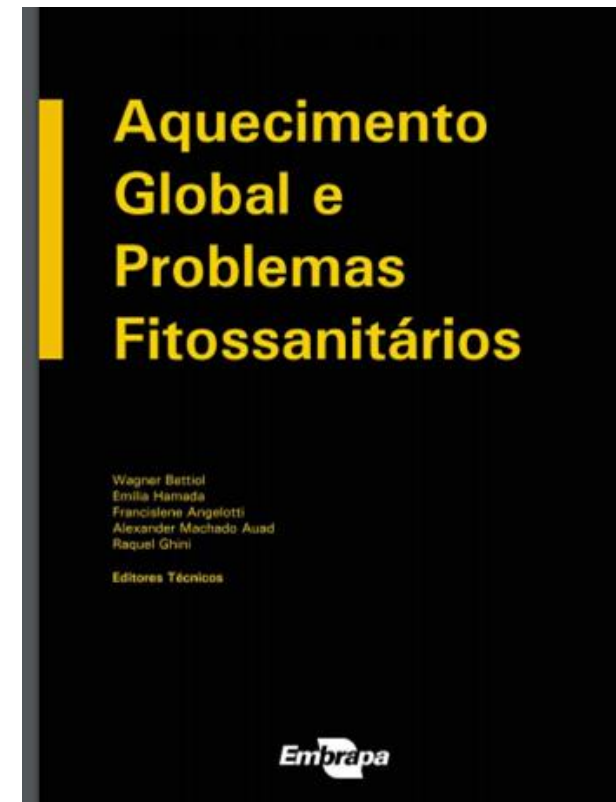
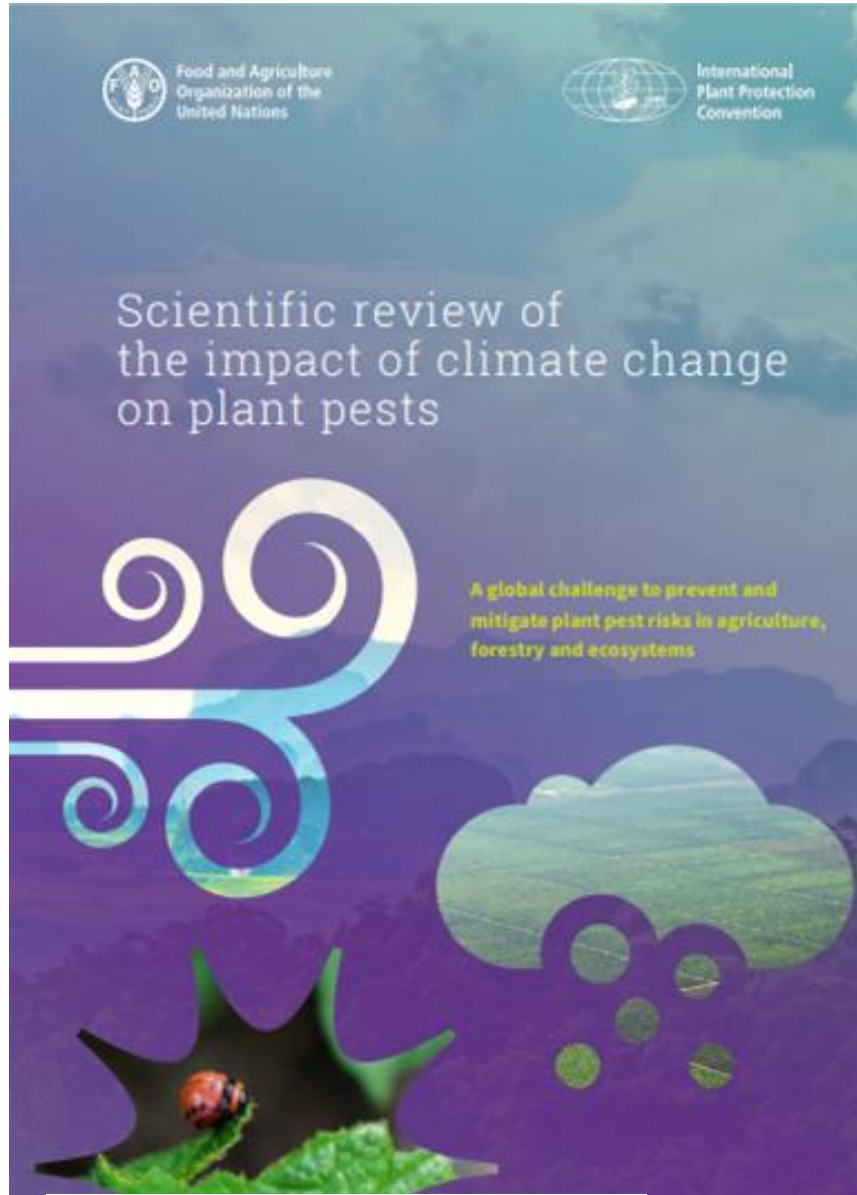
Phomopsis sp.

20 °C

Strategic actions to tackle the impacts of climate change on crop protection systems



Books and papers



REVISTA DE CIÊNCIAS AMBIENTAIS - RCA (ISSN 1981-8181)
<http://revistas.unilasalle.edu.br/index.php/Rbca>
 Canoas, v. 15, n. 1, 2021
<http://dx.doi.org/10.18316/rca.v15i15586>

IMPACT OF TEMPERATURE INCREASE ON I

ABSTRACT
 The increase in greenhouse gases (GHG) has caused an inc that temperature is determinant for the occurrence of plant study was to evaluate the influence of temperature on po melon cultivars. Nine melon cultivars were used: Araguaia, Juazeiro and Samba. Two experiments were carried out of te temp incn



AGRONOMY (AGRONOMIA)

Severity of melon powdery mildew as a function of increasing temperature and carbon dioxide concentration

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ABSTRACT: The increase of CO₂ and temperature may affect the progress of plant diseases. In this sense, the objective of this study was to evaluate the impact of increased carbon dioxide concentrations and temperature on melon powdery mildew. The experiments were performed in Fitotron growth chambers, with temperature, humidity and light control. The seedlings were) and 770 ppm). Nine ated. Melon seedlings a progress. Along with concentration, as well um sp. The incubation



Review

Climate Change and Pathways Used by Pests as Challenges to Plant Health in Agriculture and Forestry

Maria Lodovica Gullino¹, Ramon Albajes², Ibrahim Al-Jboory³, Francislene Angelotti⁴, Subrata Chakraborty^{5,6}, Karen A. Garrett⁷, Brett Phillip Hurley⁸, Peter Juroszek⁹, Ralf Lopian¹⁰, Khaled Makkouk¹¹, Xubin Pan¹², Massimo Pugliese^{13*} and Tannecia Stephenson¹³

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Citation: Gullino, M.L.; Albajes, R.; Al-Jboory, I.; Angelotti, F.; Chakraborty, S.; Garrett, K.A.; Hurley, B.P.; Juroszek, P.; Lopian, R.; Makkouk, K.; et al. Climate Change



Climate change and the occurrence of downy mildew in Brazilian grapevines

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Abstract – The objective of this work was to evaluate the potential impact of climate change on the occurrence of grapevine downy mildew in Brazil. Seedlings containing four to six leaves were sprayed with a sporangia suspension containing 10⁷ sporangia per milliliter. After spraying, the seedlings were subjected to temperatures of 26, 28, 29.1, 30.4, and 31.8°C for 24 hours. The percentage of diseased leaf area and the latent period were evaluated. Maps of the geographic and temporal distribution of the disease were made considering the monthly average of the mean air temperature and leaf wetness duration for the reference climate or climate normal (1961–1990) and the future climates (2011–2040, 2041–2070, and 2071–2100), considering the A2 and B1 gas emission scenarios, designed by the Intergovernmental Panel on Climate Change (IPCC). Favorability ranges were set and used in logic functions of the geographical information system (GIS) to generate monthly maps for grapevine downy mildew. Rising temperatures interfered with the grapevine downy mildew infections, reduced the disease severity, and increased the latent period. Future climate scenarios indicate a reduction of favorability of downy mildew in Brazil, with variability in the different grape producing regions.

Index terms: *Plasmopara viticola*, *Vitis*, air temperature, geographical information system.

Mudanças climáticas e ocorrência do míldio da videira no Brasil



plants

an Open Access Journal by MDPI

A Comprehensive Review of Climate Change and Plant Diseases in Brazil

Francislene Angelotti; Emília Hamada; Wagner Bettli

Plants 2024, Volume 13, Issue 17, 2447



Team





Obrigada!



Embrapa 50 ANOS

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