

Assessing crop-specific climate risks

A cross-border case study of agri-food trade between Türkiye and NL



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FutureWater

1. Introduction

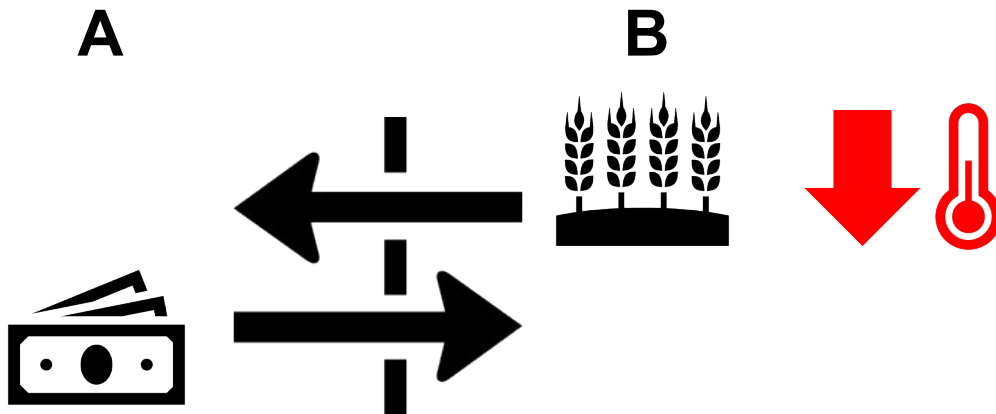
Context

- > FutureWater
- > CREATE: Cross-Border Climate Vulnerabilities and Remote Impacts of Food Systems of the EU, Türkiye and Africa
- > Ministry of Agriculture, Nature and Food Quality of The Netherlands
- > Collaboration with Ankara University and R2Water
- > Unsubmitted, work in progress



Introduction

- > Climate change impacts on agriculture
- > Regions are interconnected through global trade
- > Climate impact in one country presents cross-border risk
- > Dependency on agri-food trade
 - Import / Export
- > Cross-border vulnerability



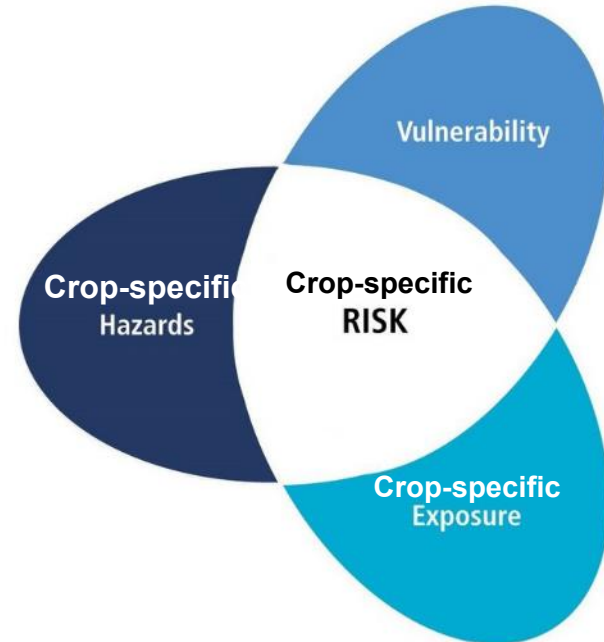
Introduction

- > A crop-specific cross-border climate risk framework that integrates:
 - Crop-specific climate risk on food production
 - Climate suitability mapping
 - Import-export dependency
- > Case study between Türkiye and The Netherlands
 - Extend to include EU
- > Key crops: apricot, figs, grape, and hazelnut
- > Define priorities and develop adaptation strategies

2. Methods and Data

Climate Risk Framework

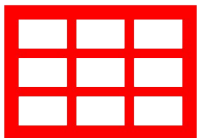
- > Risk = “*The potential loss of assets that could occur to a system, society, or a community in a specific period, determined probabilistically as a function of **hazard**, **exposure**, and **vulnerability***” (UNDRR 2020)
- > Climate Risk Framework:
 - Hazard
 - Vulnerability
 - Exposure
- > Risk of climate change on reductions of **key crop production**
- > Crop-specific climate risk!



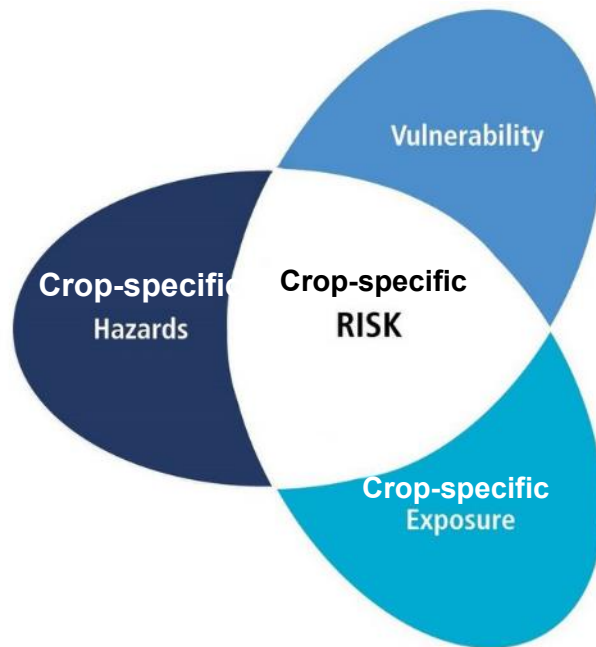
(IPCC, 2018)

Crop-specific climate risks

- > Crop-specific indicators of potential climate change impact
 - CMIP6 model ensemble
 - SSP2-4.5
 - SSP5-8.5
 - Reference period (1990-2019)
 - Future time horizon 2050 (2035-2064)



- > Socio-economic datasets
- > Physico-geographic datasets
- > Global water resources model output



- > Agricultural production maps



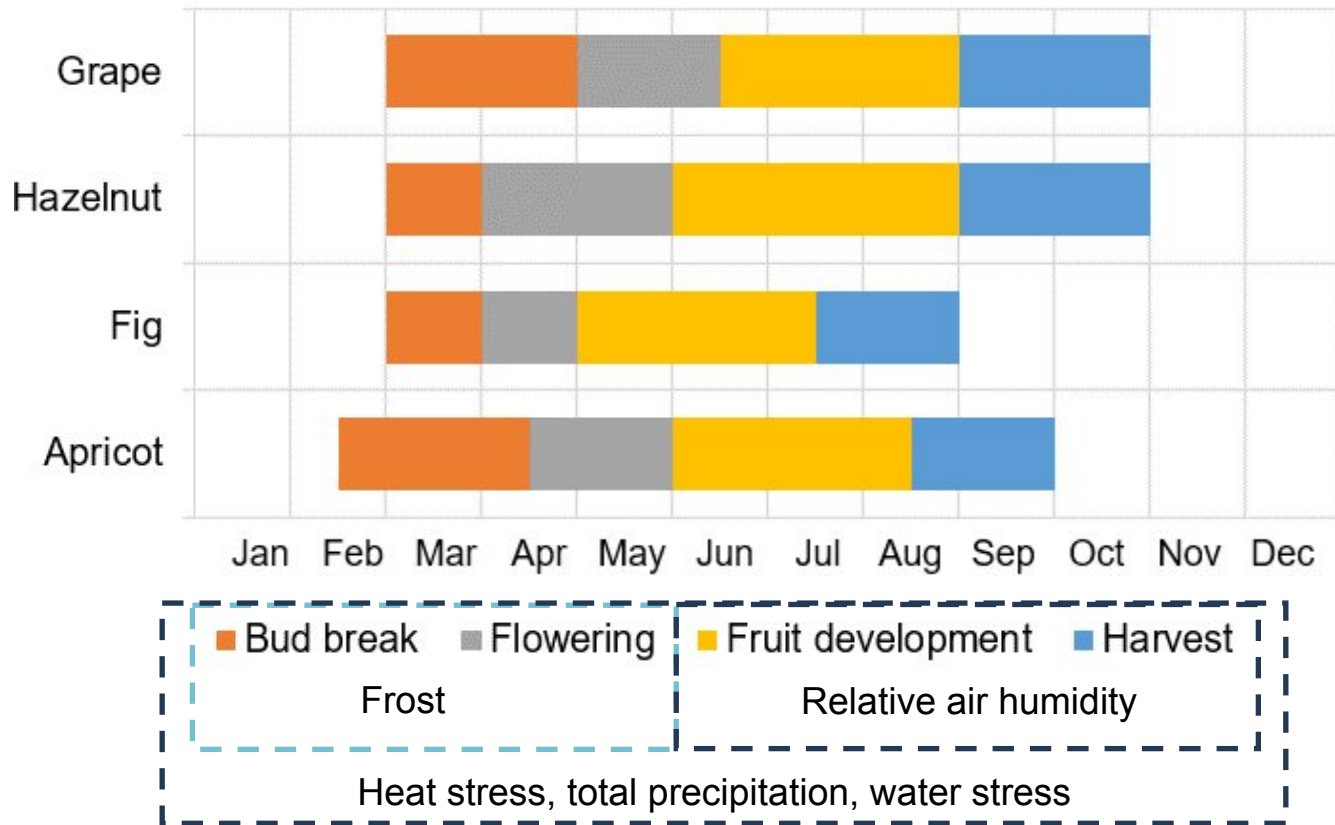
Crop-specific climate hazard



- > Indicators of potential climate change impacts:
 - Δ Heat stress [days]
 - Δ Air humidity stress [days]
 - Δ Frost [days]
 - Δ Total precipitation [mm]
 - Δ Chilling requirements [CU]
- > Relative or absolute change in indicators scaled between 0 and 1
- > Different stress thresholds for each crop
- > Fine-tuned with stakeholders

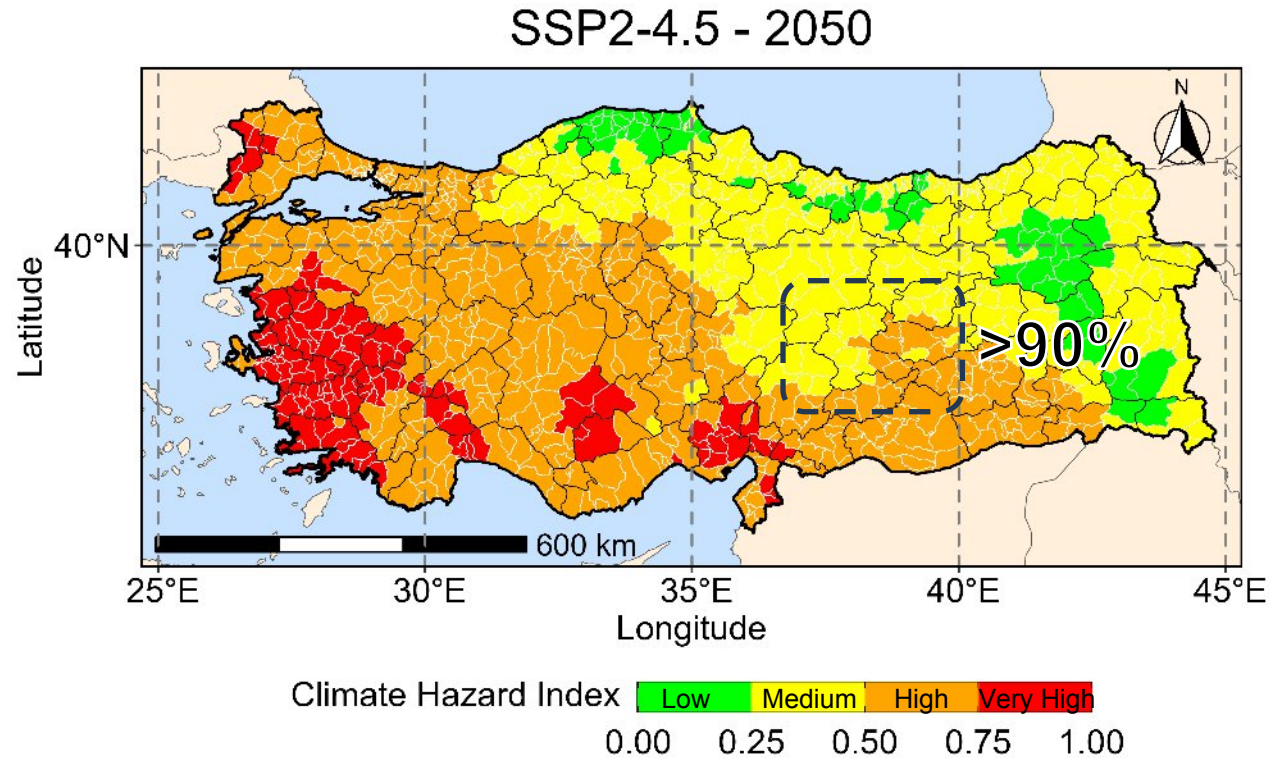
Crop-specific climate hazard

Phenological stages of key crops in Türkiye: stress threshold + temporal window



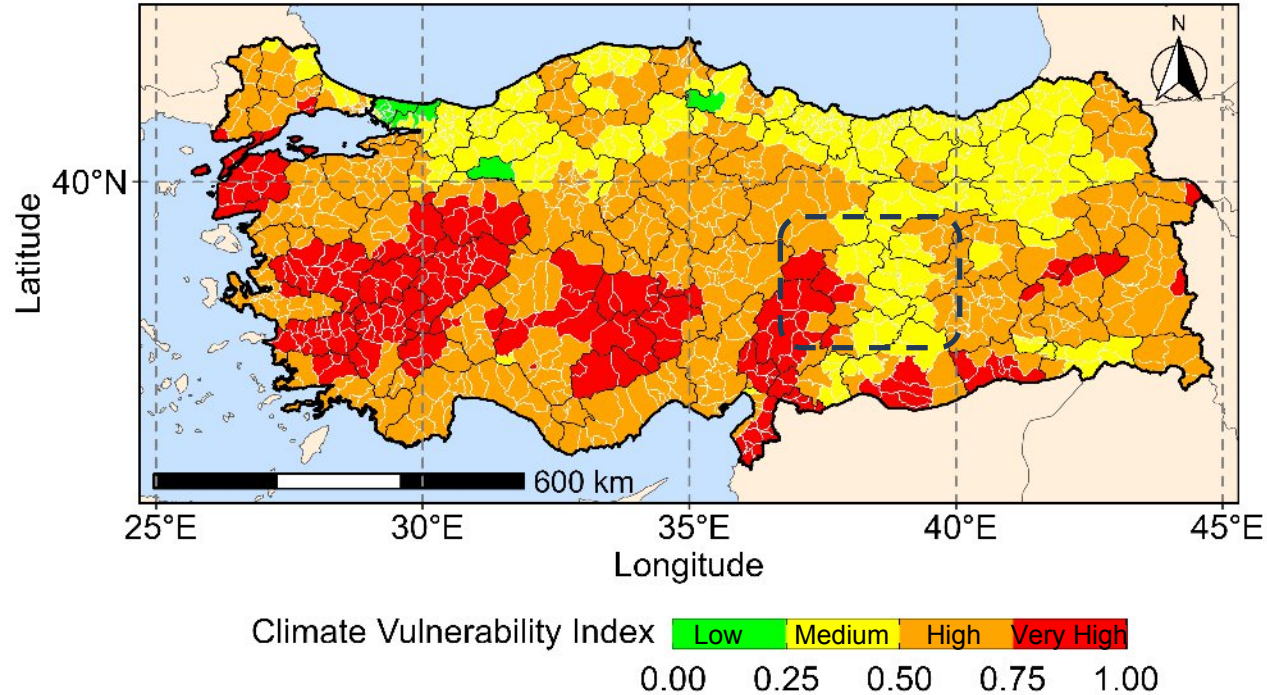
3. Results

Climate Hazard - Apricot Production

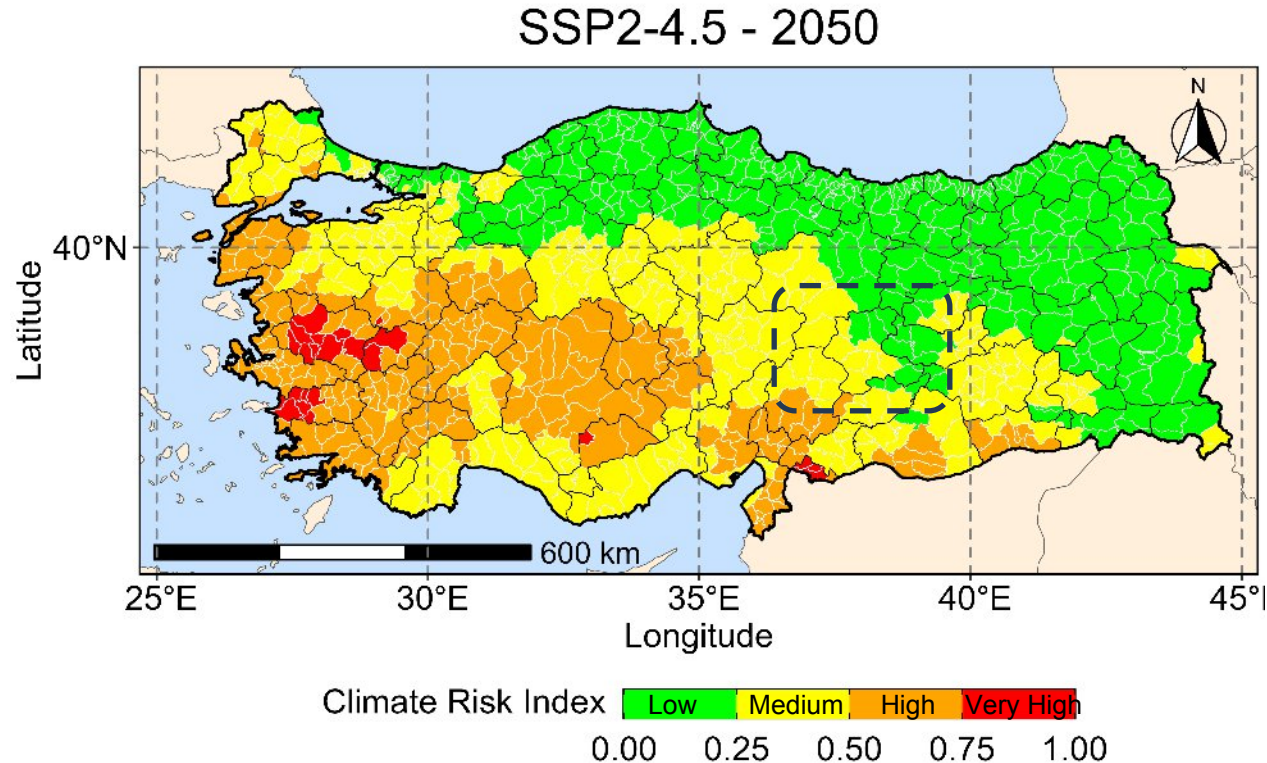


Climate Vulnerability - Apricot Production

SSP2-4.5 - 2050

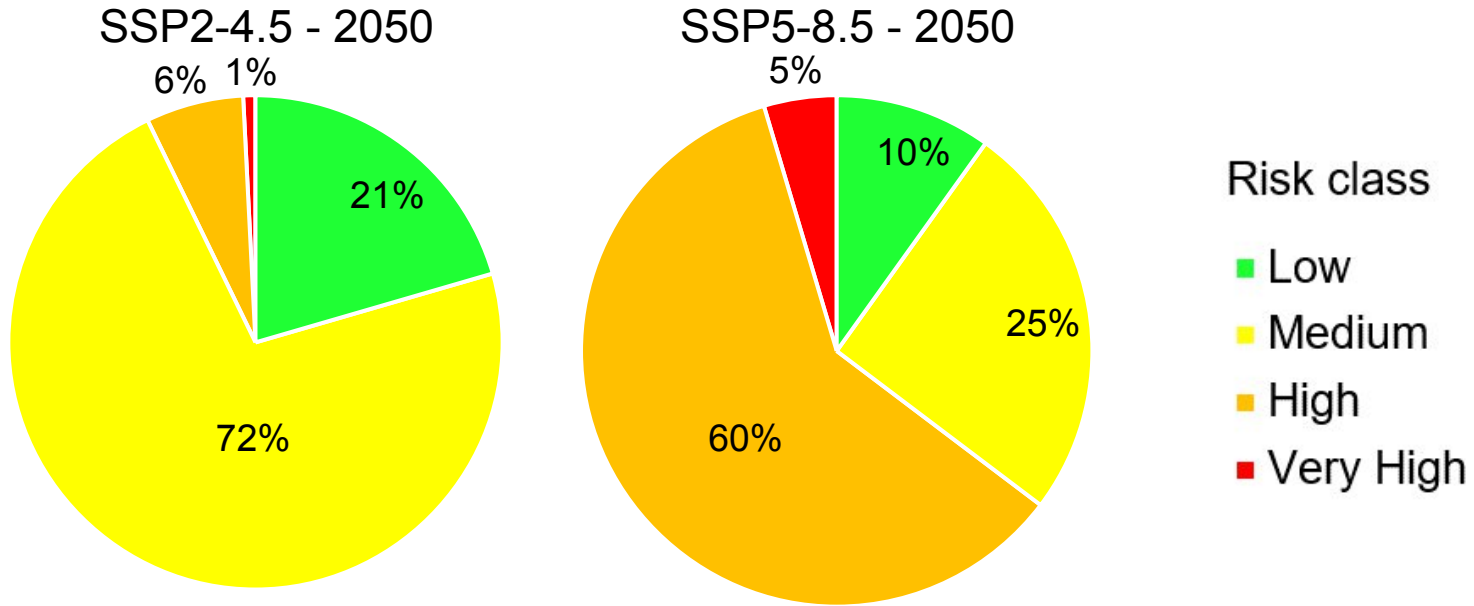


Climate Hazard x Vulnerability - Apricot Production

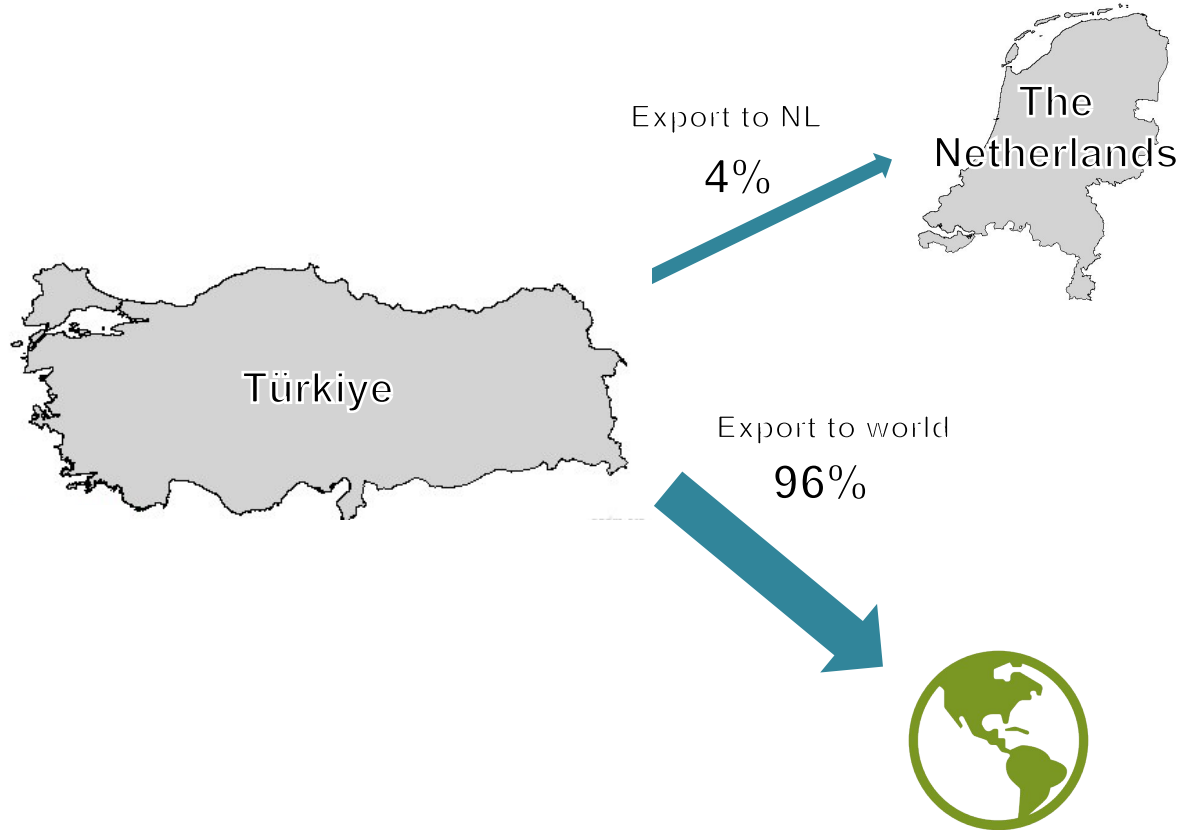


- Overlay with crop production map

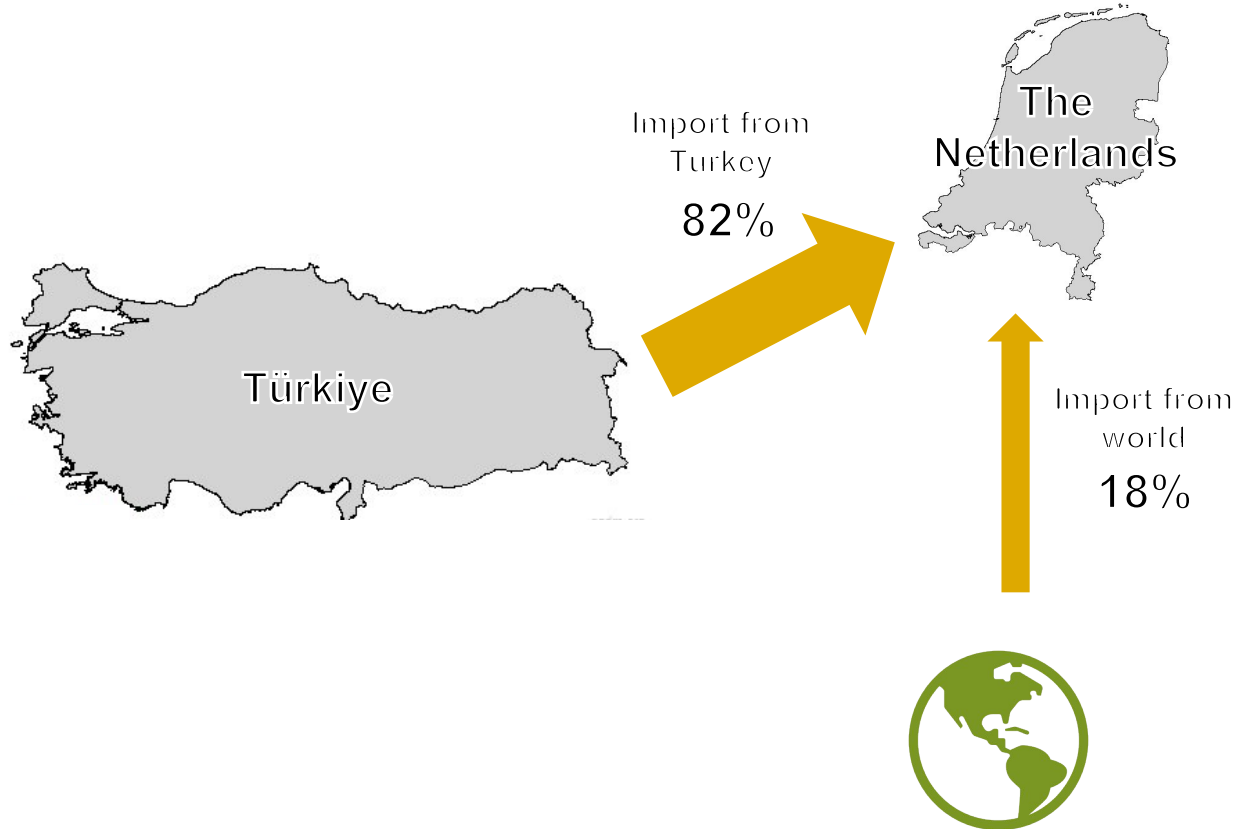
Share of national apricot production per risk class



Apricot trade flow - Export from Turkey



Apricot trade flow - Import to The Netherlands



Export / Import Vulnerabilities between NL and Türkiye

Crop	Export	Export Vulnerability	Import	Import Vulnerability
Grapes	8%	Low	9%	Low
Apricot	4%	Low	82%	Very High
Hazelnut	2%	Low	70%	High
Figs	4%	Low	46%	Medium

- > When incorporating rest of EU, the export dependency is very likely to increase!

Export / Import Vulnerabilities + Production Risk

Apricot

> Risk Class	Prod. %		> I	> E
	> SSP2-4.5	> SSP5-8.5		
> Low	> 20%	> 10%	Very High	Low
> Medium	> 72%	> 25%		
> High	> 6%	> 60%		
> Very High	> 2%	> 5%		

I = Import vulnerability E = Export vulnerability

- > Netherlands is import dependent
- > SSP2-4.5: 72% of imported apricots are likely to come from medium risk areas
- > SSP5-8.5: 60% of imported apricots are likely to come from high-risk areas

4. Conclusion

Conclusion

- > Netherlands depends heavily on Türkiye for imports of selected crops
- > Climate change is likely to disrupt agri-food trade between Türkiye and NL
- > Varying degrees of climate risk for production of different key crops
- > Crop-specific climate risk varies in space
- > Adaptation strategies and policies should be focused on specific crops
- > Collaborative efforts, innovation, and sustainable practices will be crucial to maintaining stable trade relations and ensuring food security

Thank you!

> Q & A

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