Fruit species with low irrigation requirement and drought tolerance as a water saving strategy in arid zones

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Universidad de Chile
Average rainfall (mm/year)

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Availability

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Water availability (MMm³/year)

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Context
## Context

### Average Rainfall

![Average Rainfall Graph]

- **Values for specific regions**:
  - I: 93.6 mm/year
  - II: 44.5 mm/year
  - III: 82.4 mm/year
  - IV: 222 mm/year
  - V, VI, VII, VIII, IX, X, XI, XII: Increasing values

### Water Availability

![Water Availability Graph]

- **Regions**: I, II, III, IV, V, RM, VI
- **Values for specific regions**:
  - I: 1000 Mm³/year
  - II: 500 Mm³/year
  - III: 100 Mm³/year
  - IV: 500 Mm³/year
  - V, RM, VI: Increasing values

### Demand

![Demand Graph]

- **Categories**: Irrigation, Drinking Industry, Mines
- **Values for specific regions**:
  - Irrigation: High demand
  - Drinking Industry: Low demand
  - Mines: Moderate demand

### Water Use

- **Period**: 1983-2017
- **Data Points**:
  - Irrigation: High peak
  - Drinking Industry: Low peak
  - Mines: Moderate peak
Why low water requirement?
Why low water requirement?
Why low water requirement?
Also: lower energy consumption

Not the same to pressurize 10,000 m³ than 5,000 m³

Why low water requirement?
Also: Water footprint
Why drought resistance?

Not to lose investment

Prioritize more sensitive crops
Species we study

- Fig (*Ficus carica*); aws*: 40%
- Pomegranate (*Punica granatum*); aws: 45%
- Jojoba (*Simmondsia chinensis*); aws: 65%
- Caper (*Capparis spinosa*); aws: 65%

*: approximate water saving
Species we study

Tamarillo (*Cyphomandra betacea*); aws: 45%

Date Palm (*Phoenix dactylifera*); aws: 50% after reaching water table

Pitahaya (*Hylocereus sp.*); aws: 80%

Prickly Pear (*Opuntia ficus-indica*); aws: 75%
Methodology: germplasm selection
Methodology: propagation
Methodology: adaptability
methodology: agronomic requirements
Methodology: agronomic management
Methodology: variety development en genotype x environment interactions

$R^2 = 0.97$

Contenido de aceite en semillas de jojoba en una localidad salina (Q. Camarones) y otra no salina (Cardas)

Las Cardas
Quebrada de Camarones
Methodology: value addition
Methodology: postharvest and marketing
Results: technology
Increment in growers

- Pomegranate
- Jojoba
- Figs
- Capers

Year:
- 1997
- 2007

Number of growers:
- 0
- 100
- 200
- 300

Technology adoption results for various crops from 1997 to 2007.
Results: technology adoption

Increment in growers

Number of growers

1997
2007

Pomegranate
Jojoba
Figs
Capers

Average size of orchards (ha)

Capers
Figs
Jojoba
Pomegranate
Results: technology adoption

Increment in growers and surface

⇒ Irrigation water savings equivalent to **4,315,000 m³/year** 2010 vs. 1997 and **14,380,000 m³** during the decade.
Concluding remarks

• Use of fruit trees with low water requirement and drought tolerance can significantly reduce water consumption for irrigation.

• In order for this technology to be adapted by growers technical studies (water requirements, climatic adaptation, etc.) must be combined with the development of technology and economic and market studies.

• The impact of this research line depends on market fluctuations and some results may have a long “latent” period.

• There is still a broad range of species to be studied…
Acknowledgements:

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Grower organizations: Pti CORFO
Funding agency: InnovaChile CORFO

+ so many others...
THANK YOU!