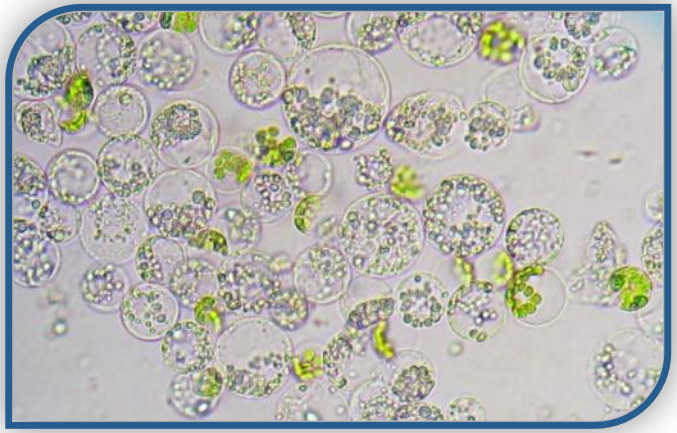
Instituto Nacional de Investigación Agropecuaria

URUGUAY

Integration of breeding and biotechnology to improve the supply of healthier fruit and vegetables



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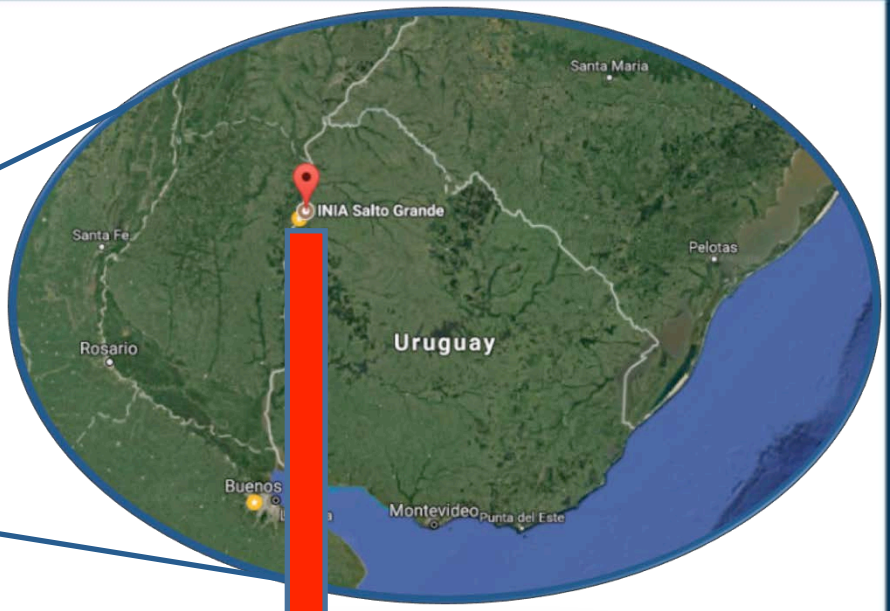


Estación Experimental
SALTO GRANDE

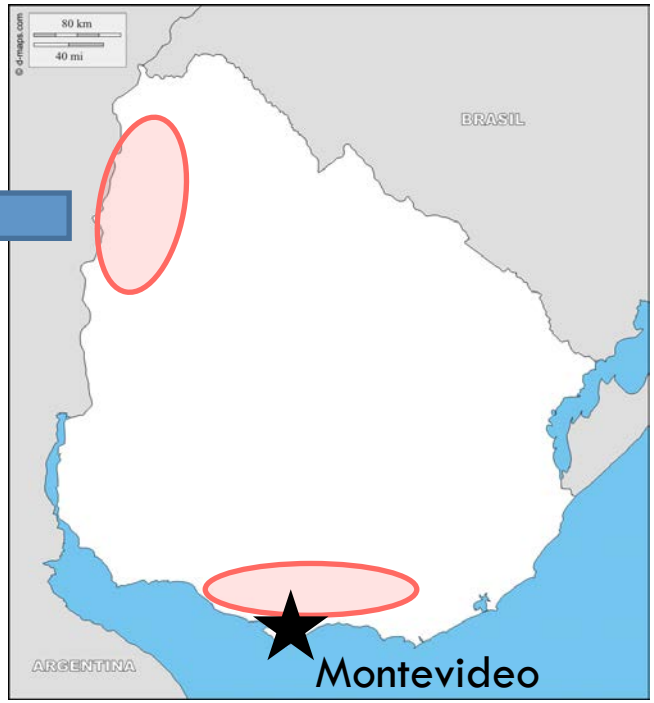
INIA

Fruit and vegetable production in northern Uruguay





85% Citrus
75% Tomato
60% Strawberry
30% Sweet potato

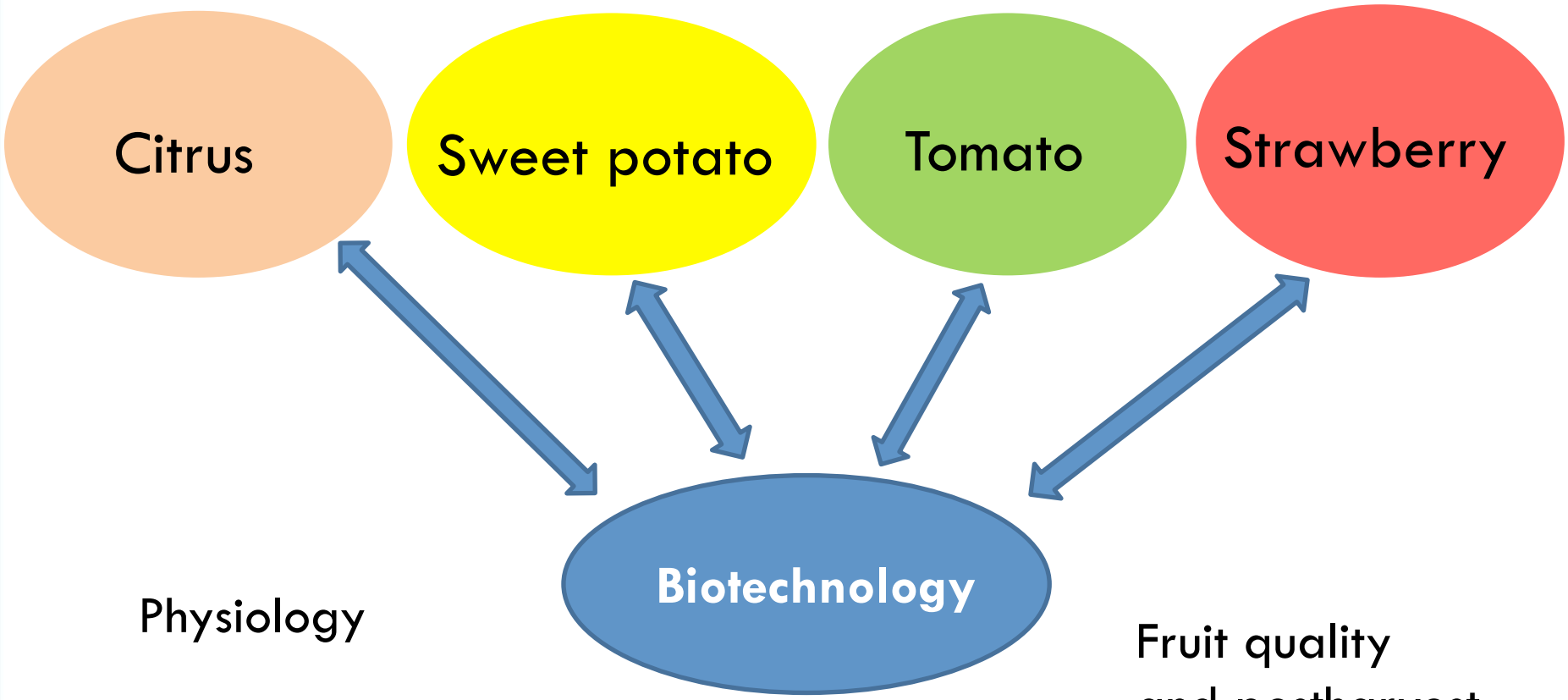


Characteristics

- High adoption of technologies
- High labor requirement
- Integrated pest control to reduce the use of agrochemicals
- Intensive production
- Good fruit quality




INIA Salto Grande: Breeding programs



Estación Experimental
SALTO GRANDE

INIA

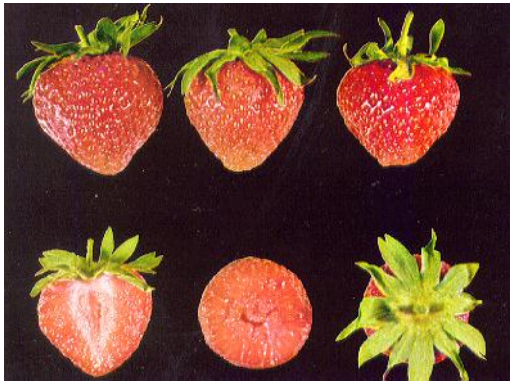
Strawberry breeding

Frutillas INIA

INIA

Strawberry in Uruguay

1975



2017

1975		2017
Low	Use of technologies	High
Outdoor	Nurseries (viveros)	In greenhouses
frequent	Mortality of plants	infrequent
From the previous crop	Mother plants	From *in vitro* culture
Foreign	Genetics	Local
4.000	**Yield (kg/ha)**	**40.000**

Frutillas INIA

INIA

Strawberry breeding

Objetives:

- High fruit quality
- Productivity (early)
- Easy-to-work plant architecture
- Resistance to diseases
- Minimum use of phytosanitary products

Frutillas INIA

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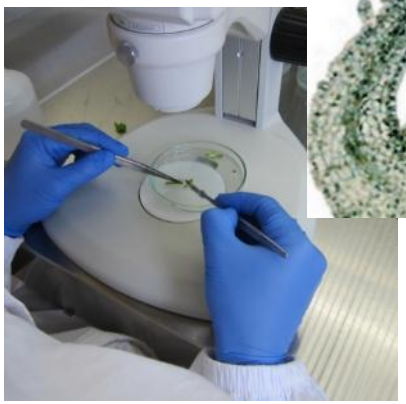
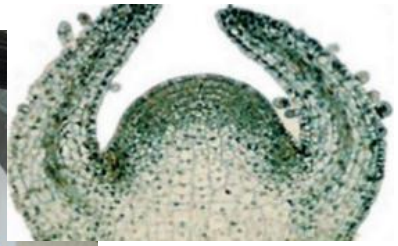
Strawberry in vitro micropropagation

In vitro culture

Strawberry in vitro micropropagation





Varietal identification using molecular markers

	FG7cd						marcador D11								FG1cd					FG2cd						
N25.1 Mainardi	255	264	272		315		203	209	212				229		489		501	507			398	406	418	424	437	
N25.1 Ferreira P	255	264	272		315		203	209	212				229		489		501	507			398	406	418	424	437	
N25.1	255	264	272		315		203	209	212				229		489		501	507			398	406	418	424	437	
R14.1	255	264			315	328	203		212				229		489	495		507			398	406	418	424	437	
Q75.1	255	264			315	328		209		215	218			232	489		501	507				406	418		437	
Q75,3	255	264	272			328		209	212	215				232	489		501	507	517				418		437	
Q80.1	255	264	272		315	328		209		215				232	489		501	507	517		398	406	418	424	437	
N6.3	255	264			315	328		209	212	215	218			232	489		501	507	517	378			418		437	442
O6.6	255	264		290	315		203	209	212	215			226	232	489		501	507	517	378		406	418		437	442
Agata	255	264			315	328		209		215				232	489	495	501	507		378		406	418		437	
Guapa	255	264		290	315	328	203	209		215				232	489		501	507		378	398	406	418	424	437	
Yurí	255	264	272		315			209		215				232	489			507	517	378		406	418	424	437	
Camarosa	255	264		290	315		203	209	212	215				232	489		501	507	517	378			418			
Aromas	255	264	272		315			209	212	215			226	229	232	489	495		507	517				418	424	437	
Oso Grande	255	264			315			209	212	215				232	489		501	507	517	378		406	418			
S. Charlie	255	264	272	290			203	209	212	215			226	229	232	489		501	507				406	418	424	437	
Addie	255	264	272		309			209	212	215	218	220		232	489	495		507					418		437	442

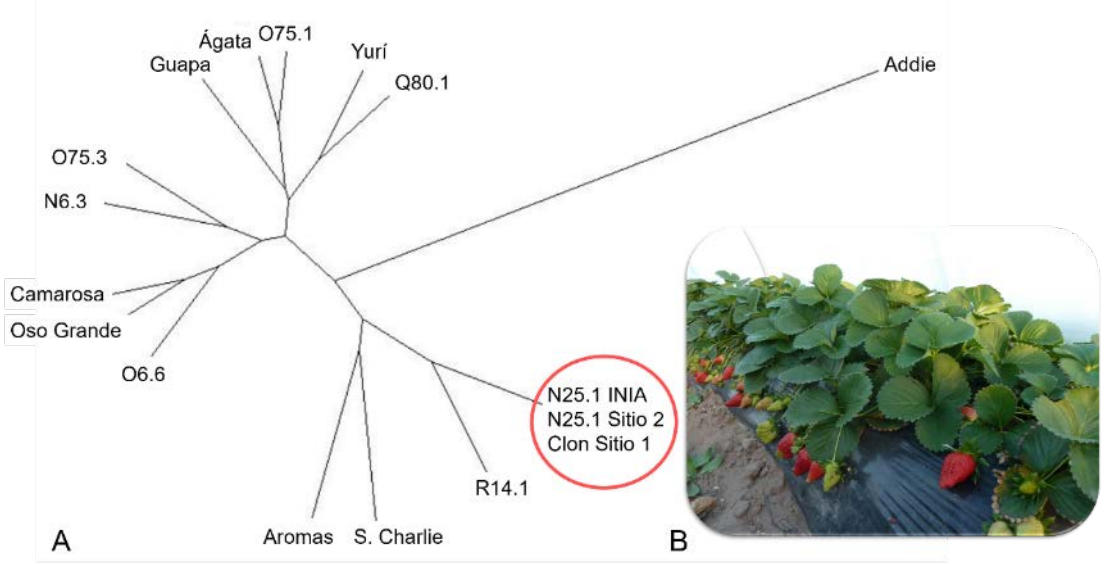


Figura 1. A. Análisis filogenético de los genotipos analizados. B. Planta de N25.1.

Sweet potato breeding

boniatos INIA

INIA

Sweet potato in Uruguay

1990

2017

1990		2017
Low	Use of technologies	medium
frequent	Mortality of plants	infrequent
From the previous crop	Seedbed (semillero)	From *in vitro* culture
Local population	Genetics	National varietis
5.200	**Yield (kg/ha)**	**30.000**

boniatos INIA

INIA

Sweet potato breeding

Objetives:

- Greater post-harvest conservation

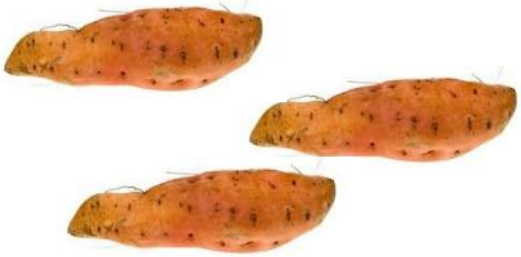
- Higher external quality: shape, skin color
- Higher internal quality: pulp color, texture, flavor
- Higher yield

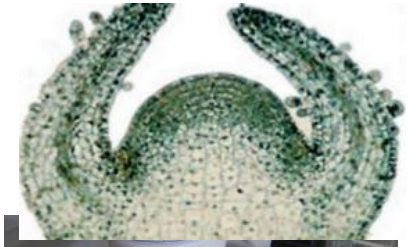
- Less use of chemical products

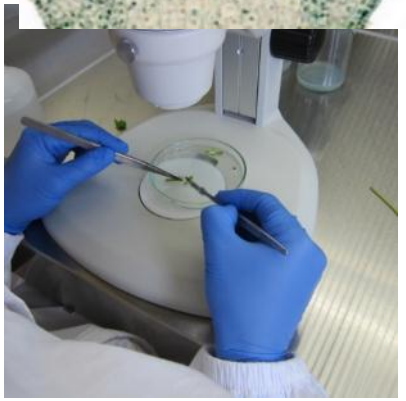
boniatos INIA

INIA

Sweet potato in vitro micropropagation







Sweet potato seed

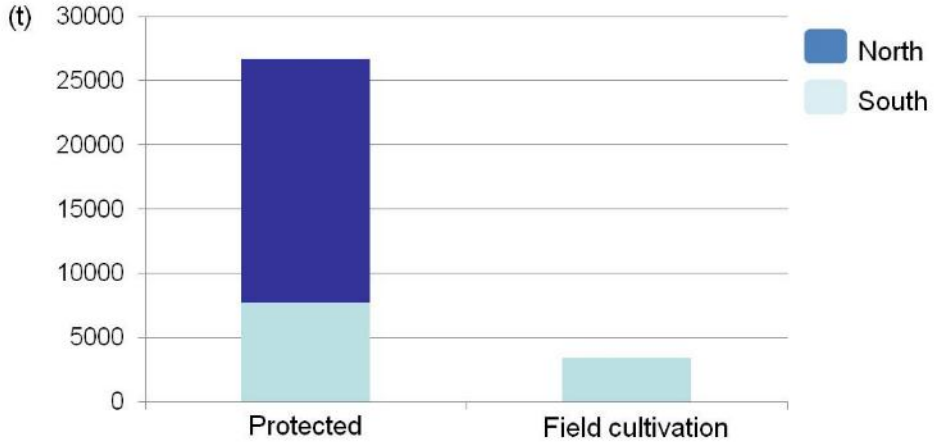
Tomato breeding

Tomates INIA

INIA

Tomato in Uruguay

100% foreign hybrid cultivars



Problems:

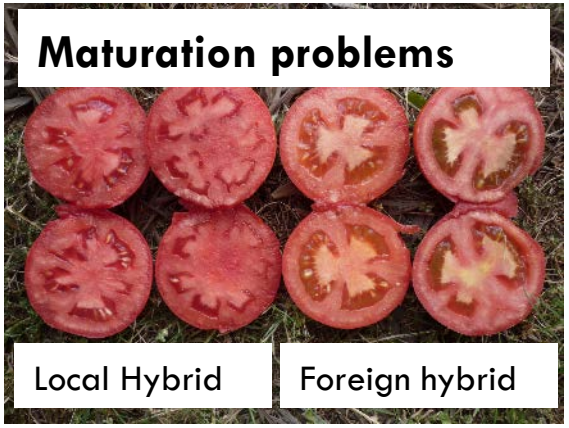
Fruit set in extreme temperatures; Bacterias; Fungus; Nematodes; Insects; Virus.

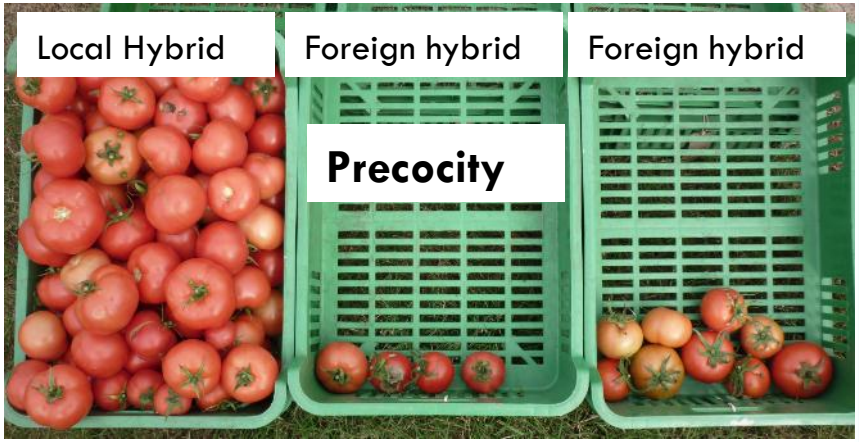
Tomato breeding of Uruguay

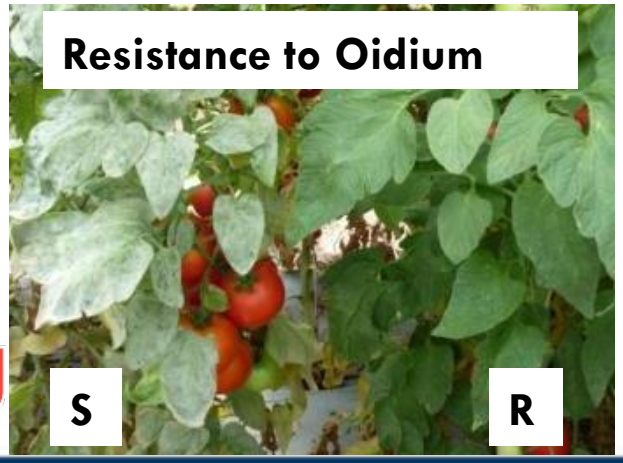
Objectives: contributions to the competitiveness of the productive sector, considering product quality and environmental impact.

- Better fruit Quality:
  - Size
  - Maturation problems (temperature and luminosity)
  - Precocity
  - Flavor

- Productive efficiency, less use of:
  - Manpower
  - Fertilization
  - Agrochemicals







Tomates INIA

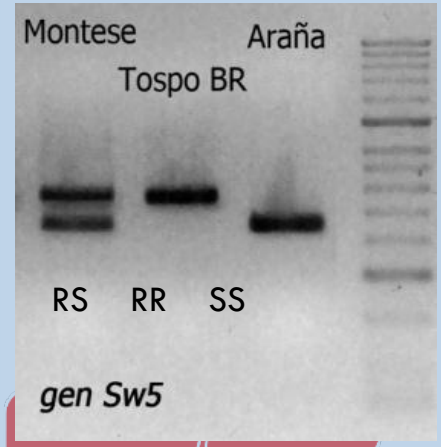
INIA

Molecular Markers Assisted Selection in Tomato

Evaluation of breeding lines for different pathogens

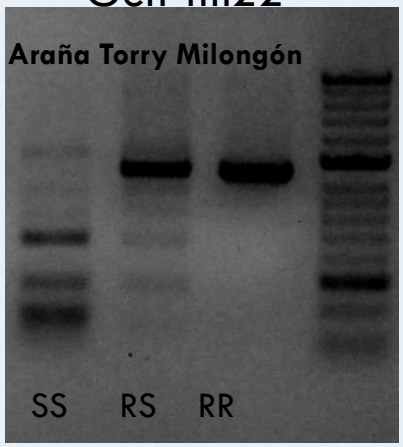
Tospovirus

Gen Sw5



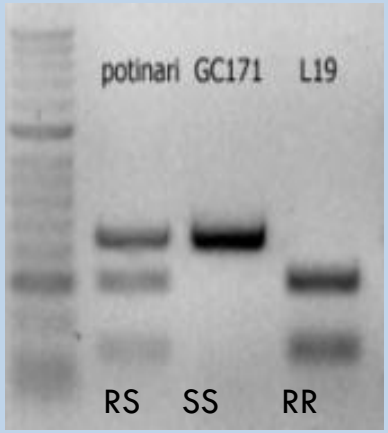
Tobamovirus

Gen Tm22



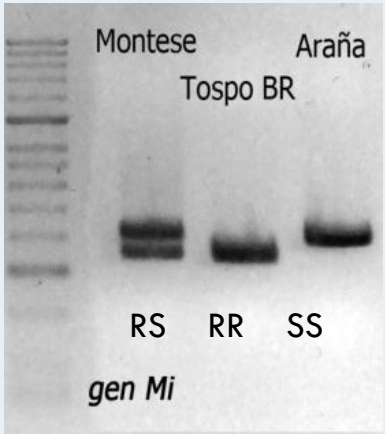
Begomovirus

Gen Ty-1



***Meloidogyne* spp**

Gen Mi

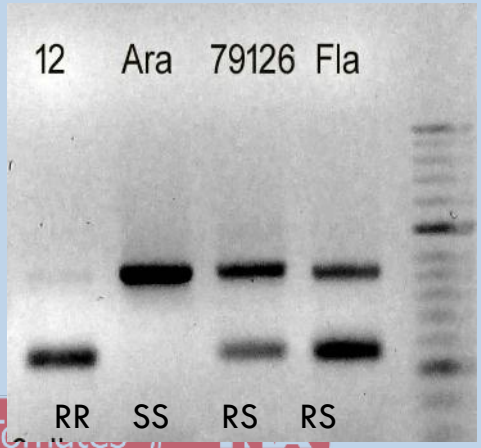


Molecular Markers Assisted Selection in Tomato

Evaluation of breeding lines for different pathogens

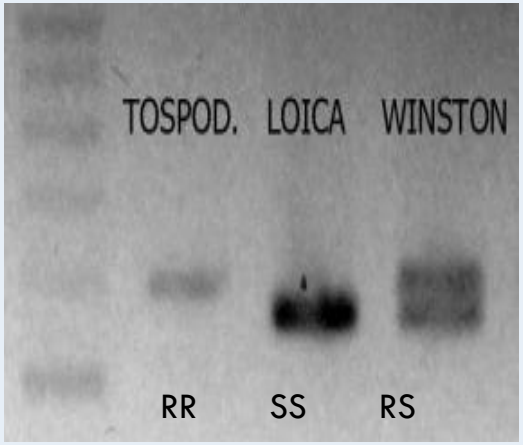
Fusarium oxysporum* f. sp. *lycopersici

Gen I-3



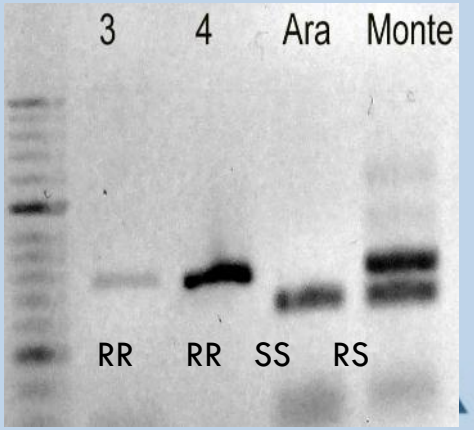
Verticillium *albo-atrum* and *V. dahliae*

Gen Ve



Pseudomonas syringae pv. tomato

Gen Pto



Citrus breeding

Cítricos INIA Genética y Sanidad

Citrus in Uruguay

The Uruguayan citrus sector occupies 17,000 hectares and exports half of the production of fresh fruit.

Markets are very demanding and there are many competitors.

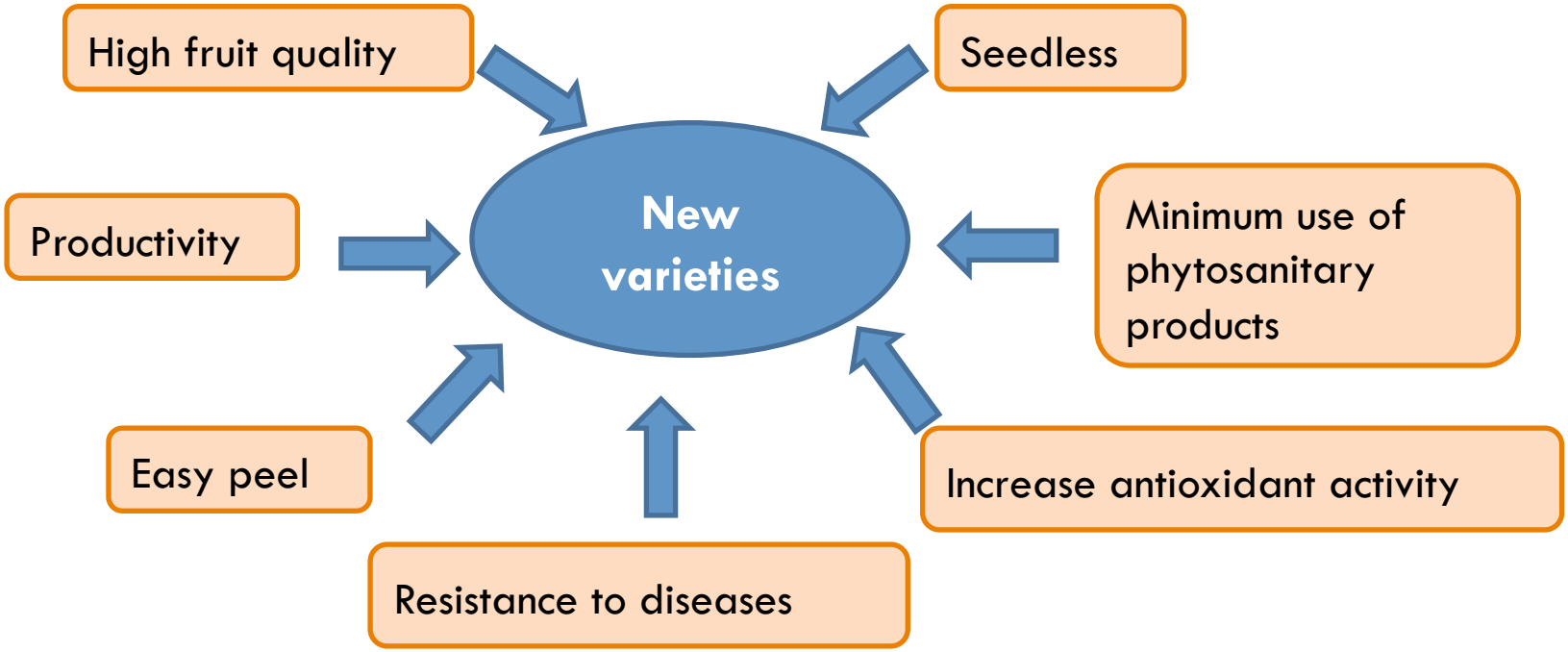
Currently foreign varieties are grown, many of them pay royalties since they are patented.

Cítricos INIA Genética y Sanidad

INIA

Citrus breeding in Uruguay

Objective:
Improve competitiveness of the citrus agro industrial chain by widening and diversifying the Uruguayan citrus fruit offer through varieties with superior quality and higher commercial value.



Cítricos INIA Genética y Sanidad

INIA

Citrus breeding in Uruguay

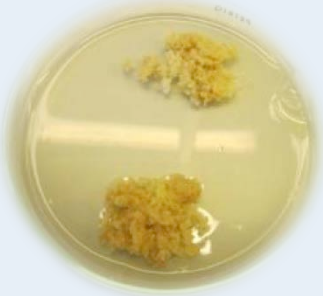
Strategies to generate diversity with biotechnology support

Gamma irradiation

Objetive: Seedless mandarin.

Variation somaclonal

Objective: Search different ripening dates and characteristics of the fruit.



Obtaing triploid

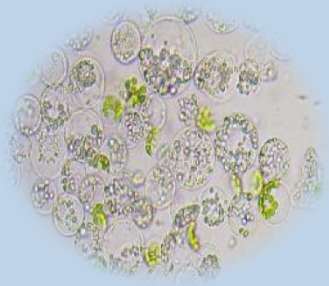
Objetive: Seedless mandarin.

Obtaing autotetraolid

Objetive: Obtain parental 4x. Somatic duplication in polyembryonic seeds.

Obtaing alotetraolid

Objetive: Obtain parental 4x. Protoplast fusion.



Citrus breeding in Uruguay

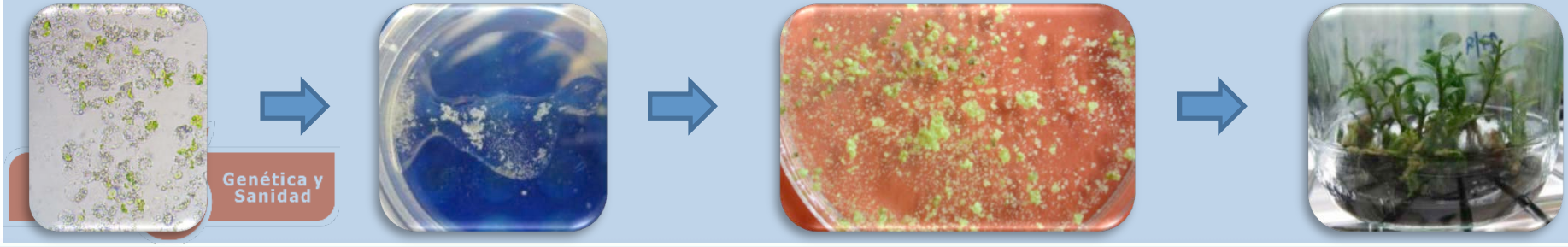
Protocol optimization

Obtaining embryogenic callus

Obtaining protoplasts

Enzymatic digestion

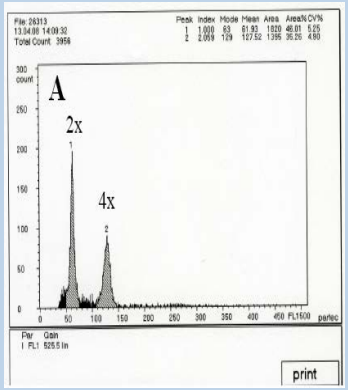
Regeneration of plants from protoplasts and embryogenic callus



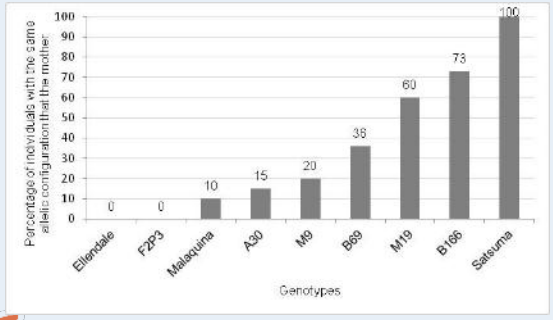
Citrus breeding in Uruguay

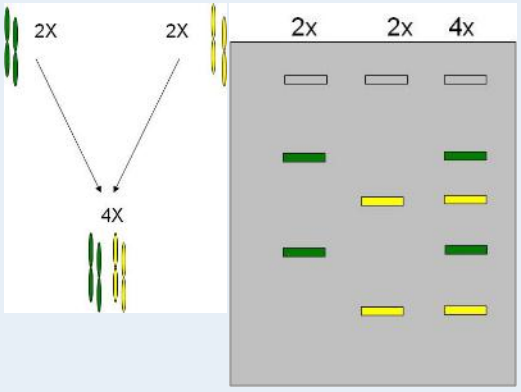
Protocol optimization

Flow cytometry



Molecular Markers (SSR)





Cítricos INIA Genética y Sanidad

INIA

Some participants

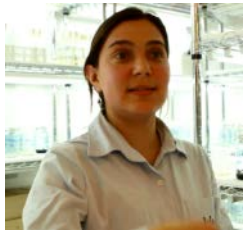
Strawberry, sweet potato and tomato breeding





Citrus breeding


Biotechnology



https://www.citrusbiotechnology2018.uy/

Thank you!

Obrigado!

Gracias!

Football players breeding