

GRAIN Crops Program

- General objectives

- Increase the productivity of the main grain crops in the region, by generating adequate technology for their agronomic management, ensuring a sustainable system from an environmental, economic and social point of view.
- Develop new cultivars adapted to our agroecological conditions of the region and to new agronomic technologies, with disease tolerance and high yield potential.
- Identify alternative grain crops, that may represent diversification for agricultural producers in the region.

Agronomic Management

Plant Breeding

- Main Crops:.

Soybean
Corn
Beans

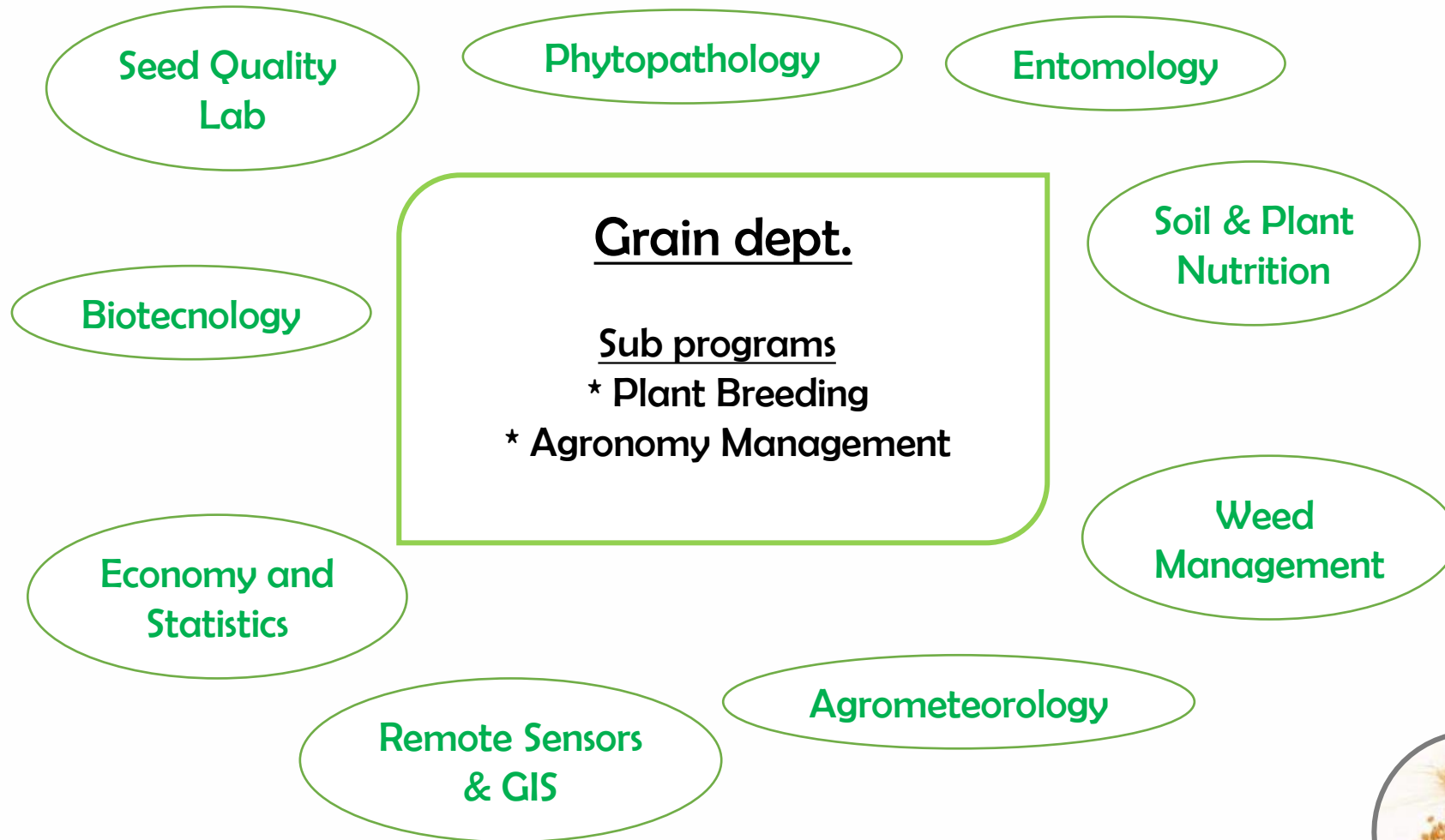
Wheat
Pulses
Chickpea

Sorghum
Sunflower
Castor Bean

Lentil
Vignas
Mung Bean
Rapeseed



GRAIN Crops Program



EEAOC Experimental sites

1

Santa Ana

50 hectáreas

Caña de azúcar



2

La Invernada

15 hectáreas

Tabaco Burley



3

Tafí del Valle

100 hectáreas

Papa semilla y frutales

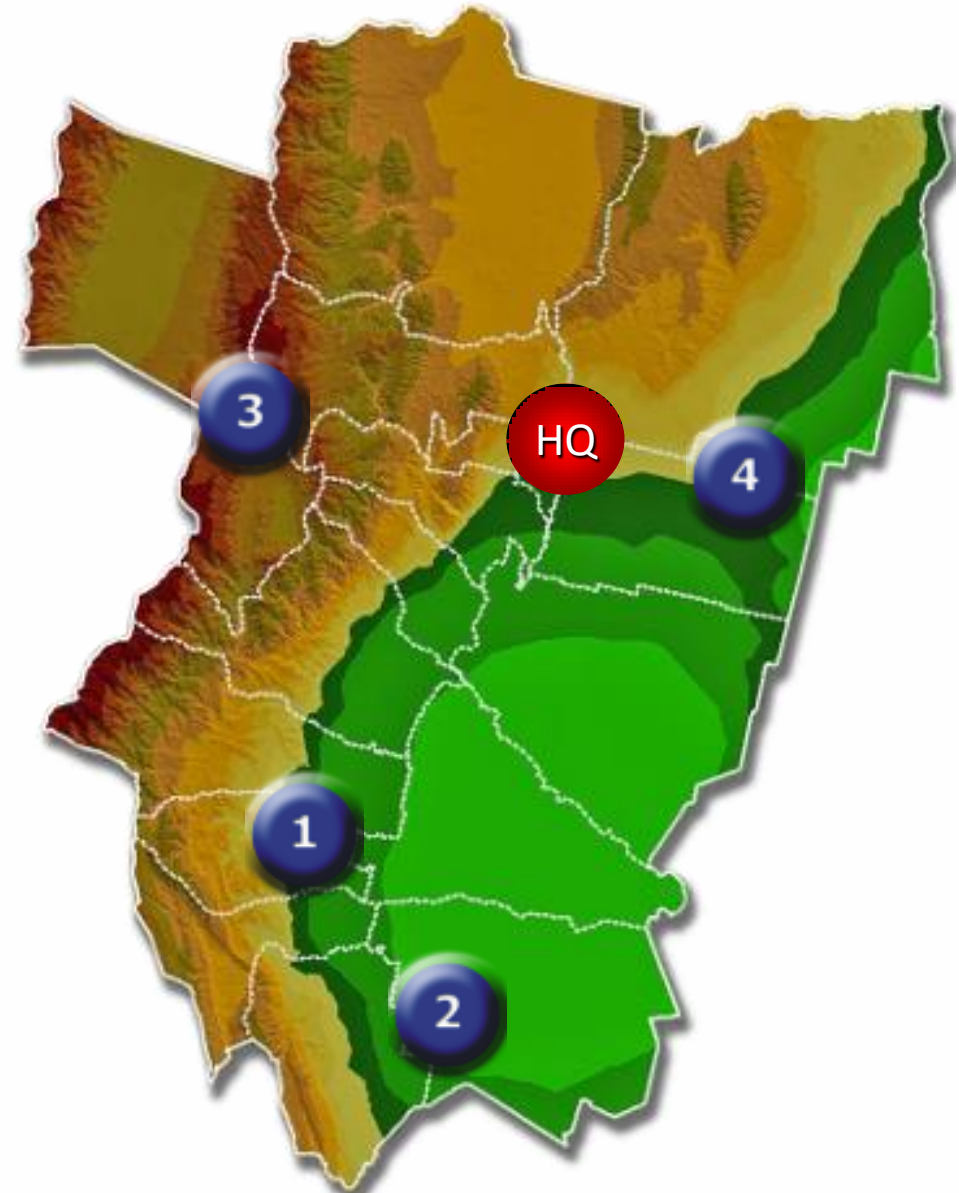


4

Monte Redondo

86 hectares

Soybean, corn, bean,
wheat, legumes



EEAOC Experimental sites



4

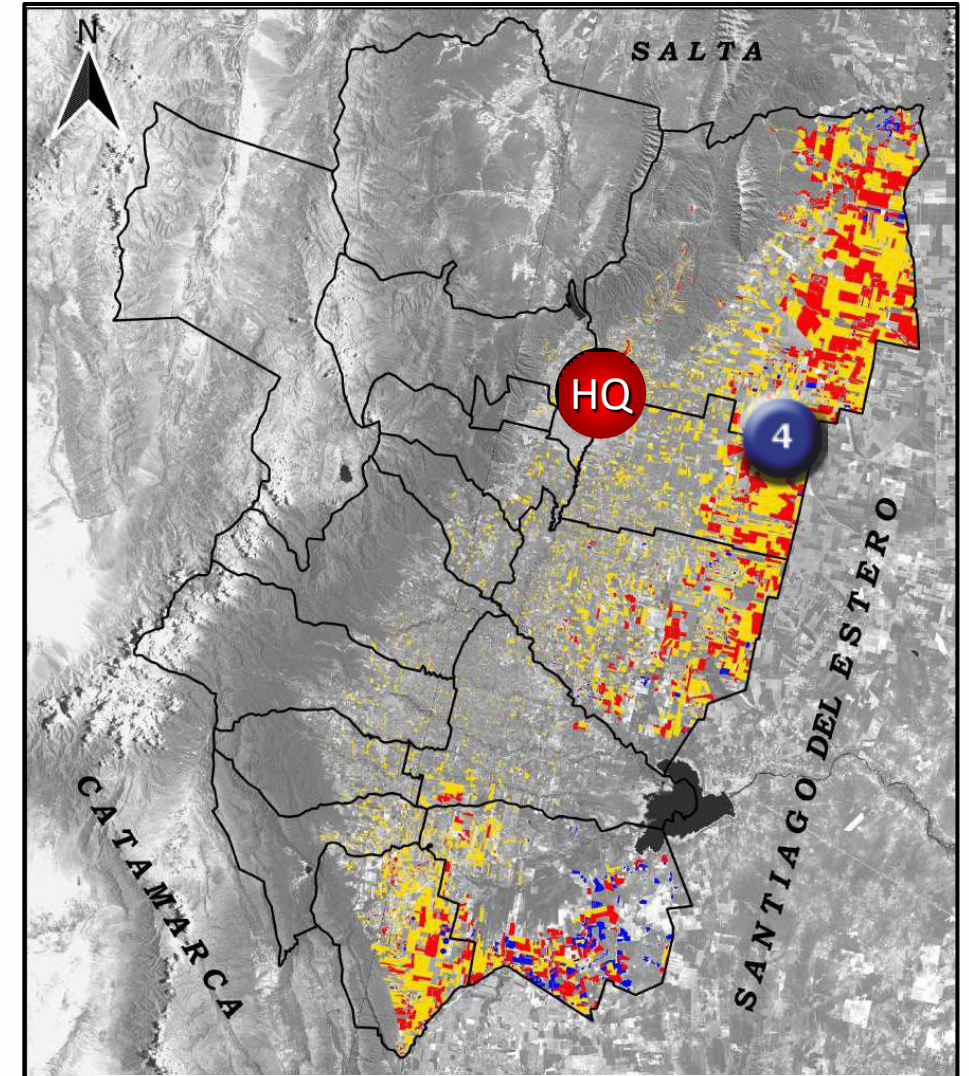
Monte Redondo

86 hectares

Soybean, corn, bean,
wheat, legumes



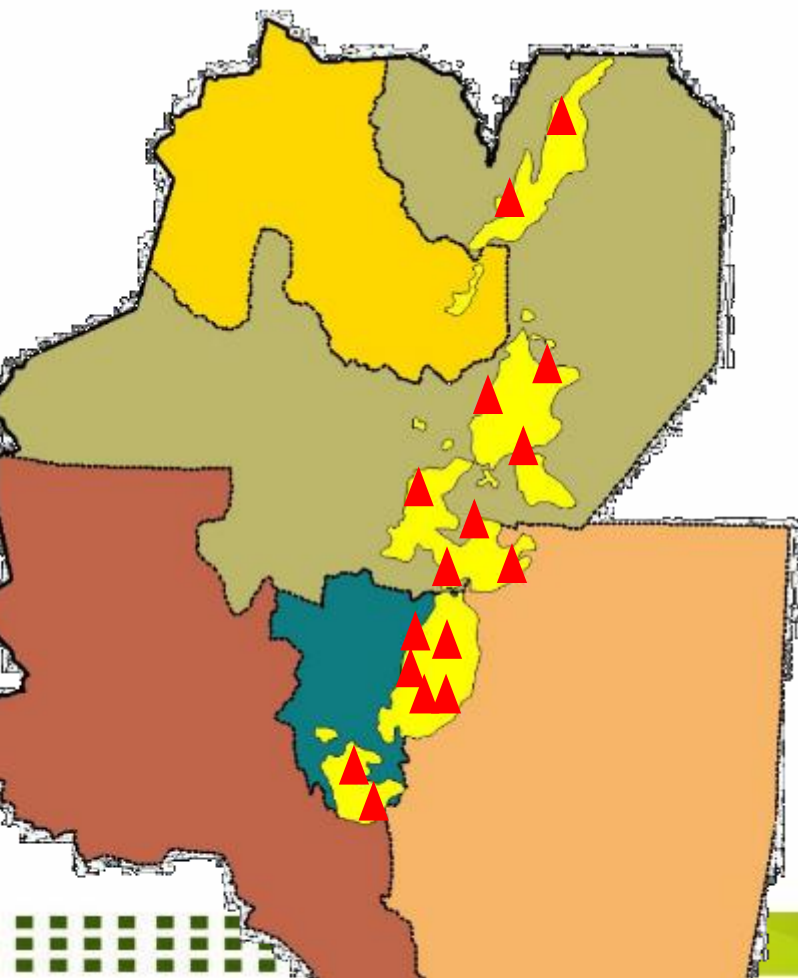
- Soybean
- Corn
- Beans



Estación Experimental Agroindustrial "Obispo Colombres"
Sección Sensores Remotos y SIG

Plant Breeding

North-West Argentina



Genetic Plant Improvement Project

Germplasm Introduction (USDA, CIMMYT, ICARDA, etc.)

Development of new local varieties

Evaluation of advanced breeding lines, hybrids and commercial varieties

Regional CYTs: microplots, 4 sites

Varieties Network: macroplots, 12 to 16 sites, N-W

National Networks: RET (Wheat evaluation network)

Soybean:

Argentina (N-W & N-E)

Bolivia – South-Africa – Brazil - Cuba

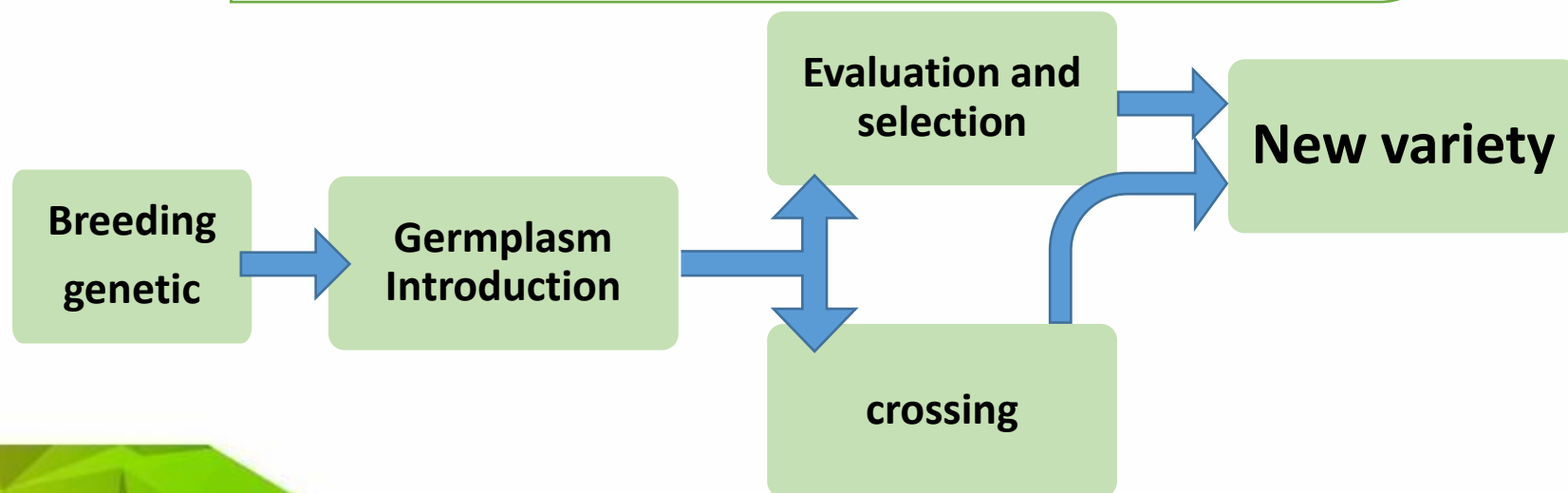
Venezuela – Paraguay

Wheat:

Argentina (N-W) – Bolivia

Beans:

Argentina (N-W)

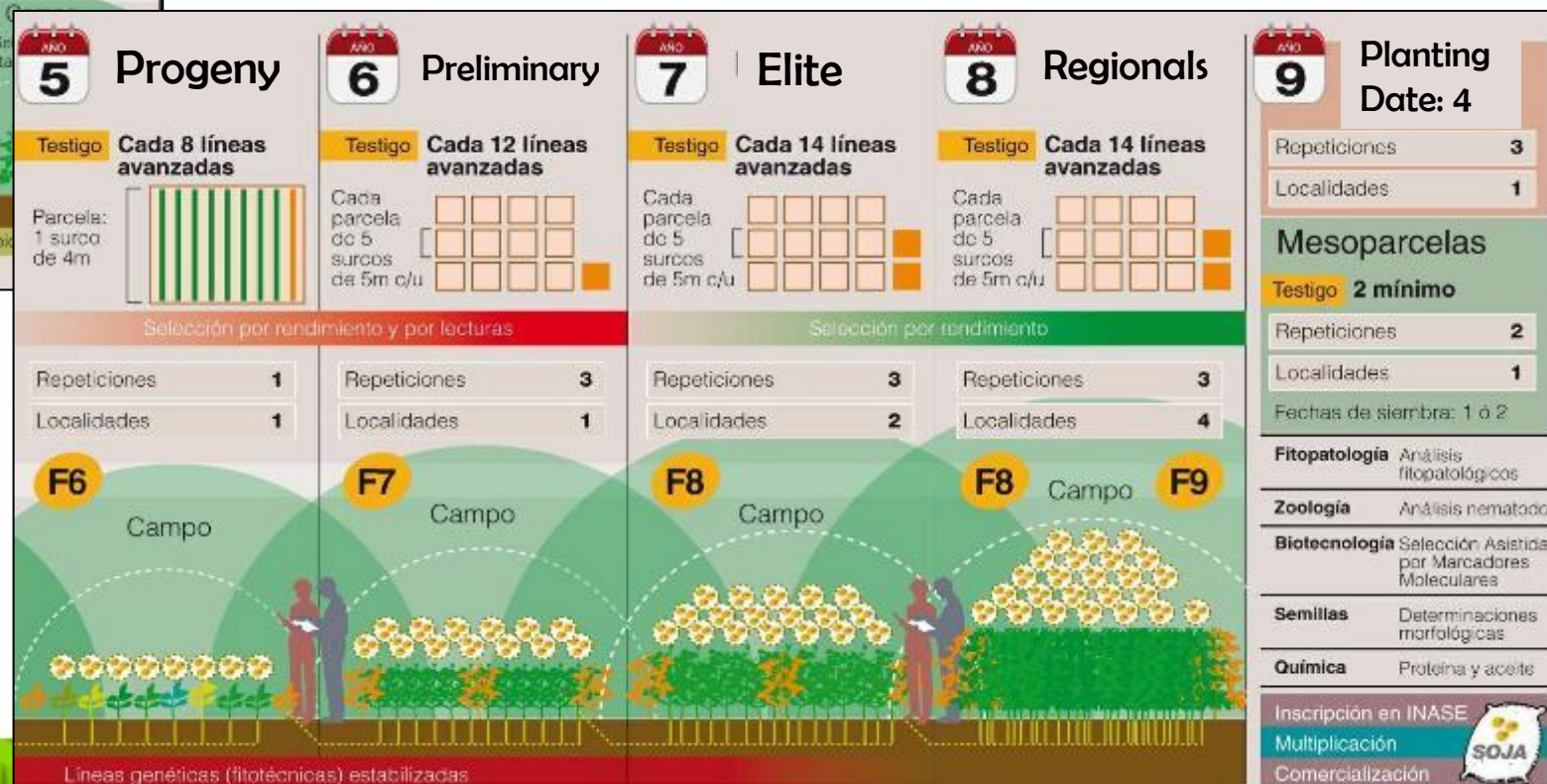
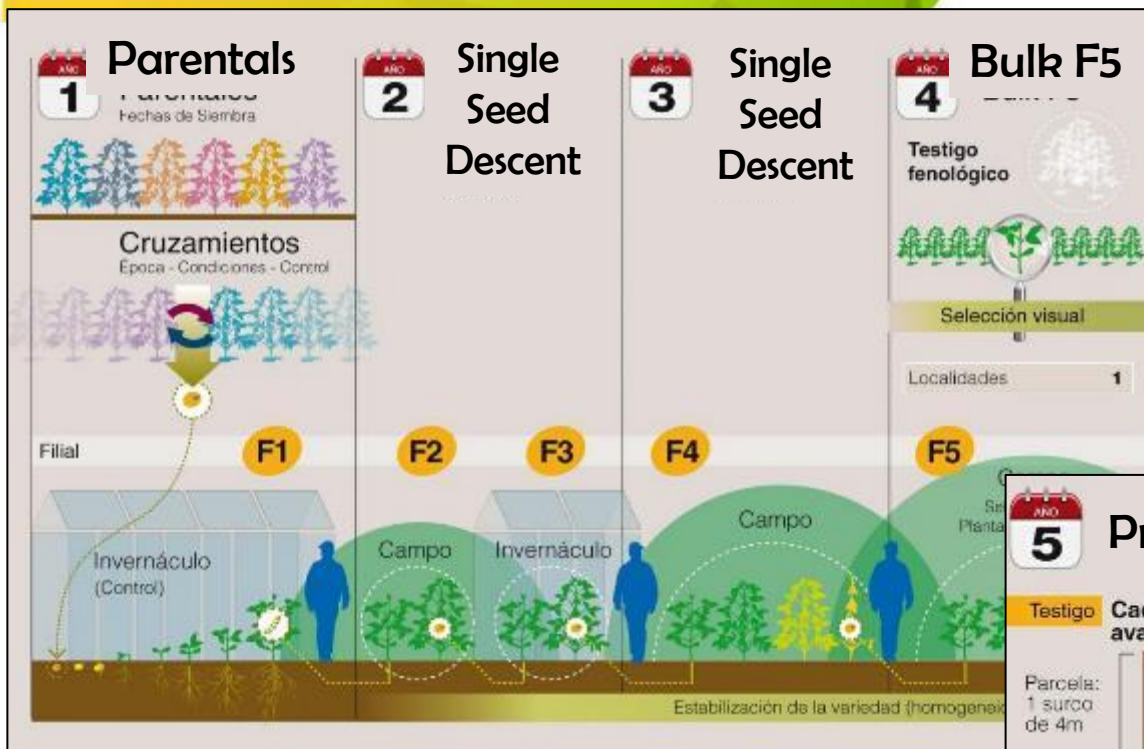


Plant Breeding

Breeding Stages Schedule



Phytopathology
Nematodes
MAS – Biotechnology
Seed Quality



- Released varieties in **Argentina**
 - Soybean (30)
 - No GMO
 - RR1. *Munasqa* (NW-NE-Bolivia-Brazil). *Tukuy. Churi*
 - Wheat (10)
 - Beans
 - Black (10)
 - Red (5)
 - White (4)
 - Carioca (1)
 - Chickpea (4)
 - Mung Bean (1)
- Evaluation and commercialization of **soybean** varieties
 - Bolivia** (8) (large area with *Munasqa*)
 - South-Africa** (7) Sensako. United Seeds
 - Brazil** (1)



Agronomic Management

Crop Agronomic Management Project

Agronomic Management trials

- | | | |
|------------------|---------------|-------------------|
| • Plant Density | Planting Date | Row spacing |
| • Maturity Group | Inoculants | Foliar Fertilizer |
| • Bio Products | Cover crops | |

Crop Health

- | | | |
|----------------|----------------------|----------------|
| • Weed Control | Insect pests control | Plant Diseases |
|----------------|----------------------|----------------|

Agriculture by zone

- Soil management and fertilization.
- Management of production systems (crop rotation) (cover crops)
- Site-Specific farming.

Economics & Data base Analysis

- Estimation of cultivated crops area
- Economics statistics at the province level
- Profit margins for specific scenarios
- Agrometeorology

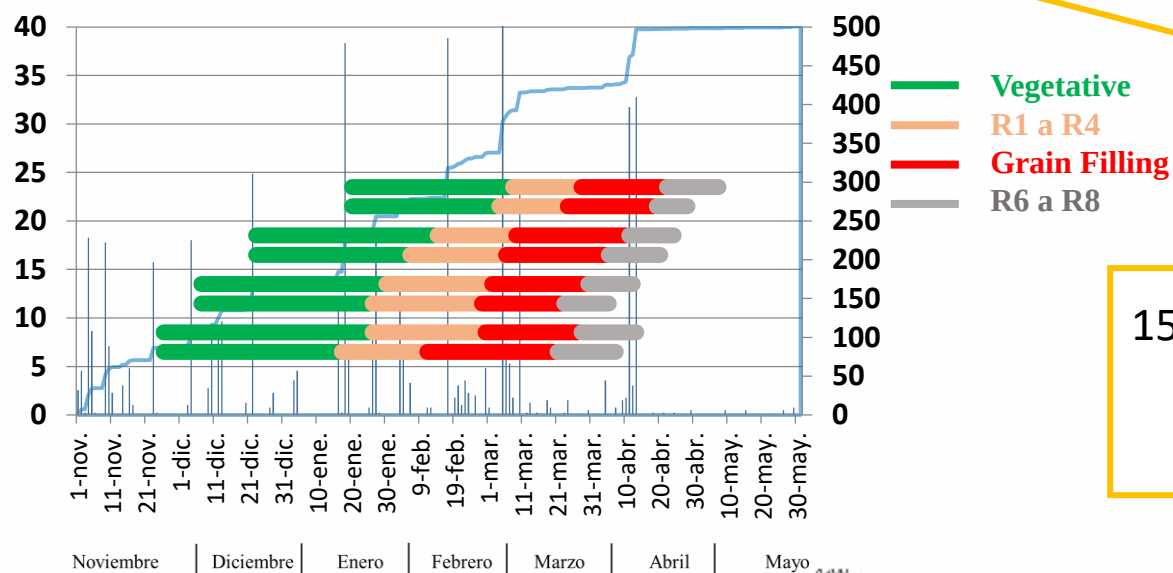
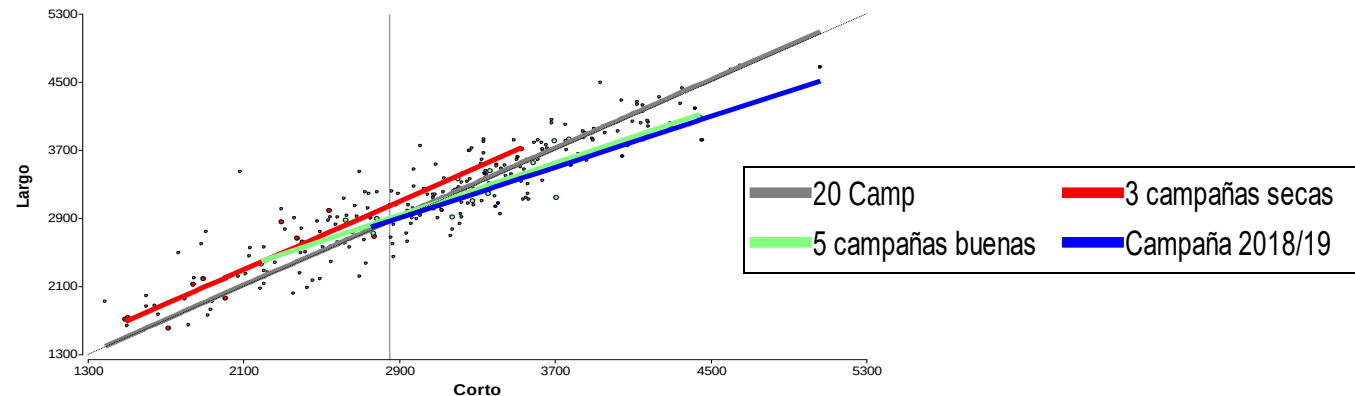


Main Achievements

- Integrated management of plant health problems.
- Management of production systems with interdisciplinary teams
- Permanent recommendations to producers and technical advisors, through different forms of knowledge transfer.

Agronomic Management

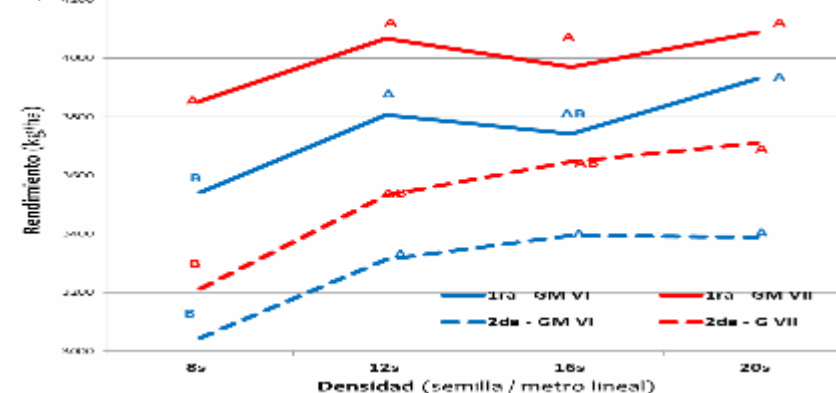
- Macro-plots network
- Planting dates
- Plant Density
- Distribution
- Extra early MG
- Inoculants
- Foliar Fertilizers
- Bio Products



1 early (Nov)
2 standard (Dec)
1 late (Ene)

15 Varieties + Adv Lines
MG: V to VII
GH: Undet

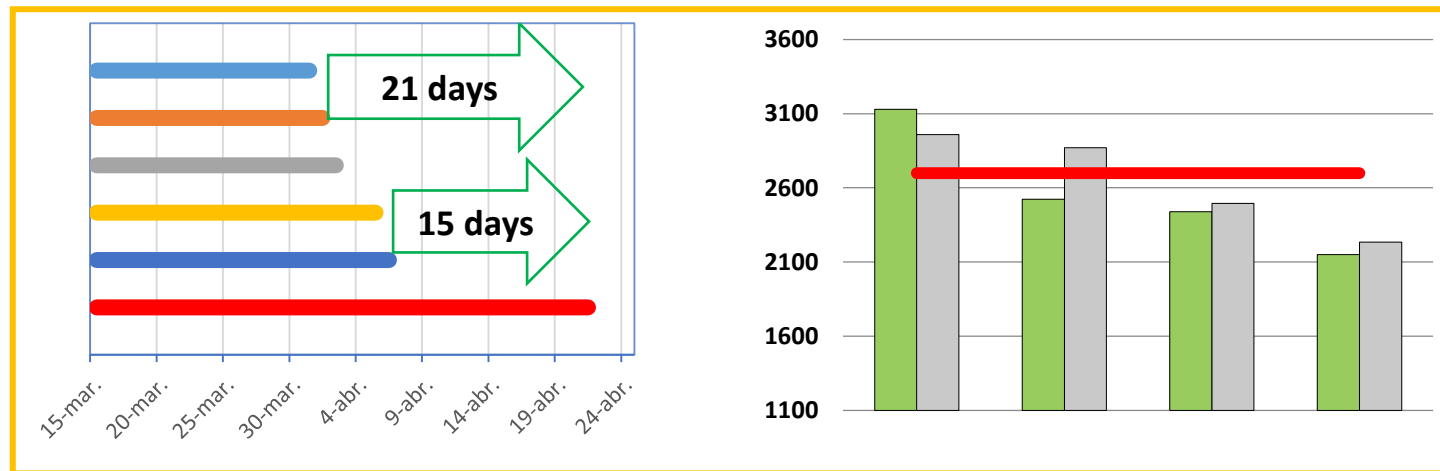
From 6 to 24 seeds per linear
meter
(115.000 to 460.000 seed per ha)



Agronomic Management

- Macro-plots network
- Planting dates
- Plant Density
- Distribution
- Extra early MG
- Inoculants
- Foliar Fertilizers
- Bio Products

	0 cm	17 cm	25 cm	35 cm	50 cm	65 cm
0 hueco	2590 (18)					
1 hueco			2726 (13,5)	2026 (11,7)	1891 (9)	1782 (6,3)
2 huecos		2423 (11,5)	2093 (9)	1784 (6,1)		
3 huecos		2659 (8,8)	2119 (6,1)			



About 6% yield increase

Josefina Amigo, F. Ledesma, M.R. Devani, J. Lenis, M. Dilasio y A. Stegmayer. 2007. Red de evaluación de cultivares de soja para el Noroeste argentino. Resultados de la campaña 2006/2007. EEAOC. Publicación Especial N° 32. pp. 151-159.

Agronomic Management

Bio Products trials

Seed Treatment

Treatment	General objective	Seed treatment	Specific treatment	Components
	Bio Stimulant	FQ e I	Control w/FQel	
			Bio Stimulant	Phytoregulator, hormonas, micronutrientes, Fert. orgánico-mineral, (N,P, hormonas)
			Chem. Fungicide	
			Chem. Fung. + Bio. Est.	
	Biologicals	FQ e I	Testigo c/FQel	
			<i>Trichoderma</i> c/Fung. Qco.	
			<i>Bacillus</i>	Solubilizador de P
			<i>Bradyrhizobium</i>	
			<i>Bradyrhizobium</i> - <i>Bacillus</i>	
		Insect	Control w/ Insecticide	
			<i>Trichoderma</i> wo/Chem.Fung.	
			Control w/ Insecticide + <i>Bradyrhizobium</i>	
			<i>Bradyrhizobium</i> - <i>Bacillus</i>	
		no	Brad - Trich - wo/F.Qco	
			Brad - Baci - Trich- wo/F.Q.e I.	

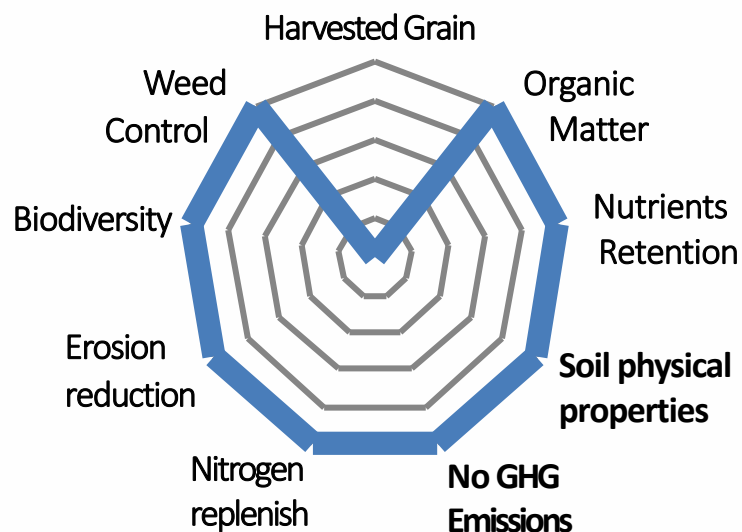
Treatment	Specific treatment	Components
Foliar others	Bio Stimulant	Phytoregulator, kinetina, Hormones, microelementos
	Fertilizer	A base de extrc. minerales, microelementos quelatados
	Control	
	Organic Fungicide	Encoded, <i>Bacillus</i>
	Org.Fung. + Chem.Fung.	idem

Treatment	Specific treatment	Components
Foliar Phytotoxicity Recovery	Control	
	Fomesafen	30% a 50% mas dosis, (+ Benazolin)
	Recup. Fomesafen	(N,P, hormones), Encoded, Bio Stimulant enriquecido
	Metolaclor	Dosis llena
	Recup. Metolaclor	(N,P, Hormones)
	2,4-D	
	Recup. 2,4-D	Phytoregulator, (N ₂ amínico y Ca)

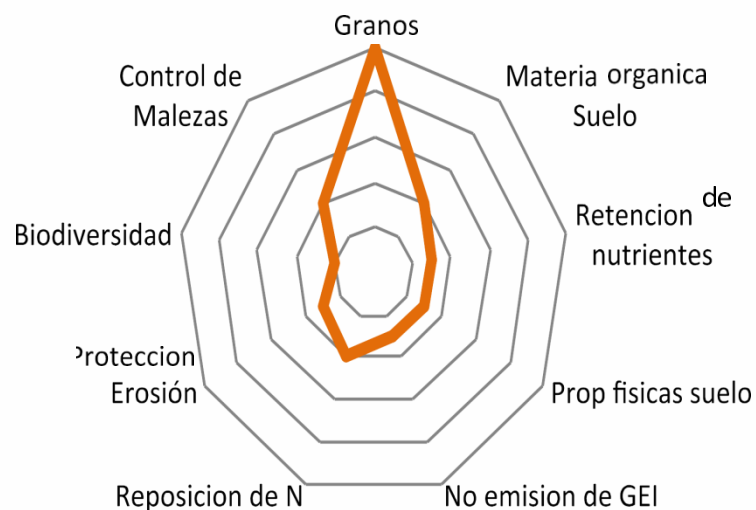
Agronomic Management

Cover Crops

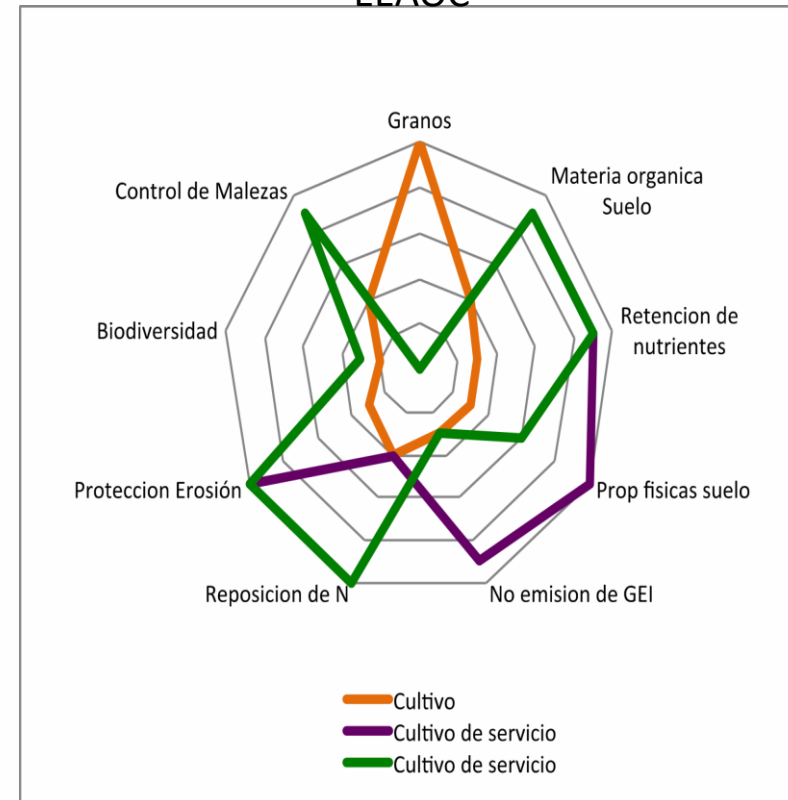
Natural Ecosystem



Crop



Seccion Suelos y Nutrición Vegetal EEAOC



Crops

Leguminous

Vetch
Melilotus
...

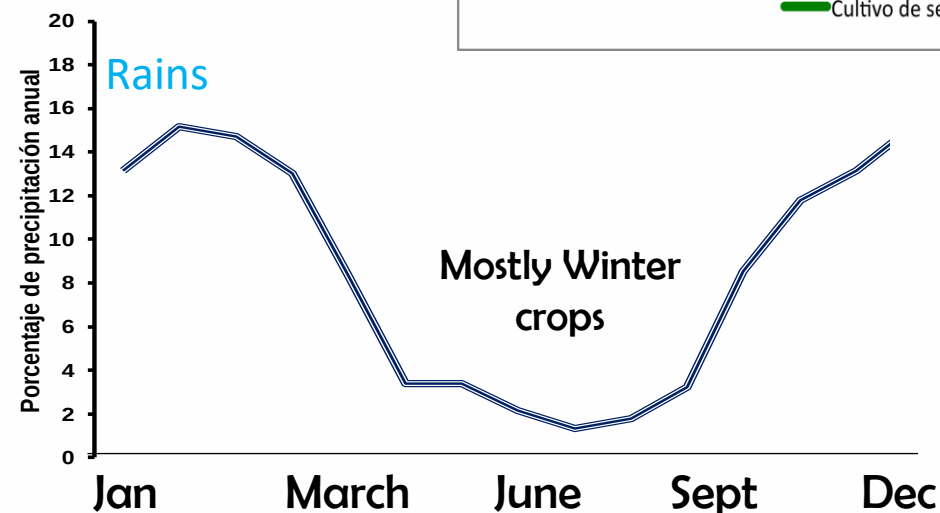
Grasses

Barley
Rye
Oatmeal
Triticale

Radish

-

Consociations



Agronomic Management

Cover Crops



Agronomic Management

Support departments

Phytopathology dept.: Disease prospecting, etiology and epidemiology.

Disease alert (rust). Studies on the use of agrochemicals and sustainable management alternatives.

DIAGNOSIS OF *SPIROPLASMA* in *Dalbulus maidis* (PCR - molecular diagnosis).

Services: seed pathology, disease diagnosis and control, training on diseases and their management, etc.

Soils and Plant Nutrition dept.: Evaluation and studies of grain production systems, aimed at increasing crop productivity in the region (evolution of physical and chemical properties of soils, carbon balance, water retention capacity, soil microorganism activity, etc.). Fertilization in crops. Service crops. Management according to the environment.

Remote Sensing and G.I.S. dept.: Determination of the cultivated area with grains in Tucumán using satellite images (soybeans, corn, wheat, chickpeas, beans). Generation of maps, spatial analysis, monitoring of cultural practices, environments. Spatial analysis of *Spiroplasma* in corn crop in relation to sowing date and location in Tucuman and influence area.

Seeds Quality: analysis of germination power, vigor and health.. Detection services for the BT protein in soybeans. Currently in agreement with Corteva.

Weeds dept.: Weed biology. Tolerant and resistant weed management systems. Study of herbicides. Study of weed management using service crops. Control of VOLUNTEER CORN.



Knowledge Transfer

Field days: Tucumán & Salta

EEAOC

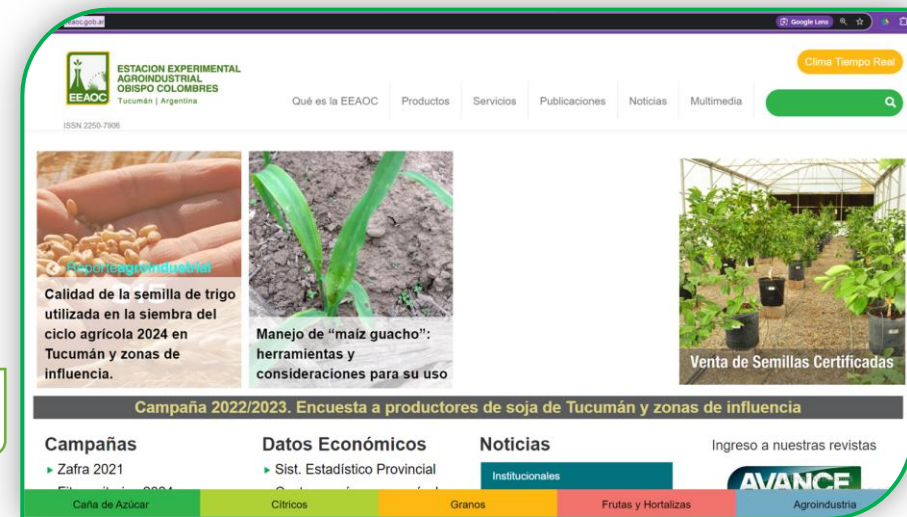
• Workshops

- Soybean varieties & agronomic
- Corn hybrids
- Wheat varieties
- Bean varieties

- Congress,
- Conferences,
- Seminars
- Technical Talks

- Indexed Magazines (local, national and international)
- Books (soybean – corn - bean)
- On Line Reports

<https://www.eeaoc.gob.ar/>





Gracias !

Thanks !

Baie Dankie !





**ESTACIÓN EXPERIMENTAL
AGROINDUSTRIAL
OBISPO COLOMBRES**
Tucumán | Argentina



SOILS and PLANT NUTRITION

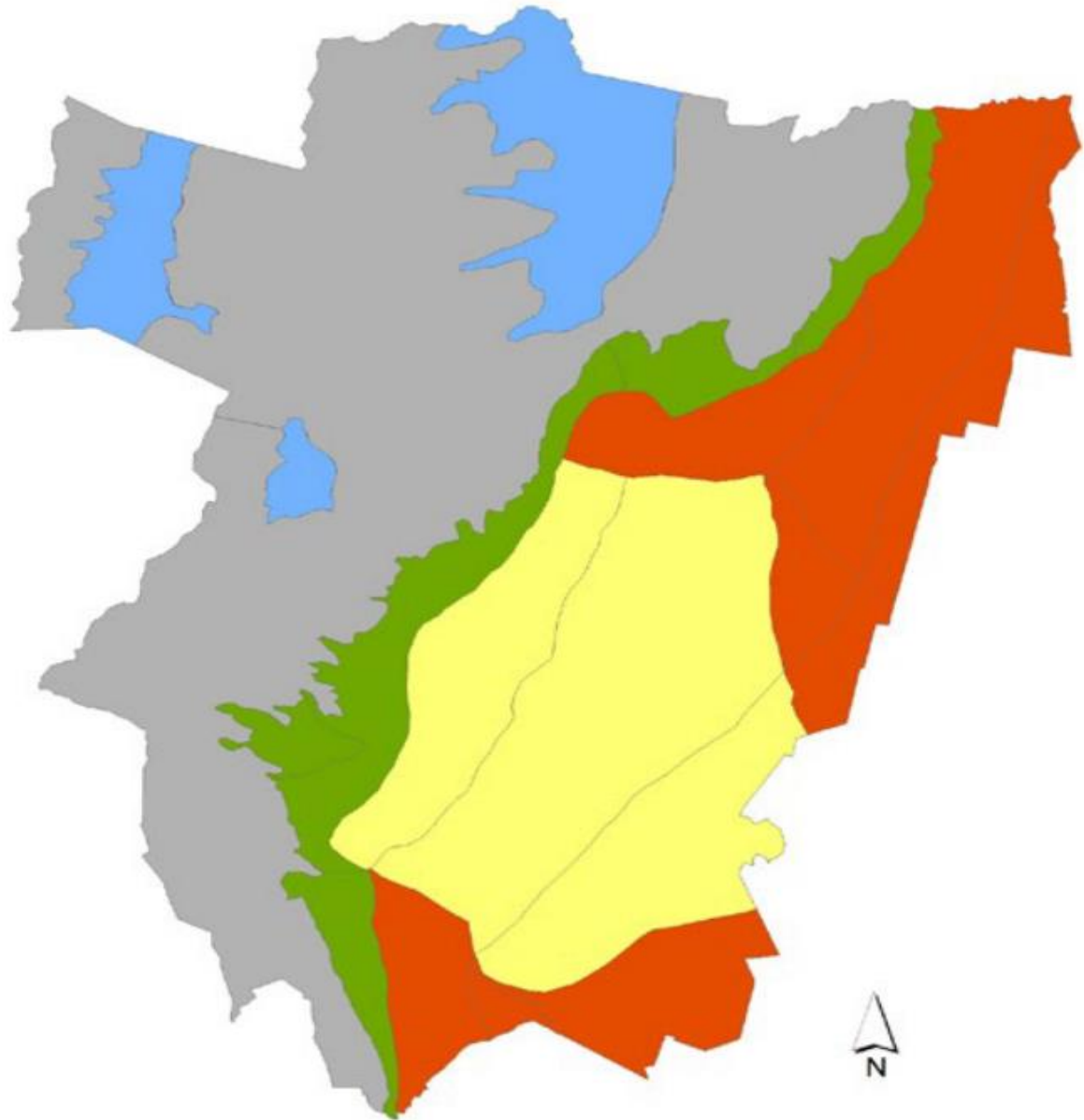
Ing. Agr. M. Sc. Agustín Sanzano

Ing. Agr. Gonzalo Robledo

Ing. Agr. Juan Ignacio Romero



Tucumán



Soils in Tucuman plain, main features



Material parental:
loess.

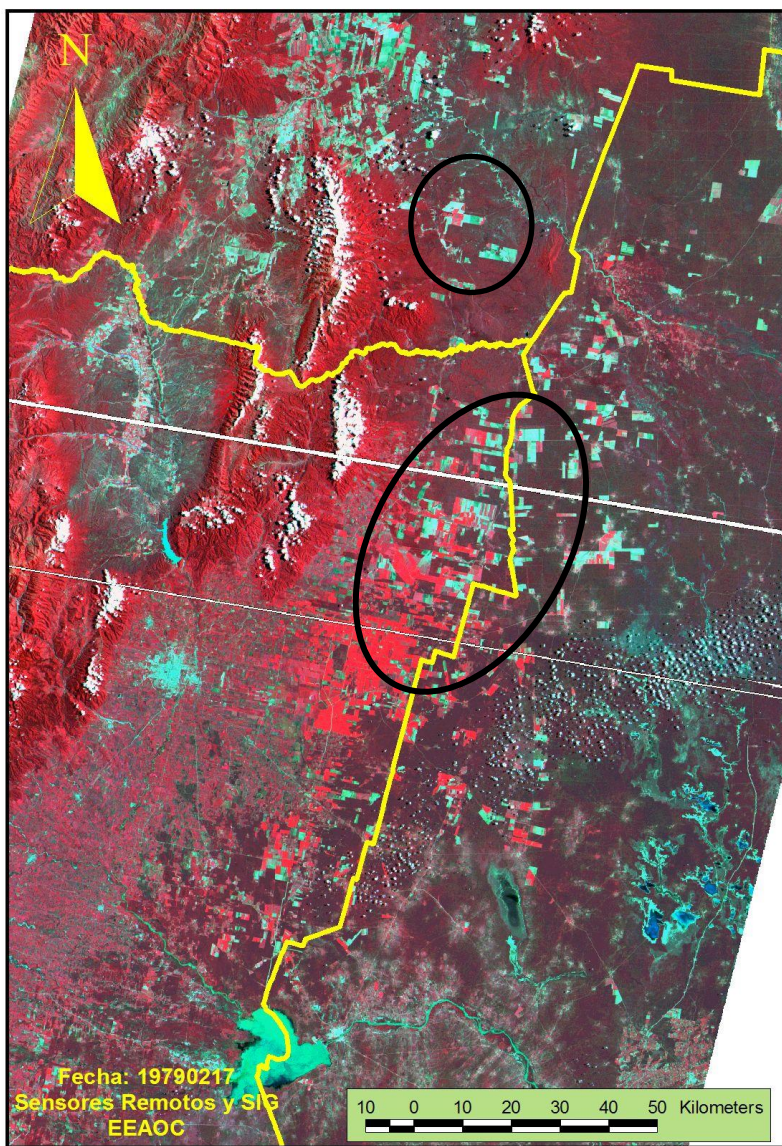
texture: **silty loam** with 50-60% silt

2% organic matter on average in the upper layer

pH: slightly acid to neutral

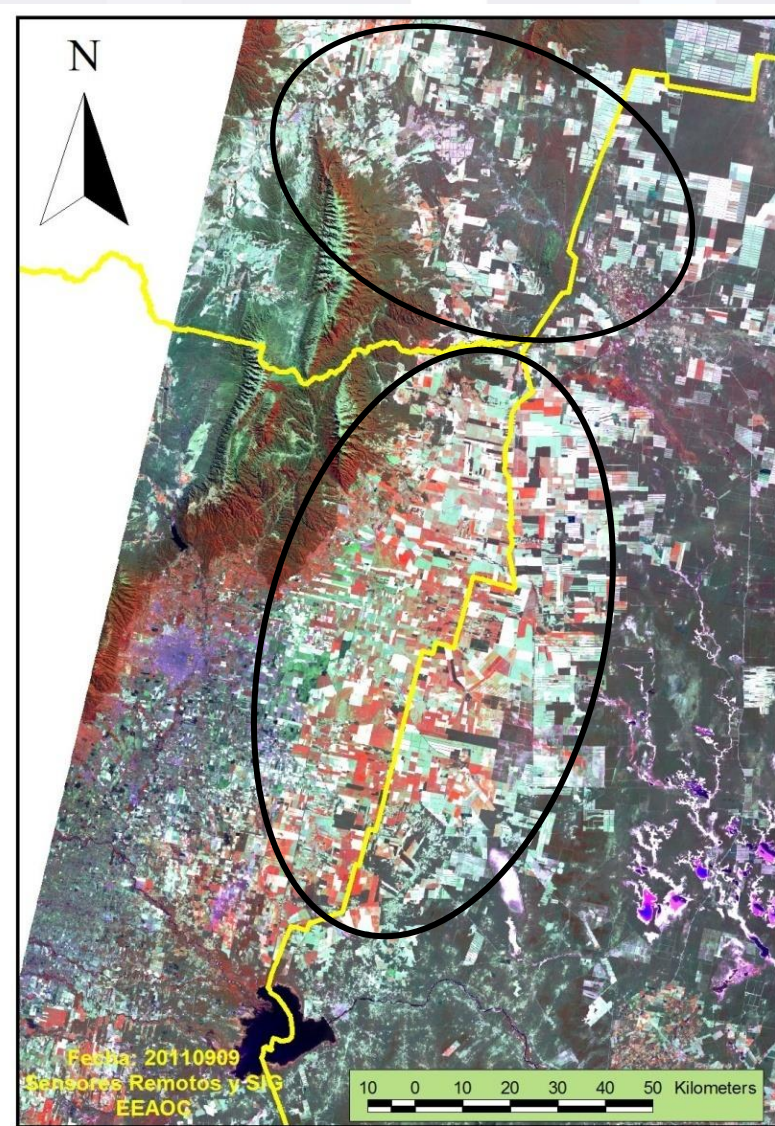
Low structural stability and **high water storage capacity**





1979

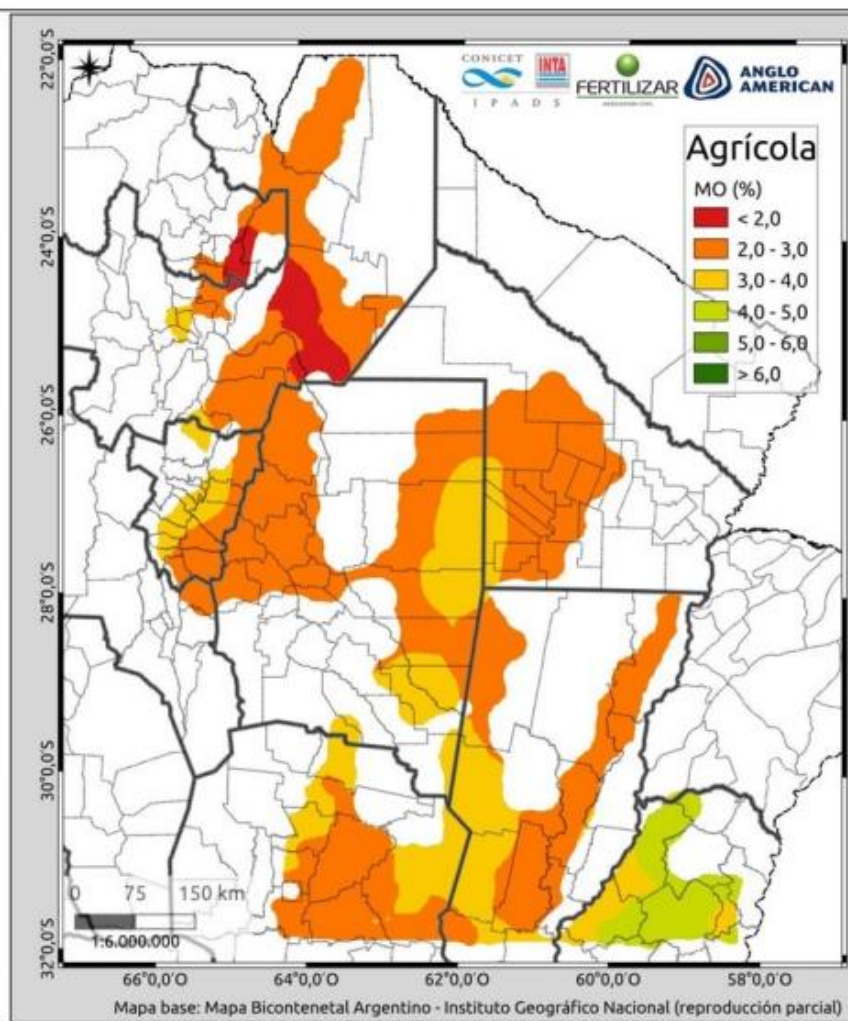
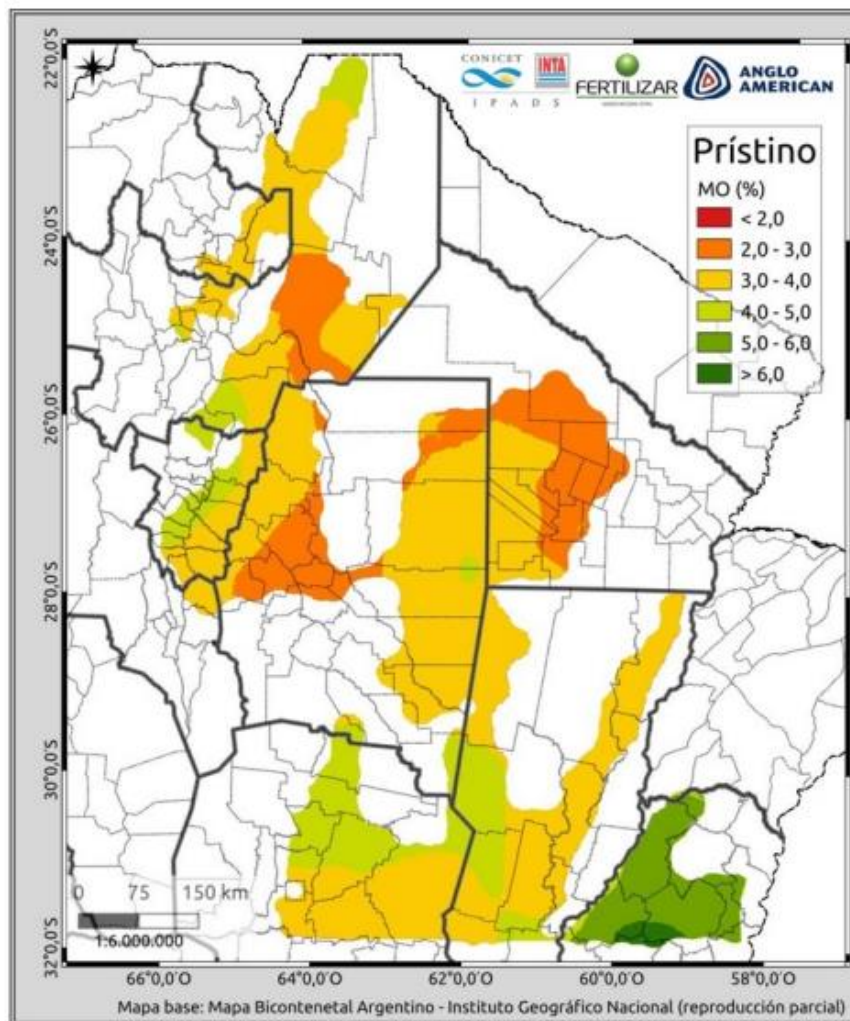
**Soybean
Monoculture
C. Tillage**



2011



Organic matter levels (0-20 cm) in some pristine and agricultural soils of northwest and northeast Argentina



Some indicators of soil degradation

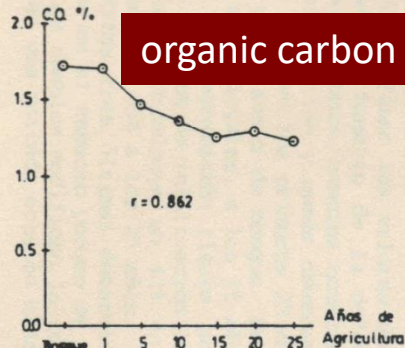


FIGURA N°1

Valores Medios de C.Org.

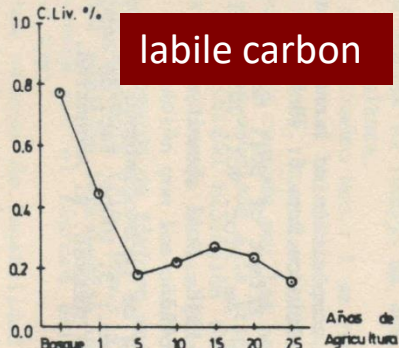


FIGURA N°2

Valores Medios de C.Liv.

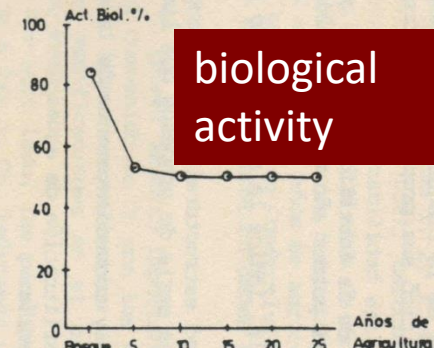


FIGURA N°3

Valores Medios de Act. Biológica

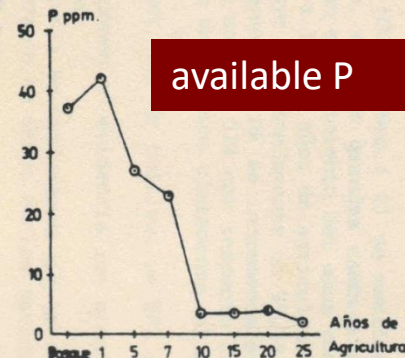


FIGURA N°4

Valores Medios P Asimilable

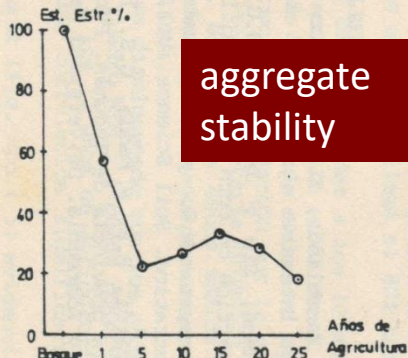


FIGURA N°5

Valores Medios Estab. Estructural

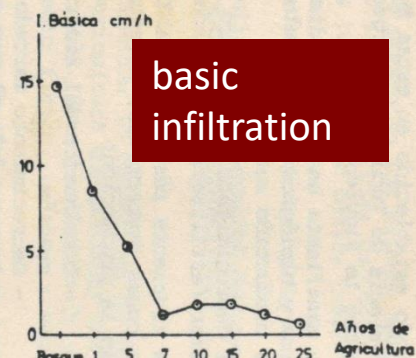
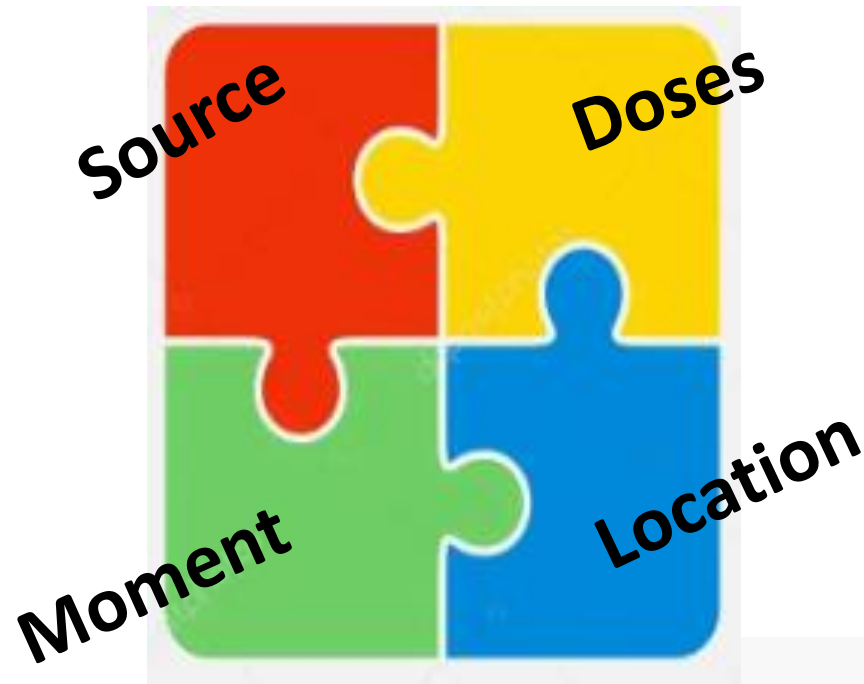


FIGURA N°6

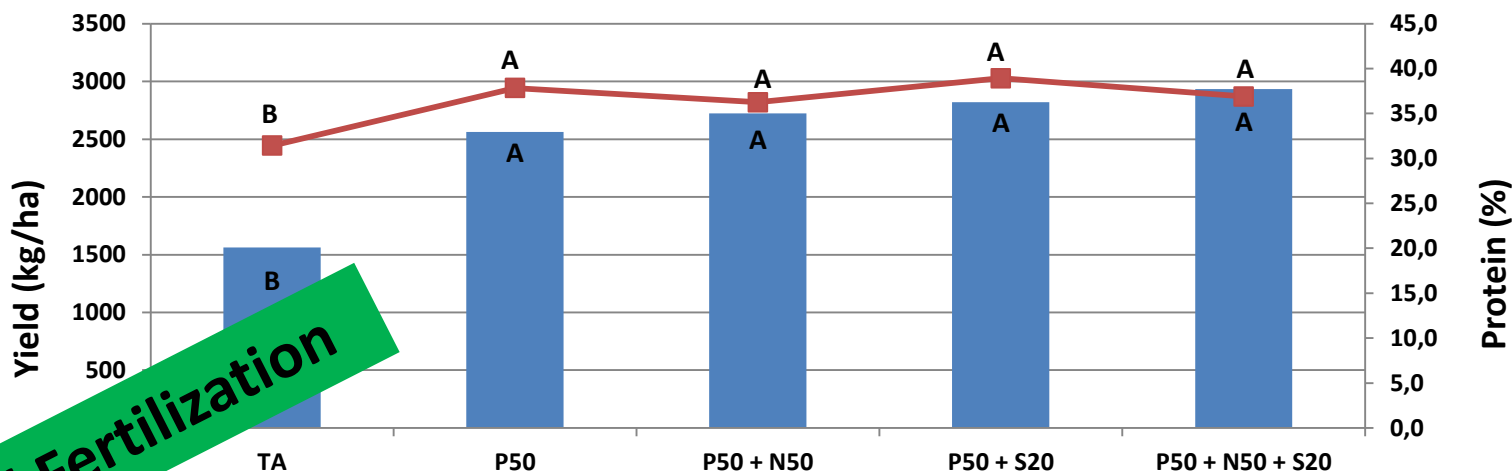
Valores Medios Infiltración

Crop Fertilization

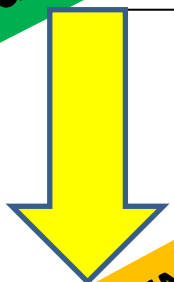


Some soybean fertilization trials

Fertilization with NPS to the soil in the sowing

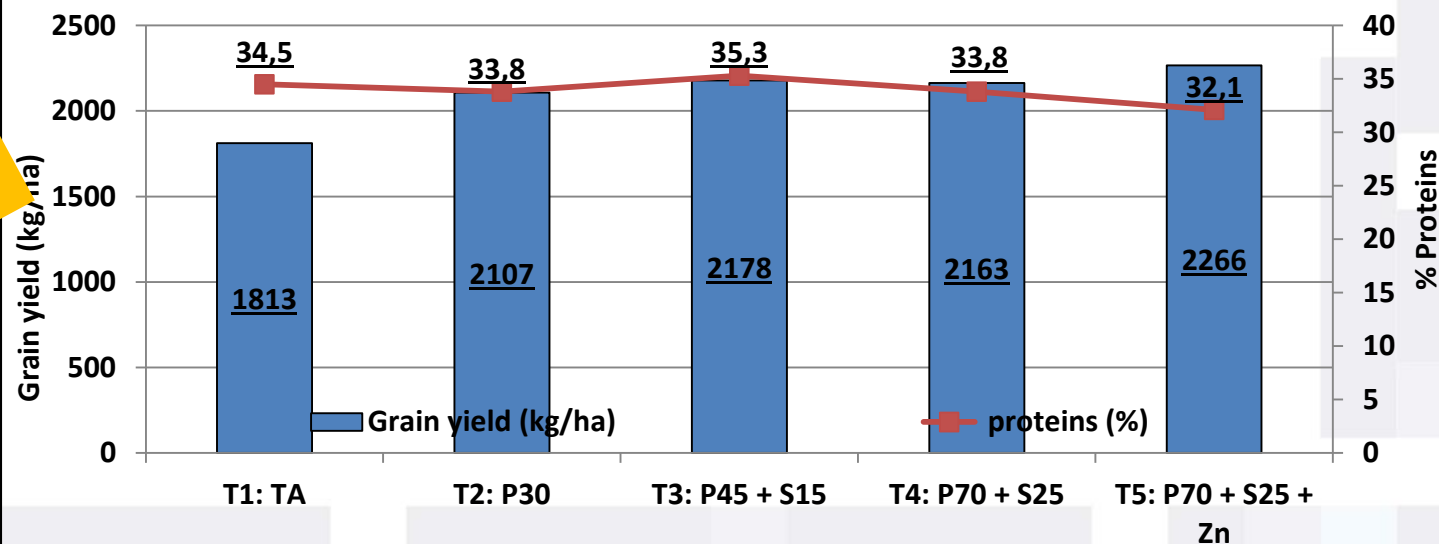


Balanced Fertilization



YIELD & PROTEIN

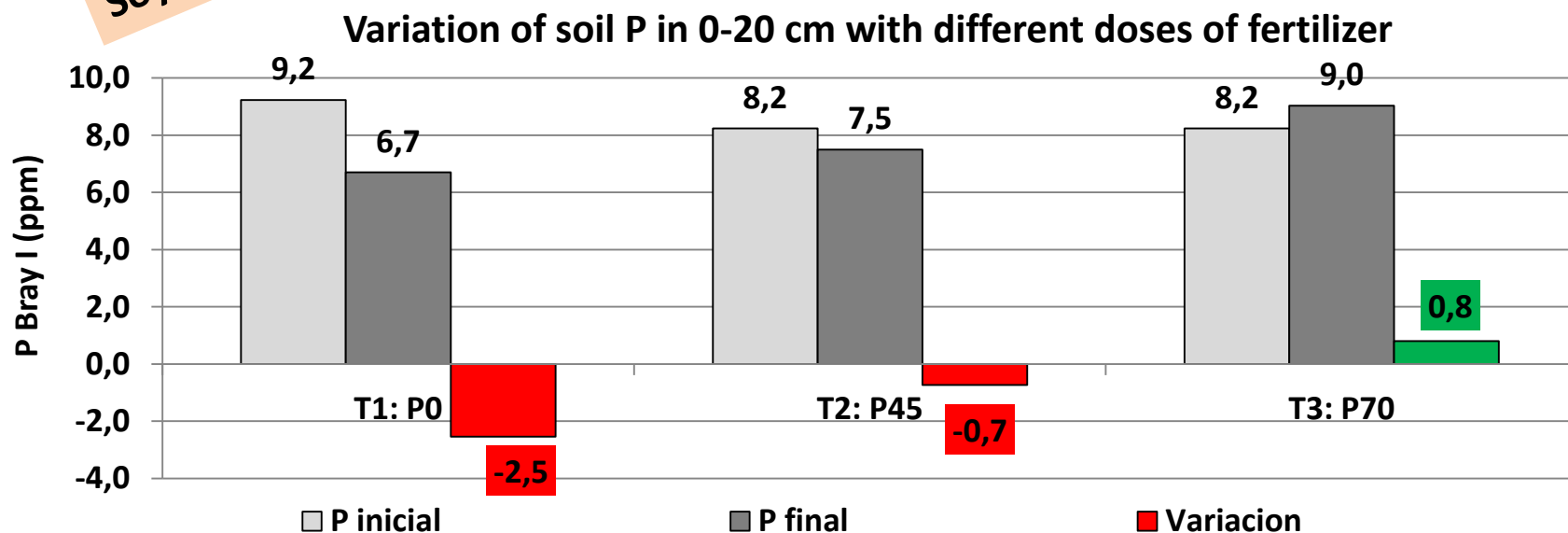
Fertilization with P, S, Zn



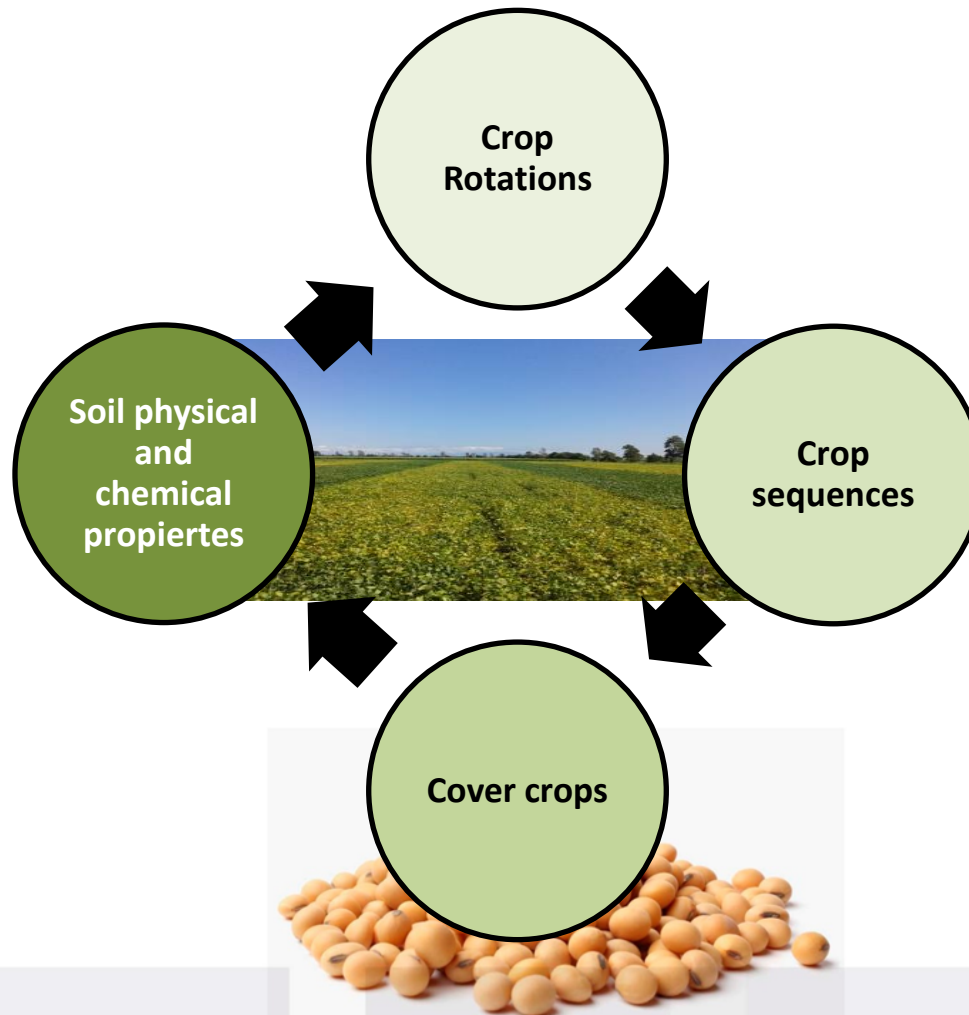
NUTRIENT BALANCES - NUTRIENT REPOSITION - SUSTAINABILITY

Soybean PHOSPHORUS BALANCE

System Nutrient Balances



Sustainable Production Systems



TREATMENTS	SYSTEMS - SUMMER	WINTER
T1	Monoculture soybean	Fallow
T4		
T2		Commercial wheat
T5		
T3		CC Grass
T6		
T7	Rotation Soybean Corn 1:1	Fallow
T9		Wheat + CC Grass
T11		
T13		CC Legume + CC Grass
T15		
T17		
T8	Rotation Soybean Corn 2:1	Fallow
T10		Wheat + CC Grass
T12		
T14		
T16		CC Legume + CC Grass
T18		

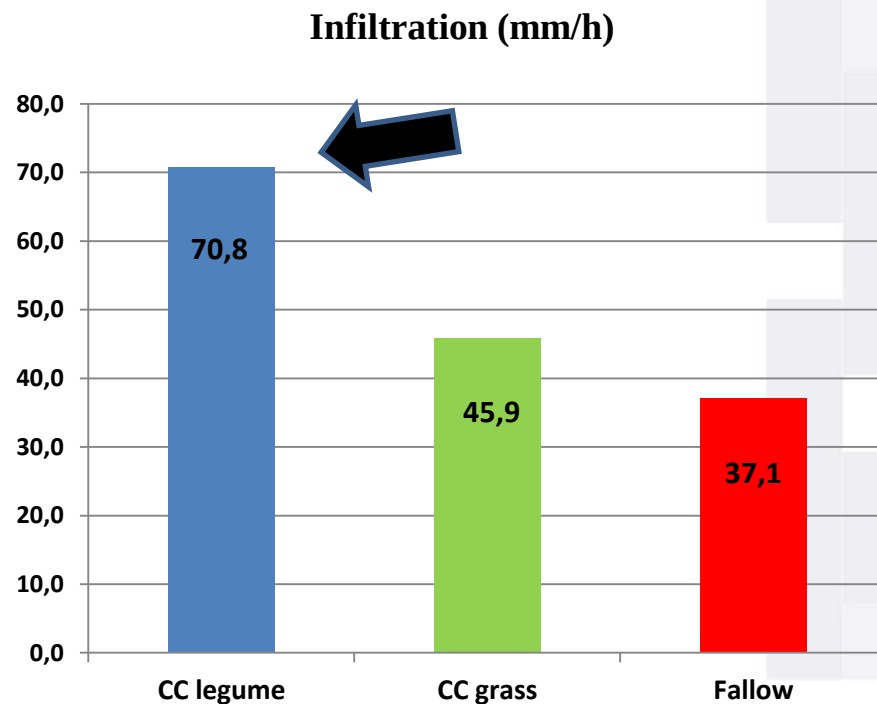
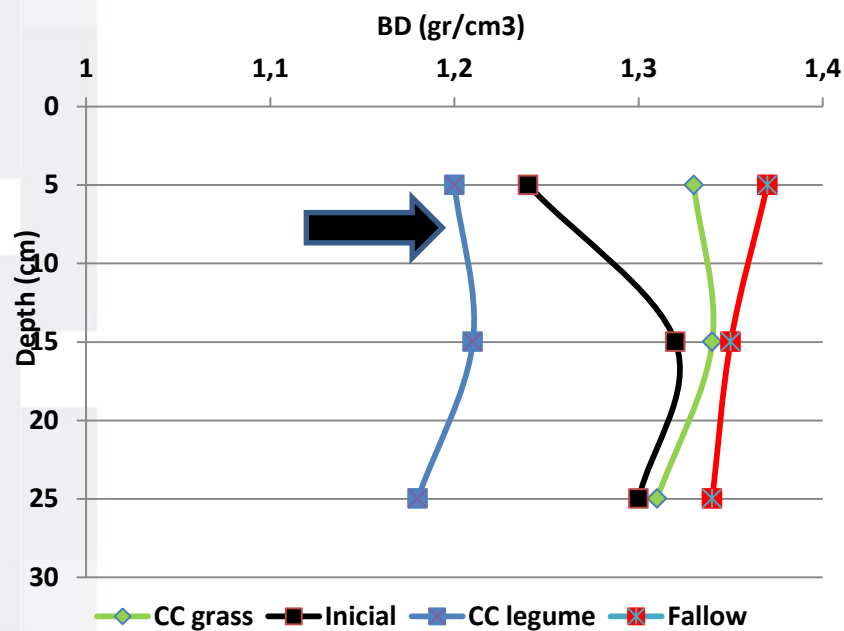
Physical

Chemical

Biológico

Influence on physical soil properties

depth (cm)	Bulk Density (gr/cm ³)			
	Initial	CC Grass	CC Legume	Fallow
0-10	1,24	1,33	1,20	1,37
10-20	1,32	1,34	1,21	1,35
20-30	1,30	1,31	1,19	1,34



Residual NO_3 for corn



Sustainable Production Systems

CC Legume: 2,5 Tn/ha DM
20 kg N/Tn DM ha
 $C/N < 30$

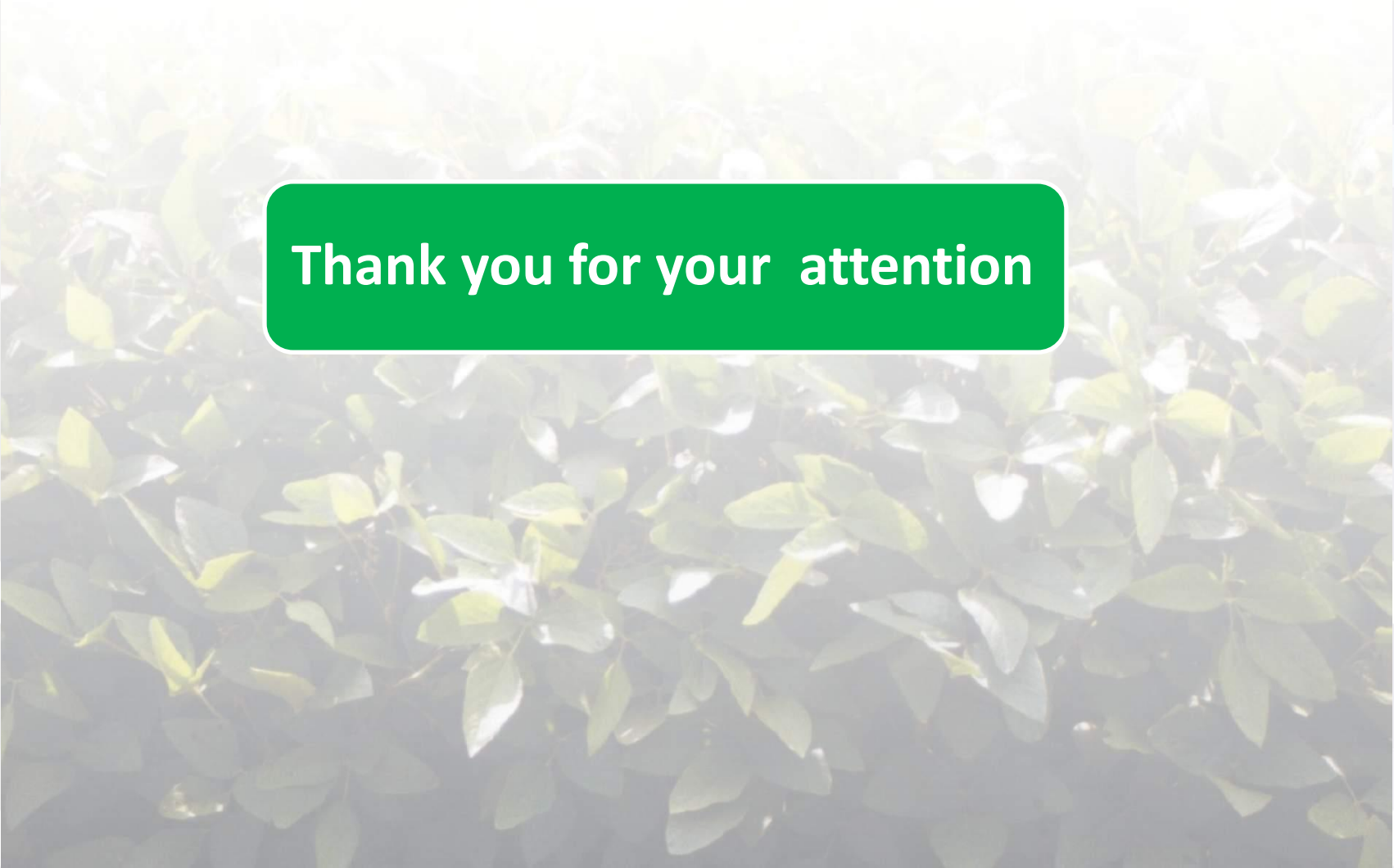
CC Grass: 3 Tn/ha DM
11 kg N/TN DM ha
 $C/N > 30$



Summarizing

We want to contribute for a **Sustainable Soil Management in NOA**, providing local knowledge about the benefits of:

- **Balanced Fertilization Strategies:** Grain Yield and Quality
- **Nutrient Replacement** – Nutrient Balances
- **No till** and Crop **Rotation**
- System **Intensification:** Cover Crops
- **Carbon Sequestration**
- **Taking care of Soils Health is a worldwide issue.**

The background of the slide is a dense, out-of-focus image of green foliage, likely a bush or tree, with many small green leaves visible. A semi-transparent green rounded rectangle is centered over the foliage, containing the text "Thank you for your attention".

Thank you for your attention





Simplified Carbon Balance Model

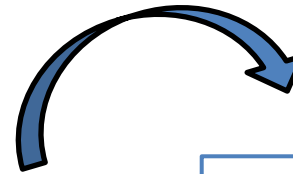
Seminario Soja EEAOC
para el NOA

$$\text{C Balance (Tn C/Ha/Año)}: (\text{Yield} * \text{HCC}) - (\text{COS} * \text{Coef. Min.})$$

HCC: Humus contribution coefficient

SOC: Soil organic carbon

Min. Coef.: Mineralization coefficient



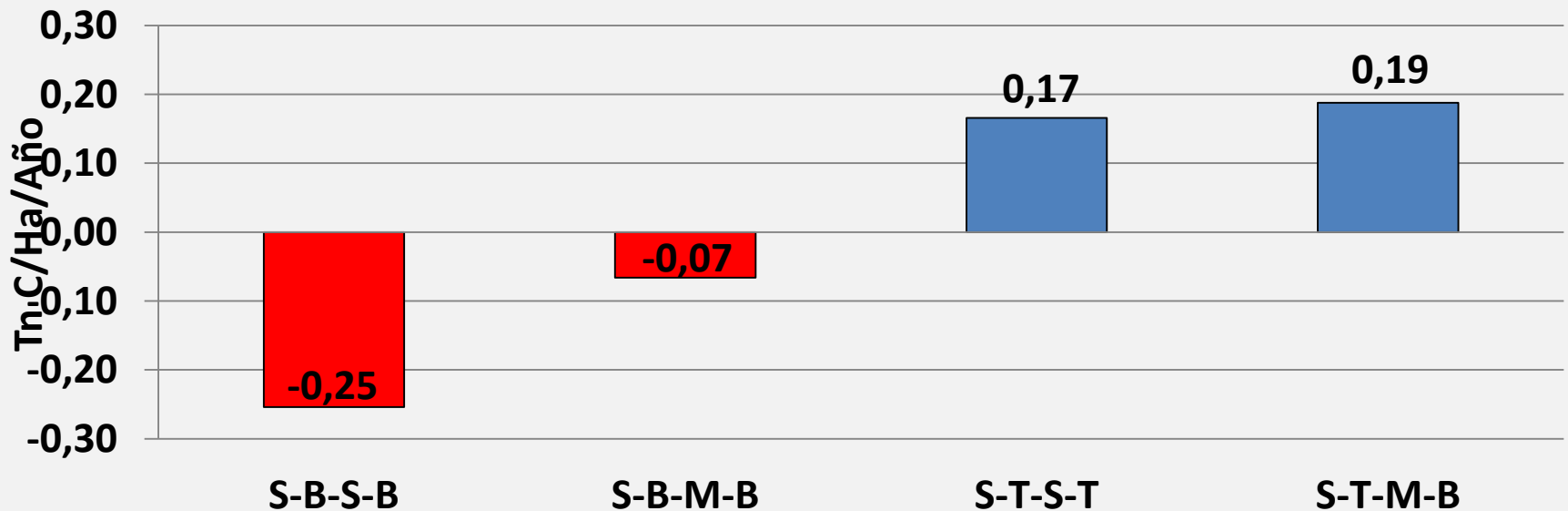
HCC

SOYBEAN: 0,37

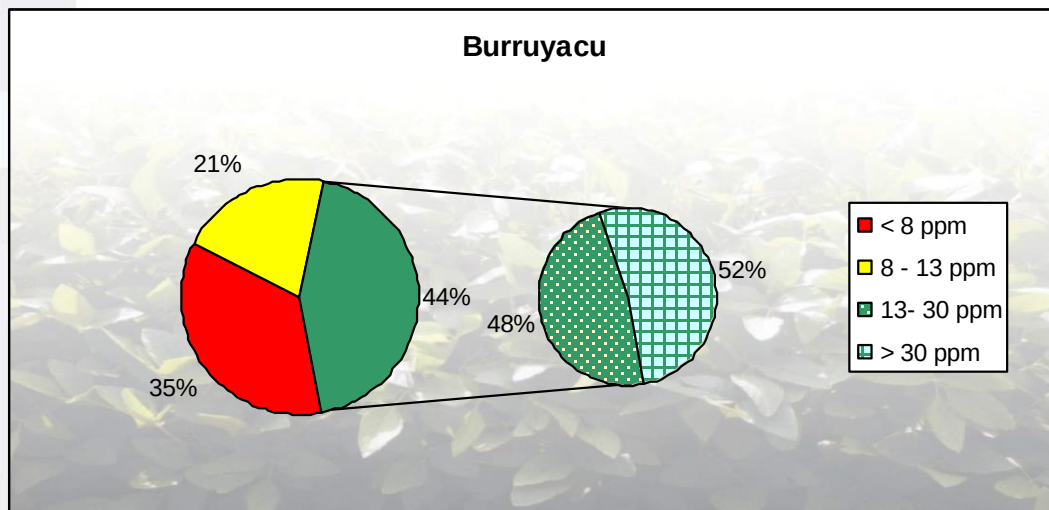
CORN: 0,20

WHEAT: 0,40

C Balance en Grain Production Systems (5 years)

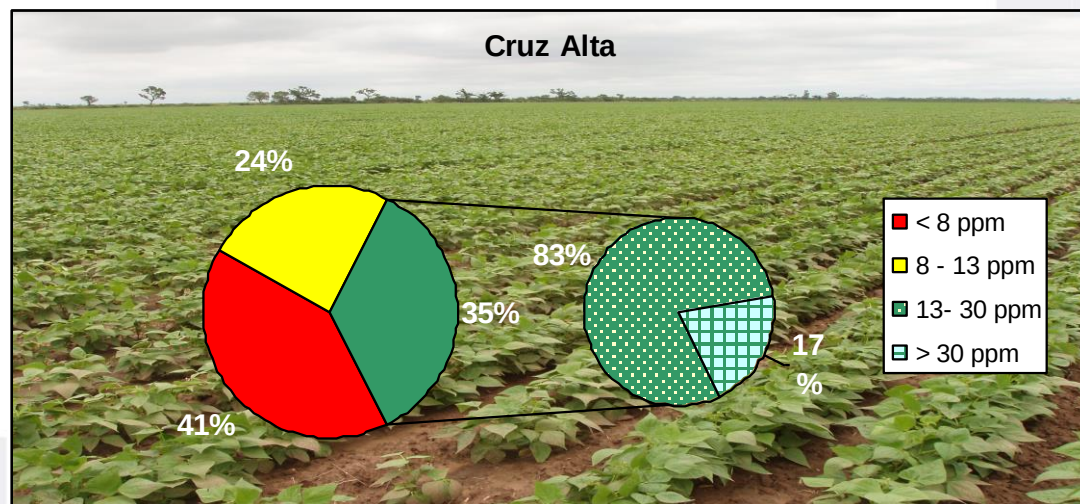


P content available in Tucumán soybean soils



250 samples

150 samples



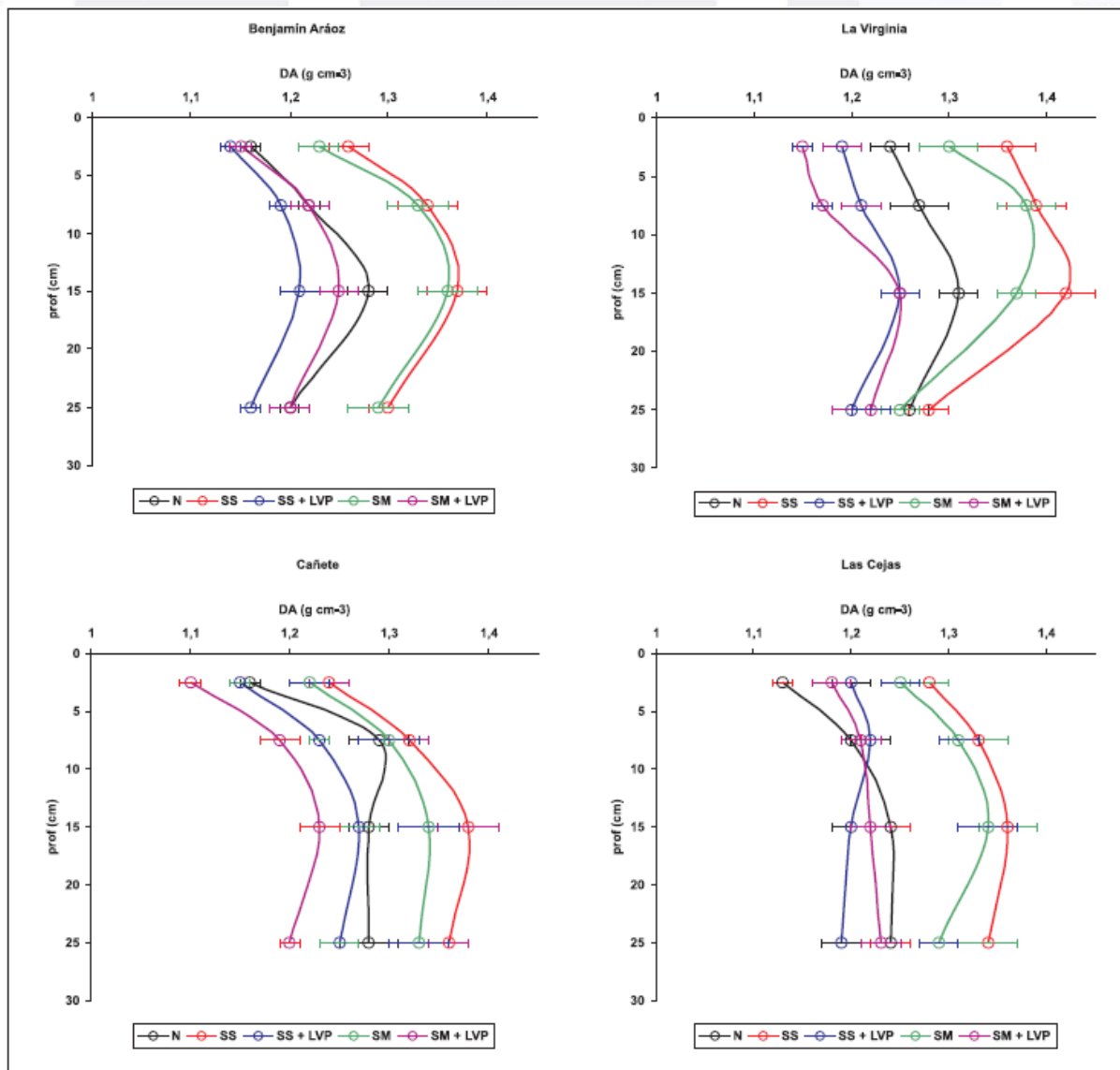


Figura 3. Efecto de distintos sistemas de producción sobre la densidad aparente (Dap), a cuatro profundidades, en cuatro localidades de la región de la Llanura Chacopampeana de Tucumán. Año 2009.
Las barras horizontales indican los desvíos estándar.

Fuente Sanzano et. al 2012



Plant Pathology Lab: Soybean research lines

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Plant pathology Lab: soybean team

Proyect: soybean diseases



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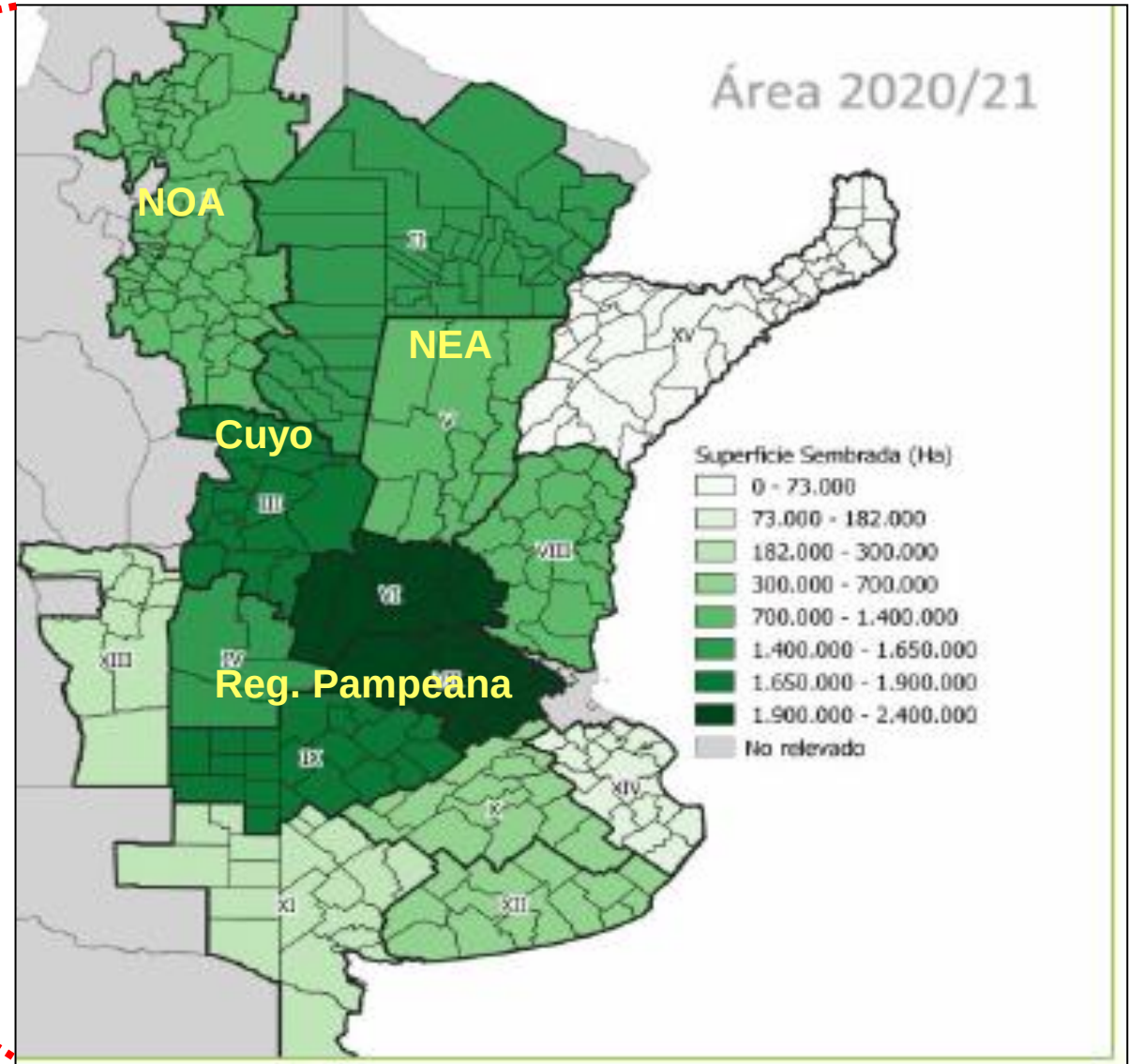
Dr. Juliana Bleckwedel
jbleckwedel@eeaoc.org.ar



Exequiel Nieva
rnueva@eeaoc.org.ar

Argentina

Soybean production area



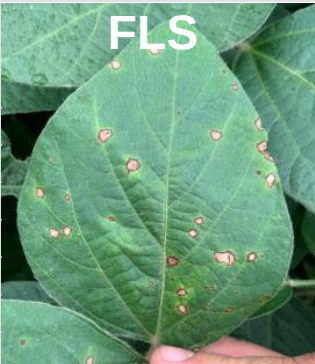
Soybean diseases - Argentina



Pampean region



NWA



Pampean region



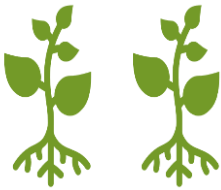
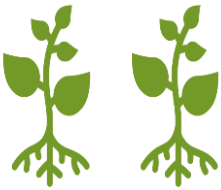
NWA



Soybean diseases - Argentina

Pampean region

NWA



Sudden Death Syndrome



Charcoal Rot



Sclerotinia Stem Rot

Soybean diseases - Argentina

Stem canker

Epifitia 1996/97 y 1997/98

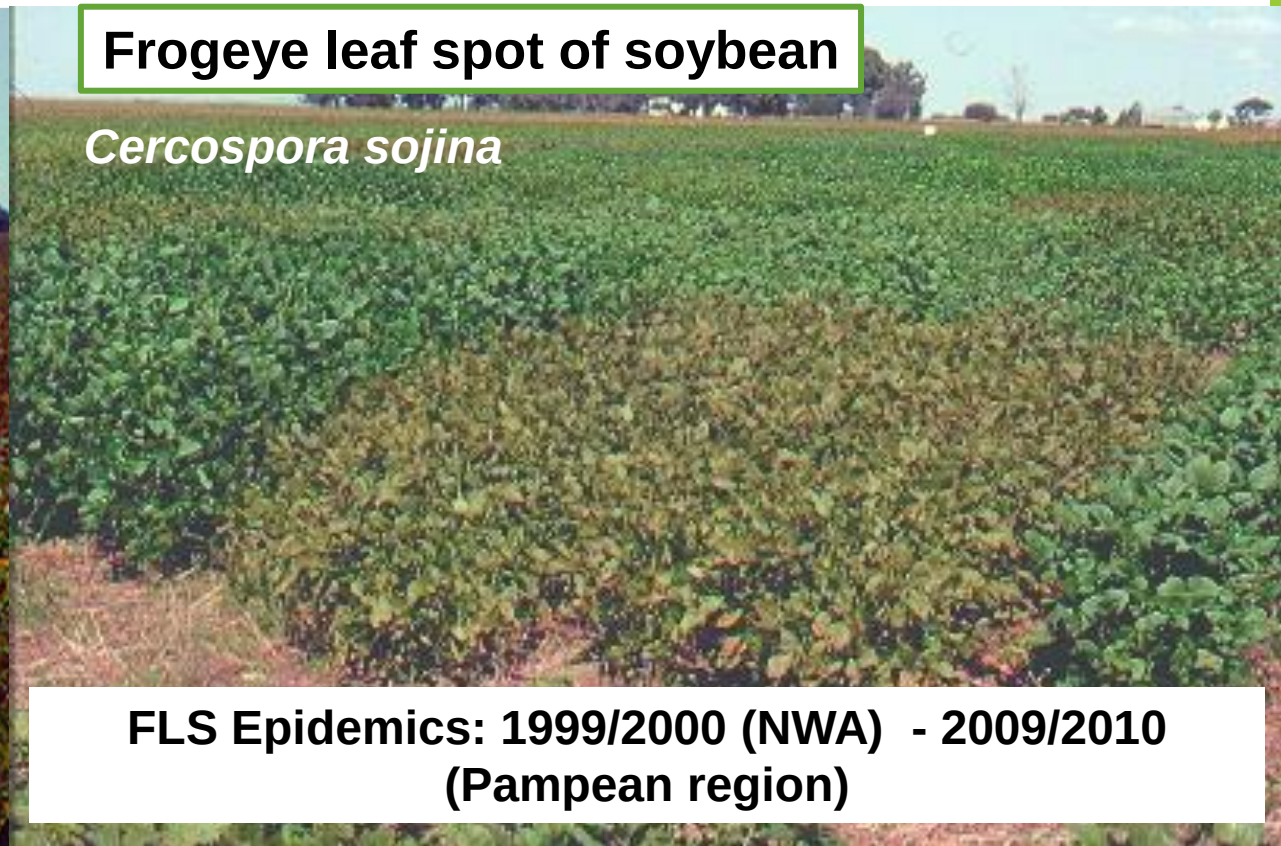
Diaporthe phaseolorum var. *meridionalis*



SC Epidemics: 1996/1997 and 1997/1998

Frogeye leaf spot of soybean

Cercospora sojina



**FLS Epidemics: 1999/2000 (NWA) - 2009/2010
(Pampean region)**

Soybean diseases - Argentina

Asian Soybean Rust

Phakopsora pachyrhizi

ASR Outbreaks: Since 2003/2004



Proyect: Soybean Diseases

Research line GrF1: Studies of soybean diseases in the crop production area in northwestern Argentina (NWA)

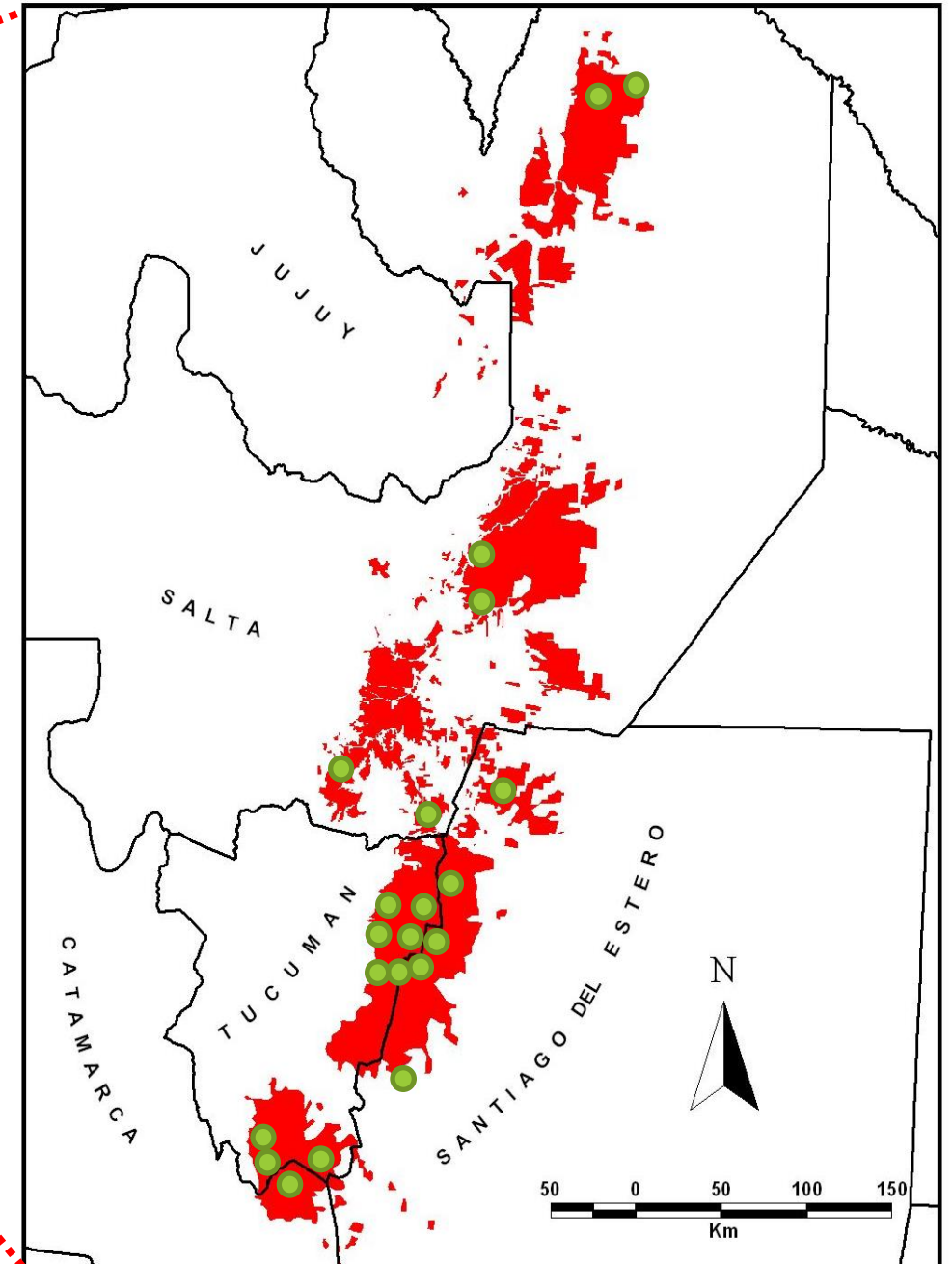
Aim: Evaluate distribution, prevalence and importance of soybean diseases caused by fungi, bacteria and viruses in different locations in NWA



Northwestern Argentina

Soybean production area

● 20 locations visited



Soybean diseases in NWA – Season 2023/2024



Vegetative

Reproductive

Harvest



Asian Soybean Rust first detection (*Phakopsora pachyrhizi*)

Location	Date	Fenol. Est.	Inc. (%)	Sev. (%)
Los Pereyra, Cruz Alta, Tucumán	6/03	R 5	1	< 1

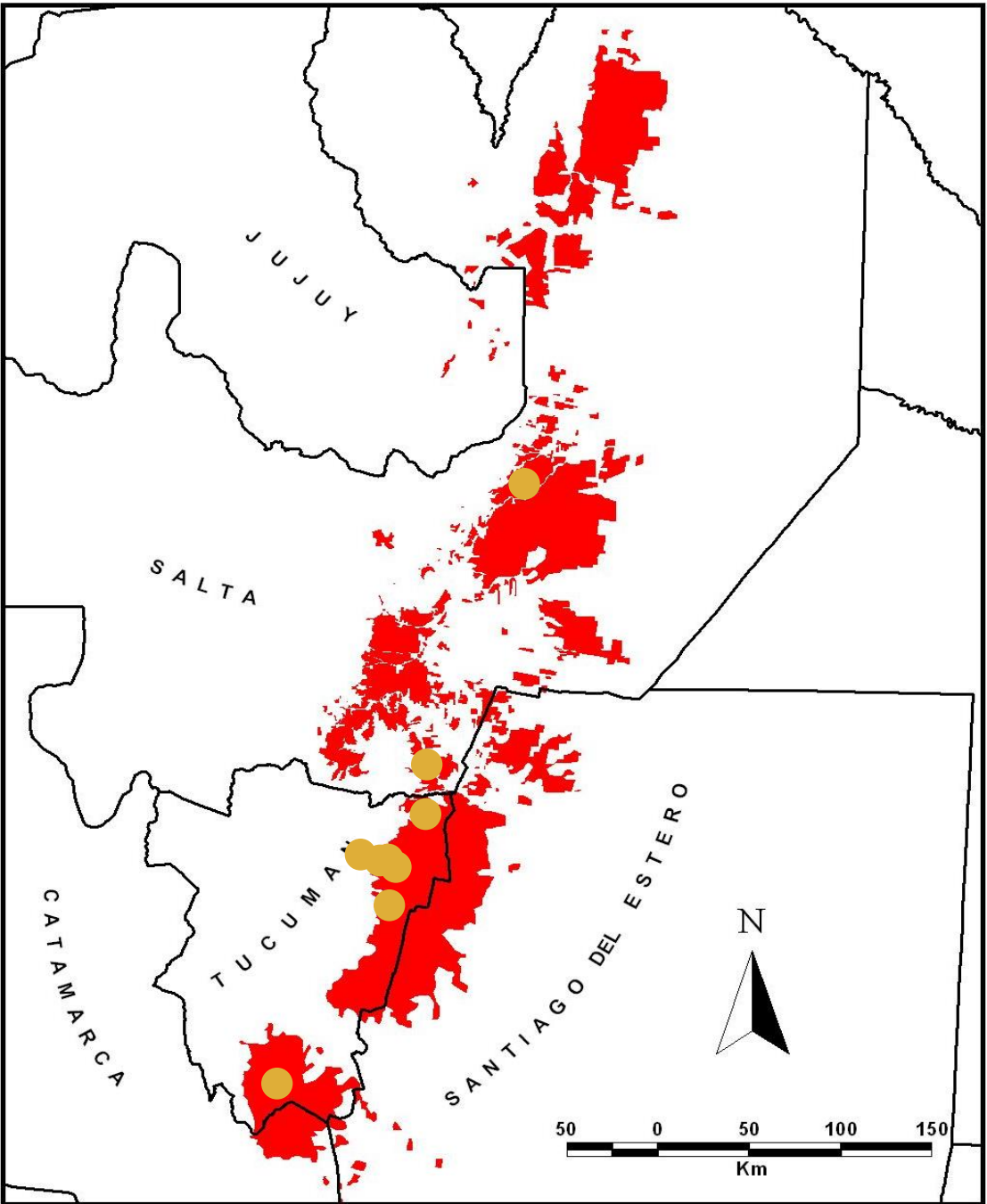


Asian Soybean Rust pustule



Uredospore

March 6th 2024



ASR (*Phakopsora pachyrhizy*)

Location	Date	Fenol. Est.	Inc. (%)	Sev. (%)
Los Pereyra, Cruz Alta, Tucumán	6/03	R 5	1	1
Taruca Pampa, Burruyacú, Tucumán	12/03	R5.4	30	1
Antilla, Rosario de la Frontera, Salta	14/03	R5.5	15	1
San Lorenzo, R. de la Frontera, Salta	14/03	R6	10	1
Laguna de Robles, Burruyacú, Tuc.	18/03	R5	3	1
Burruyacú, Tucumán	19/03		25	5
San Agustín, Cruz Alta, Tucumán	21/03	R5.3	1	1
Los Pereyras, Cruz Alta, Tucumán	21/03		30	5
Villa Padre Monti, Burruyacú, Tuc.	25/03	R6	100	5
Río Nío, Burruyacú, Tucumán	25/03	R6	50	1
San Agustín, Cruz Alta, Tucumán	26/03	R5.5	100	7
Taruca Pampa, Burruyacú, Tucumán	26/03		60	1
La Cocha, Tucumán	05/04	R6	55	1
La Cruz, Burruyacú, Tucumán	05/04	R6	100	10
Las Lajitas, Salta	26/04	R7	100	10

Weekly reports

www.eeaoc.org.ar



Informe de **Fitopatología**

Primera detección roya de la soja

• **Periodo informado:** 18 de febrero de 2019

• **Área geográfica involucrada:** Coronel Molino

• **Técnicos participantes:**

Dres. Sebastian Reznikov, Juliana Bleckwed

Lisi, Victoria González y Lic. Paula Claps. S

Ing. Mario Devani. Sección Granos.

EEAOC.

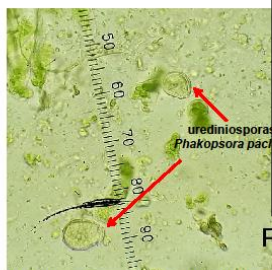


Fig. 1. Primera detección de roya de soja, microscopio óptico (40x).

El día 18 de febrero de 2019 se realizó la primera detección de roya asiática de la soja causada por el hongo *Phakopsora pachyrhizi*, (Figura 1) en lotes comerciales de soja pertenecientes a Coronel Molino, Dpto Anta, Provincia de Salta.



Informe de **Fitopatología**

Enfermedades de fin de ciclo

Periodo informado: 4 al 8 de febrero



Mildiu
(*Peronospora manshurica*)

Localidades
• Los Altos, C
• La Cocha, T



Mancha marrón
(*Septoria glycines*)

Localidades
• Las Cejas, C
• San Fernando
• Piedra Buena
• Villa B. Arac
• Las Lajitas, S
• Anta, Salta



Mancha ojo de rana
(*Cercospora sojina*)

Localidades
• Anta, Salta
• Los Altos, C



Tizón bacteriano
(*Pseudomonas savastanoi pv. glycinea*)

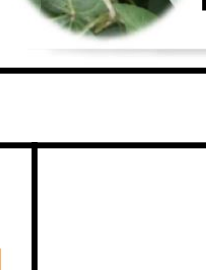
Localidades
• Anta, Salta
• Los Altos, C



Informe de **Fitopatología**

Enfermedades de fin de ciclo

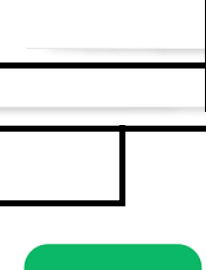
Periodo informado: 4 al 8 de marzo



Informe de **Fitopatología**

Enfermedades de fin de ciclo

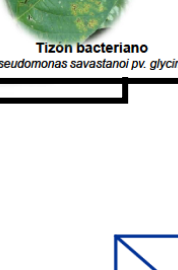
Periodo informado: 8 al 17 de abril



Informe de **Fitopatología**

Enfermedades de fin de ciclo

Periodo informado: 11 al 15 de



Informe de **Fitopatología**

Enfermedades de fin de ciclo

Periodo informado: 11 al 15 de



Boletín fitosanitario



Informe de **Fitopatología**

Enfermedades de fin de ciclo

Periodo informado: 18 al 22 de fe



Mildiu
(*Peronospora manshurica*)

Localidad
• Las Cejas, C
• Piedra Buena
• Villa B. Arac
• La Cruz, T
• Taco Ralo, C
• La Cocha, T
• El Palomo, S
• Antilla, S
• La Candelaria, S
• Los Altos, C



Mancha marrón
(*Septoria glycines*)

Localidad
• Las Cejas, C
• Piedra Buena
• Villa B. Arac
• La Cruz, T
• Taco Ralo, C
• La Cocha, T
• El Palomo, S
• Antilla, S
• La Candelaria, S
• Los Altos, C



Mancha ojo de rana
(*Cercospora sojina*)

Localidad
• Villa B. Arac
• La Cocha, T
• Taco Ralo, C
• El Palomo, S
• Antilla, S
• Los Altos, C

Boletín fitosanitario



Informe de **Fitopatología**

Enfermedades de fin de ciclo

Periodo informado: 18 al 22 de fe



Boletín fitosanitario



Informe de **Fitopatología**

Programa Granos

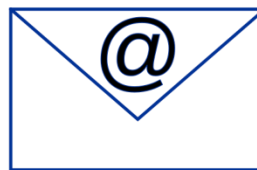
Enfermedades de fin de ciclo y roya de la soja

Periodo informado 24 de marzo al 5 de abril de 2019.

Roya asiática de la soja

(*Phakopsora pachyrhizi*)

Localidades	Incidencia (%)	Severidad (%)
• Leales, Tucumán	70	10
• Taco Ralo, Tucumán	10	1
• La Calera, Alberdi, Tucumán	60	5
• Pampa Pozo, Burruyacu, Tucumán	80	10
• La Cruz, Burruyacu, Tucumán	100	20
• Gamendia, Burruyacu, Tucumán	100	20
• Overo Pozo, Cruz Alta, Tucumán	30	30
• Las Cejas, Cruz Alta, Tucumán	40	5
• Chilcas, Burruyacu, Tucumán	80	10
• La Cocha, Tucumán	10	5
• Antilla, El Potrero, Salta	70	5
• Santa María, Salta	20	2
• Rosario de la Frontera, Salta	10	1
• La Candelaria, Salta	10	1
• El Bañado, Catamarca	40	5
• Los Altos, Catamarca	50	5
• Bobadal, Jiménez, Sgo. Del Estero	20	2
• El Charco, Sgo. Del Estero	60	5



Proyect: Soybean Diseases

Research line GrF2: Screening reaction of soybean cultivars and advanced lines from the EEAOC breeding program to the main diseases

Aim: Determine reaction of soybean genotypes to different diseases



Target spot screening (natural infection) – 2022/2023

- CZ 5923 RR STS, BRV 56222 E RR, Neo 63S22 E, Neo 69S23 CE, DM 68K68 SCE and Tukuy RR cultivars have good response to Target spot.

Macroparcels Los Altos Catamarca (18 april 2023)					
Company	Variety	MG	Technology	Inc TS (%)	Sev TS (%)
Credenz	CZ 6505 RR	65	RR1	100	25
Santa Rosa	RA 5816 RR	58	RR1	100	7
Credenz	CZ 5923 RR STS	59	RR1-STS	100	3
Don Mario	DM 60K60 SCE	60	Conkesta-STs	100	10
Pioneer	P60A01 SCE	60	Conkesta-STs	100	20
Brevant	BRV 56123 SCE	61	Conkesta-STs	100	20
Brevant	BRV 56222 E RR	62	Enlist	100	5
Don Mario	DM 60i62 IPRO	62	RR2Bt	100	20
Don Mario	DM 64K64 SCE	64	Conkesta-STs	100	10
Credenz	CZ 6423 E STS	64	Enlist-STs	100	7
Credenz	CZ 6522 RR	65	RR1	100	7
Neogen	Neo 63S22 E	63	Enlist	100	5
Neogen	Neo 69S23 CE	69	Conkesta	100	3
Santa Rosa	RA 655 RR	65	RR1	100	7
Don Mario	DM 68K68 SCE	68	Conkesta-STs	100	5
Illinois	IS 69.2 CE	69	Conkesta	100	20
ACA	ACA 70a70	70	Conkesta	100	15
Brevant	BRV 57122 CE	71	Conkesta	100	10
Pioneer	P75A06 SCE	75	Conkesta-STs	100	20
Pioneer	P80A02 SCE	80	Conkesta-STs	100	10
Don Mario	DM 75K75 SCE	75	Conkesta-STs	100	15
Don Mario	DM 75i75 IPRO	75	RR2Bt	100	15
Don Mario	DM 80K80 SCE	80	Conkesta-STs	100	10
LealSem	Tukuy RR	80	RR1	100	5

n	TS Severity (%)				Q1	Q3
	Media	Minimun	Maximun			
24	11,4	3,0	25,0		5,0	15,0



Frogeye leaf spot screening (natural infection) – 2022/2023

Macroparcelas Los Altos Catamarca (18 april 2023)					
Company	Variety	MG	Tecnology	Inc FLS	Sev FLS
Credenz	CZ 6505 RR	65	RR1	0	0
Santa Rosa	RA 5816 RR	58	RR1	30	5
Credenz	CZ 5923 RR STS	59	RR1-STS	0	0
Don Mario	DM 60K60 SCE	60	Conkesta-STs	0	0
Pioneer	P60A01 SCE	60	Conkesta-STs	70	25
Brevant	BRV 56123 SCE	61	Conkesta-STs	70	15
Brevant	BRV 56222 E RR	62	Enlist	10	1
Don Mario	DM 60i62 IPRO	62	RR2Bt	60	5
Don Mario	DM 64K64 SCE	64	Conkesta-STs	0	0
Credenz	CZ 6423 E STS	64	Enlist-STs	5	1
Credenz	CZ 6522 RR	65	RR1	0	0
Neogen	Neo 63S22 E	63	Enlist	10	3
Neogen	Neo 69S23 CE	69	Conkesta	0	0
Santa Rosa	RA 655 RR	65	RR1	5	1
Don Mario	DM 68K68 SCE	68	Conkesta-STs	70	10
Illinois	IS 69.2 CE	69	Conkesta	70	7
ACA	ACA 70a70	70	Conkesta	0	0
Brevant	BRV 57122 CE	71	Conkesta	50	5
Pioneer	P75A06 SCE	75	Conkesta-STs	70	3
Pioneer	P80A02 SCE	80	Conkesta-STs	70	5
Don Mario	DM 75K75 SCE	75	Conkesta-STs	50	1
Don Mario	DM 75i75 IPRO	75	RR2Bt	20	3
Don Mario	DM 80K80 SCE	80	Conkesta-STs	40	3
LealSem	Tukuy RR	80	RR1	100	15
FLS Severity (%)					
n	Media	Mínimun	Maximun	Q1	Q3
24	4,5	0,0	25,0	0,0	5,0

•CZ 6505 RR, CZ 5923 RR STS, DM 60K60 SCE, DM 64K64 SCE, CZ 6522 RR, Neo 69S23 CE and ACA 70a70 cultivar were resistant to FLS.



Field screening for charcoal rot (*Macrophomina phaseolina*)

- Mp inoculation and planting



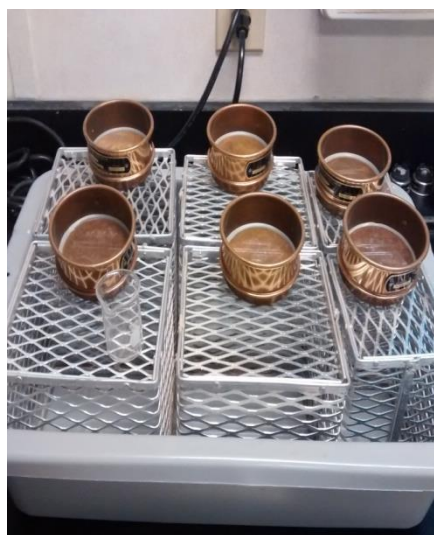
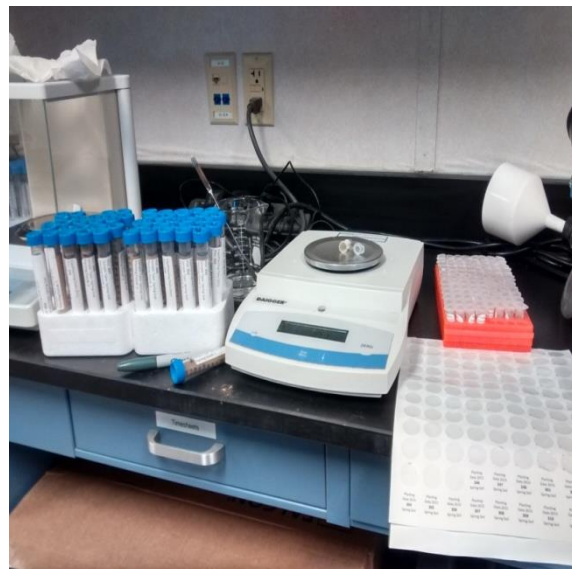
Charcoal rot field screening



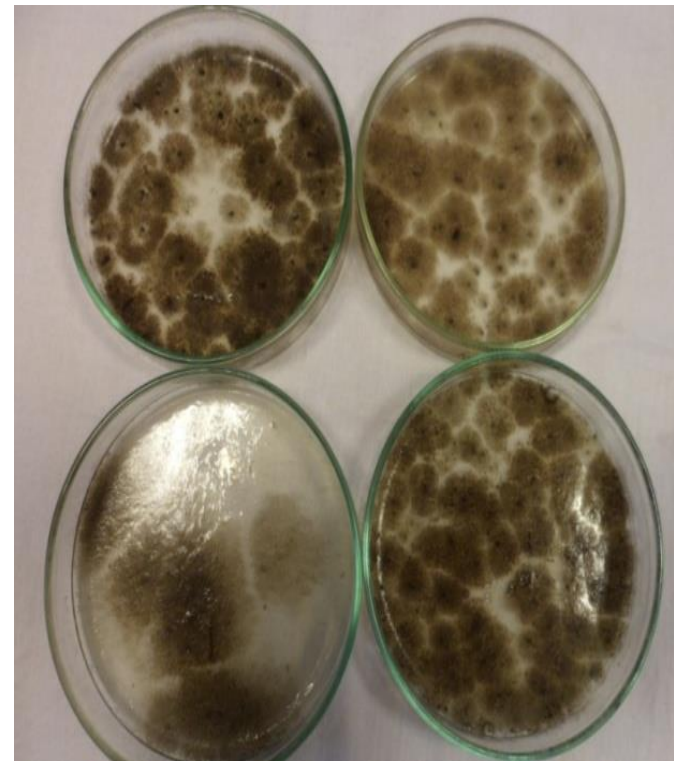
•Severity at R7

Charcoal rot field screening

- CFUI



Mengistu *et al.* (2007) scale



- Resistant (0 a <10)
- Moderately resistant (10 a ≤30)
- Moderately susceptible (>30 a 60)
- Susceptible (>60).

Charcoal rot field screening - Results

Season 2017/2018					
Genotypes	Sev.	Paris <i>et al.</i> 2006	CFU/g	CFUI	Mengistu <i>et al.</i> 2007
1-56 Em 4-13/458	2,7	Moderately Susceptible	25.067	56	Moderately Susceptible
2-TJ 8 P123-13/411	3,2	Susceptible	31.267	70	Susceptible
3-S 59 H7-15/362	3,3	Susceptible	21.600	48	Moderately Susceptible
4-R 63731-15/362	2,9	Moderately Susceptible	16.267	36	Moderately Susceptible
5-Mq N 47-15/309	1,6	Moderately Resistant	8.933	20	Moderately Resistant
6-MD 5,8-21	2,5	Moderately Susceptible	8.733	20	Moderately Resistant
7-P 4 ch 80-14/065	3,6	Susceptible	37.267	84	Susceptible
8-Mq Br 34-14/220	1,3	Moderately Resistant	6.600	15	Moderately Resistant
9-Virg 5909 13/015	2,1	Moderately Susceptible	12.733	29	Moderately Resistant
10-Mq DT 97-15/214	3,5	Susceptible	25.200	57	Moderately Susceptible
11-D38 M3-13/182	1,2	Moderately Resistant	900	2	Resistant
12-ShN 80-11/402	2,9	Moderately Susceptible	28.367	64	Susceptible
13-Mq 49-15/505	1,1	Moderately Resistant	1.200	3	Resistant
14-Mq DT 97-15/502	1,9	Moderately Resistant	44.600	100	Susceptible
15-MP chR56-11/521	2,9	Moderately Susceptible	12.400	28	Moderately Resistant
16-BOG R7-15/119	2,1	Moderately Susceptible	30.333	68	Susceptible
17-Mq N 49 16/069	1,2	Moderately Resistant	1.133	3	Resistant
18-Mp D784907-15/491	1,5	Moderately Resistant	18.667	42	Moderately Susceptible
19-D70 H4-15/046	2,2	Moderately Susceptible	18.267	41	Moderately Susceptible
20-Mq Br1-14/120	1,3	Moderately Resistant	10.600	24	Moderately Resistant
21-N67 Se-14/087	2,6	Moderately Susceptible	31.067	70	Susceptible
22-Munasqa RR	1,3	Moderately Resistant	1.133	3	Resistant
23-MP D15 N59 14/247	2,1	Moderately Susceptible	12.733	29	Moderately Resistant
24-D51 R56-14/141	1,3	Moderately Resistant	1.400	3	Resistant

Proyect: Soybean Diseases

Research line GrF3: Use of chemical and biological fungicides for soybean diseases management

Aim: To evaluate the efficacy and application timing of different fungicides for soybean disease management in northwestern Argentina



Chemical control trials



Target spot (*Corynespora cassiicola*)



Location	Cultivar	Sev.	kg/ha
La Cruz	AW 6211	22,5%	2659,7
Monte Redondo	M 6410	14,2%	2140,9
Coronel Mollinedo	DM 80k80	38,8%	2359,4

Sev.	Control	Increase kg/ha
11,0%	51,1%	187,9
9,2%	35,2%	276,0
30,0%	22,7%	93,9

Sev.	Control	Increase kg/ha
14,2%	36,9%	178,8
12,5%	12,0%	373,4
28,8%	25,8%	194,2



Localidad	Sev.	kg/ha
La Cruz	22,5%	2659,7
Mte. Redondo	14,2%	2140,9
Cnel. Mollinedo	38,8%	2359,4

Sev.	Control	Inc. kg/ha
5,5%	75,6%	283,1
4,0%	71,8%	757,4
5,5%	84,5%	602,0

Sev.	Control	Inc. kg/ha
7,2%	68,0%	256,4
5,0%	64,8%	806,9
6,0%	84,5%	639,5

Sev.	Control	Inc. kg/ha
9,0%	60,0%	135,2
4,8%	66,2%	554,0
8,5%	78,1%	477,2

Target spot

Cripton Xpro		
Sev.	Control	Inc. kg/ha
7,8%	65,3%	87,2
7,0%	50,7%	282,3
12,0%	69,1%	406,0

Chemical control

Untreated control



**Pyraclostrobin +
Epoxyconazole**



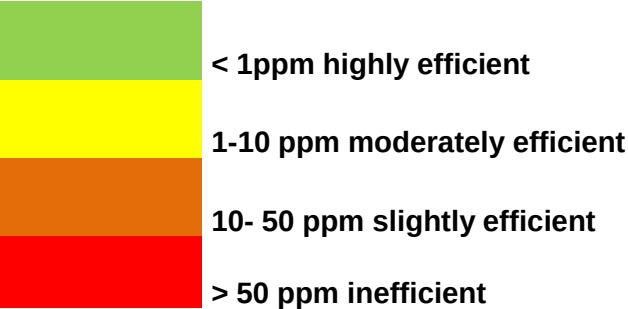
**Pydiflumetofen +
Difenoconazole**



EC50 for *Corynespora cassiicola* isolates

EC ₅₀ (µg mL ⁻¹)											
		Strobilurin		Triazole	Benzimidazole	Carboxamide		Mixtures			
Isolates	Location	Azoxyst.	Pyraclostr.	Trifloxystr.	Difenoc.	Thiophanate-methyl	Pydiflumetofen	Pyr + Epo	Trif + Prot + Bix	Dif + Pyd	Pyr + Epo + Flux
MR 1-3	Cruz Alta, Tucumán	1891.3	19.6	5987.6	1.6	10471.3	1.9	2.3	1.5	0.3	0.04
ELM 1-2	Gral. Mosconi, Salta	12974.2	49.8	62155.3	3.9	0.3	4.0	6.3	4.1	0.001	0.007
A 1-3	Gral. Mosconi, Salta	854673.0	392.1	3103.2	44.2	3.7	1.7	4.7	1.1	0.1	0.000003
MR 8-4	Cruz Alta, Tucumán	5916.1	177.6	10865.2	3.1	0.001	4.6	3.6	2.0	0.5	0.05
LC 1-1	La Cocha, Tucumán	40634.9	235.5	62787.4	4.1	0.3	3.4	8.1	3.7	0.3	0.03
A 1	Gral. Mosconi, Salta	54683.6	148.8	236159.7	6.2	0.2	5.8	1.9	1.7	0.5	0.03

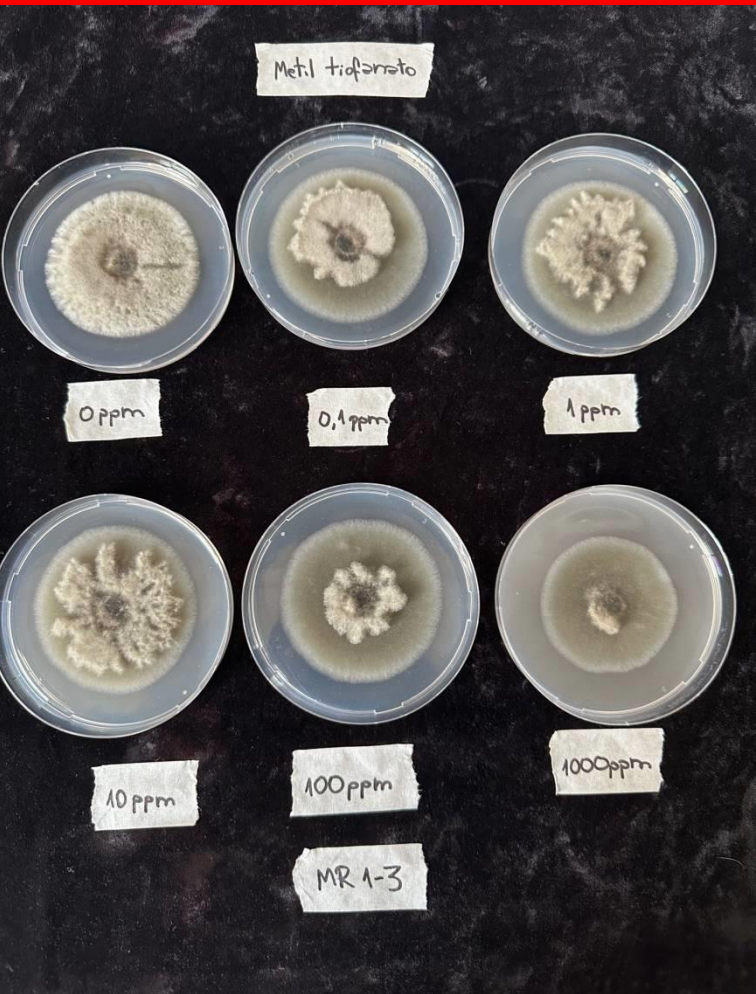
Kataria and Grover, 1978



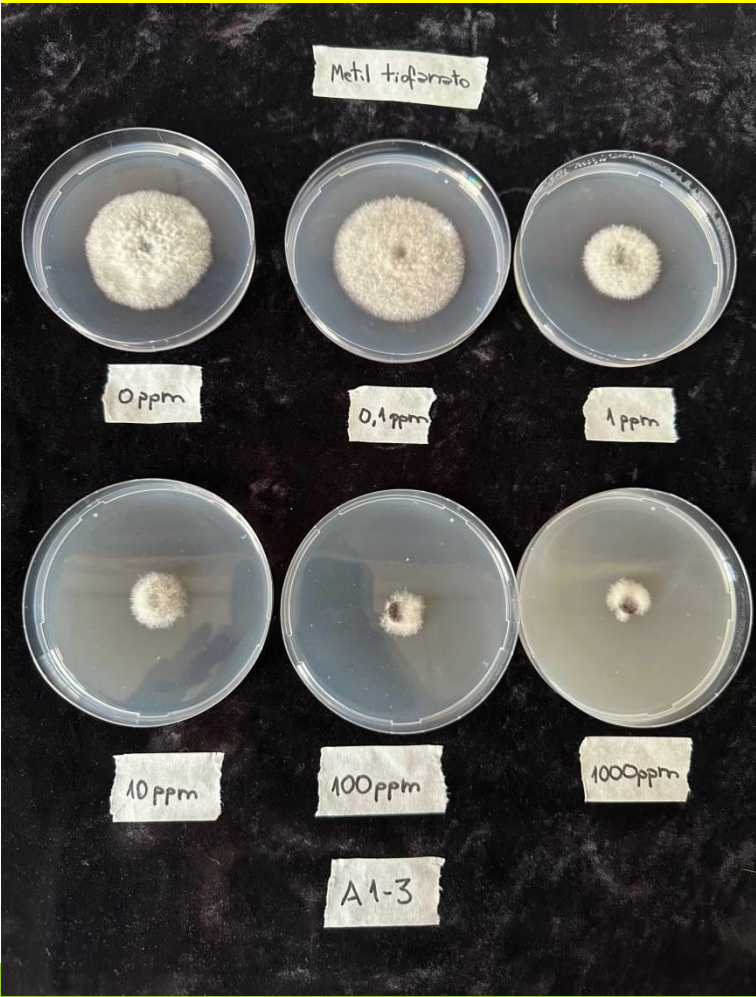
EC50 for *Corynespora cassiicola* isolates

Thiophanate-methyl

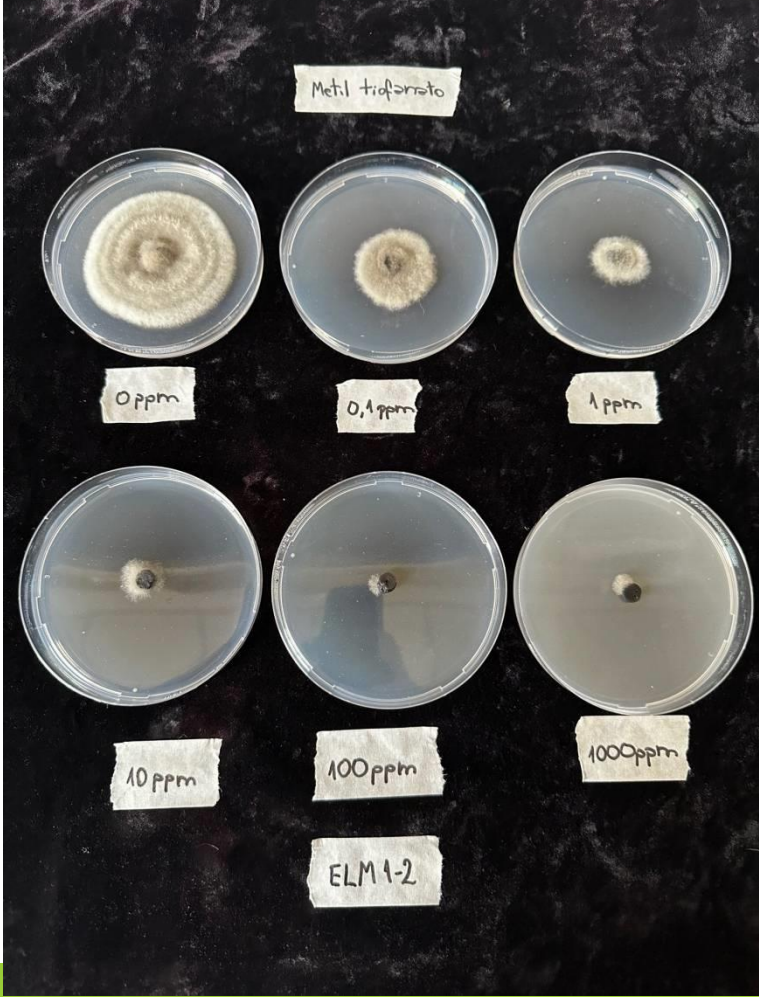
EC₅₀ > 50 ppm inefficient



EC₅₀ 1-10 ppm moderately efficient



EC₅₀ < 1 ppm highly efficient

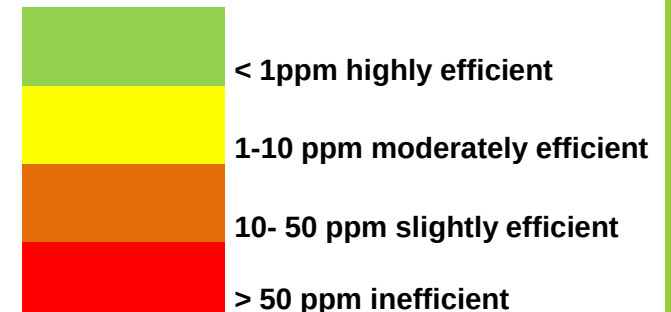


EC50 for *Cercospora sojina* isolates

Products	Location	EC50 (ppm)
Carbendazim	Los Altos, Catamarca	0.01114
	Monte Redondo, Tucumán	0.1319
	Anta, Salta	0.1046
Difenoconazole	Los Altos, Catamarca	0.0062
	Monte Redondo, Tucumán	0.0117
	Anta, Salta	0.0066
Pyraclostrobin	Los Altos, Catamarca	0.0433
	Monte Redondo, Tucumán	0.1506
	Anta, Salta	0.0181
Pyraclostrobin + Epoxiconazole	Los Altos, Catamarca	0.0052
	Monte Redondo, Tucumán	0.0034
	Anta, Salta	0.0043
Fluxapyroxad+Pyraclostrobin+Epoxiconazole	Los Altos, Catamarca	0.0556
	Monte Redondo, Tucumán	0.1797
	Anta, Salta	0.0901

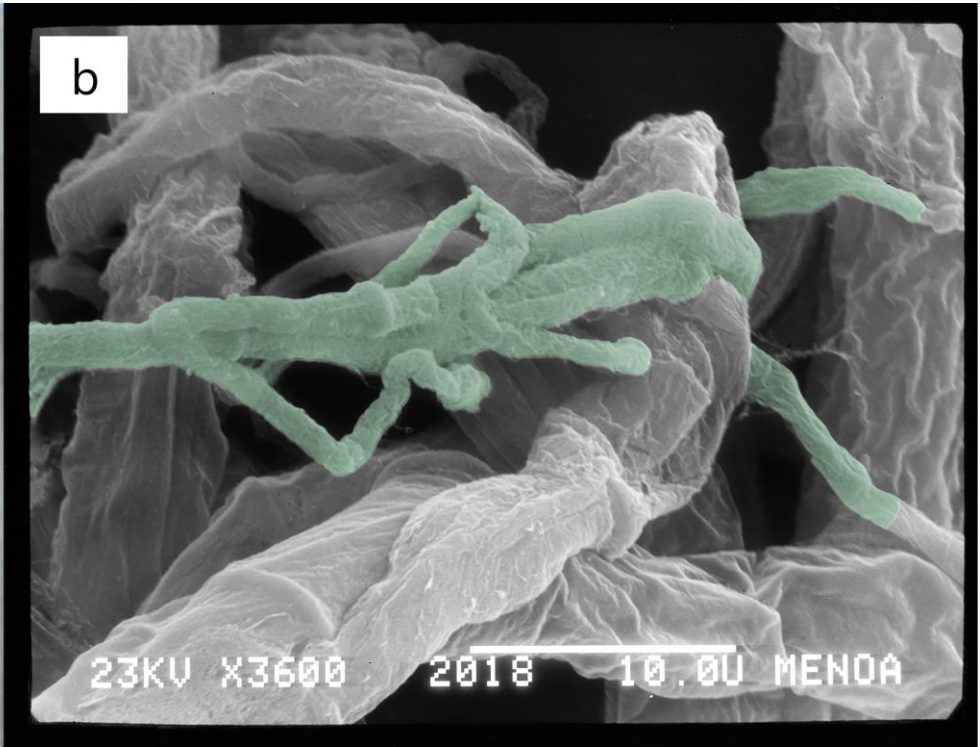
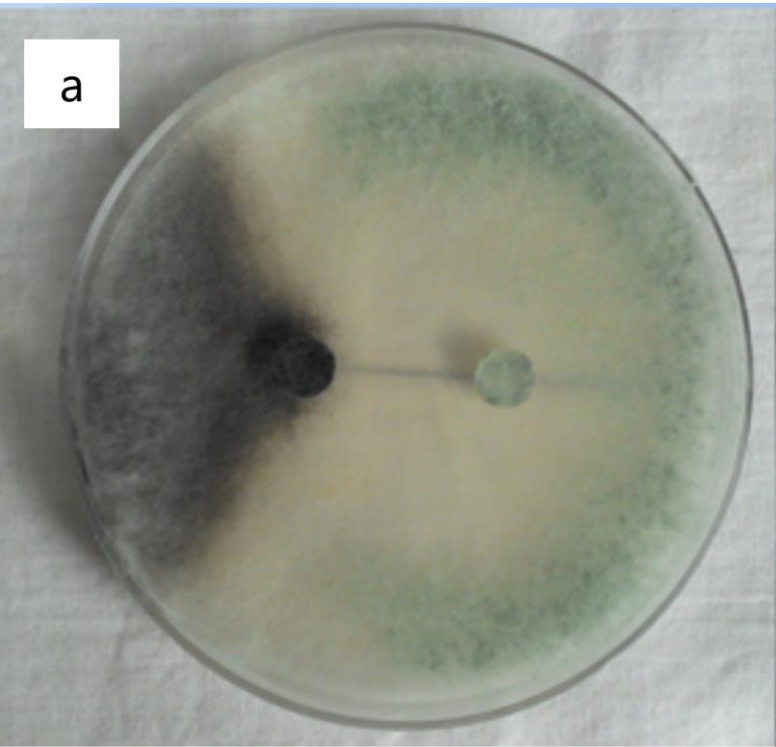
Ing. Agr. Carolina Gómez Fuentes

Kataria and Grover, 1978

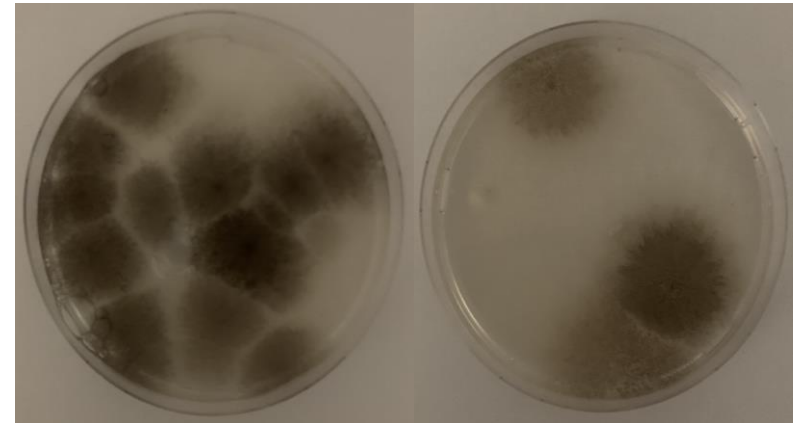


Biological control

Interaction of <i>M. phaseolina</i> with isolate Tr009						
Competition for substrate				Mycoparasitism	Antibiotic effect	
Day of contact	Bell's scale	ARG (mm)	PRG (mm)	Invasion and sporulation	PIRG	Halo
1	2	17,67	12,33	Yes	72,37 C	No



Biological control – Greenhouse and field conditions



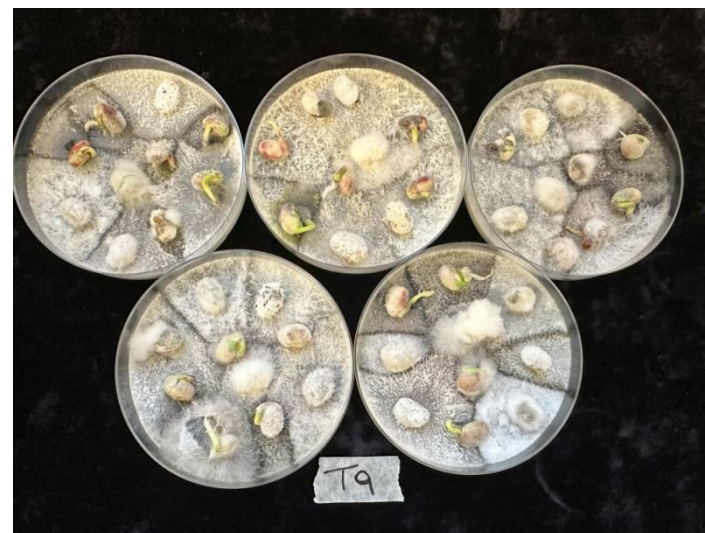
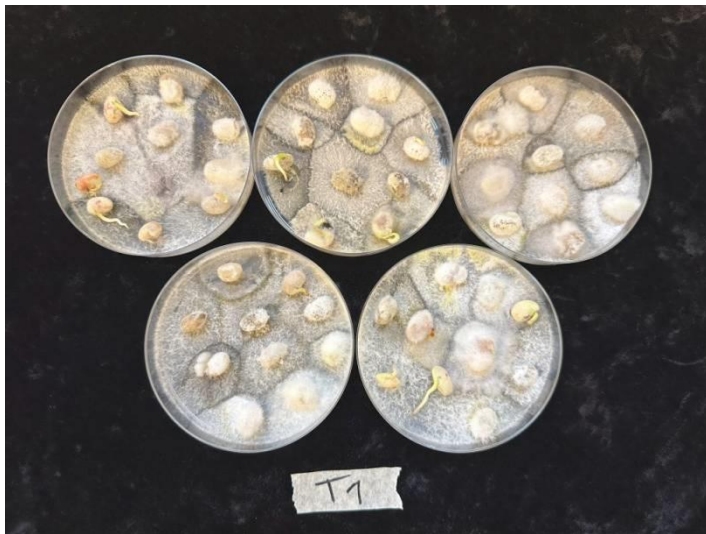
Seed pathology

Location	Samples	<i>Phomopsis</i> sp. (%)	<i>Fusarium</i> sp. (%)	<i>C. kikuchii</i> (%)	<i>Alternaria</i> sp. (%)	Emergency (%)
La Cruz, Tucumán	14	66 a 96	0 a 20	0 a 6	0 a 2	14 a 42
Leales, Tucumán	2	27 a 33	20 a 33	11 a 18	4 a 8	25 a 26
Cruz Alta, Tucumán	31	20 a 68	4 a 34	0 a 28	0 a 6	22 a 80
Mollinedo, Salta	10	4 a 26	2 a 12	10 a 28	0 a 16	56 a 78
Total	57					



Seed pathology

La Cruz



THANK YOU



What does the soybean chain contribute to Argentina?



Ing. Agr.
Mg
Daniela
Pérez



Ing. Agr. Mg
M. Virginia
Paredes



Ing. Agr.
Graciela
Rodríguez

Sección Economía y Estadísticas

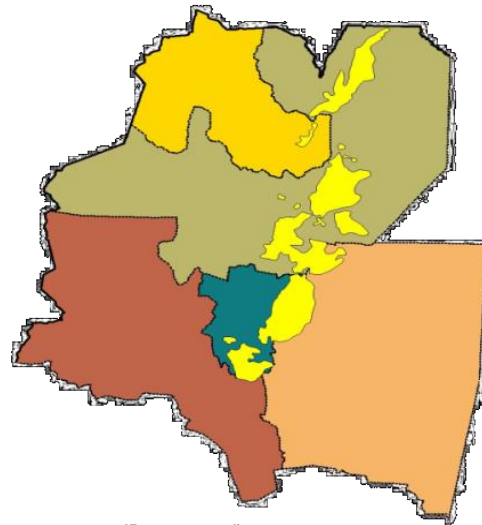
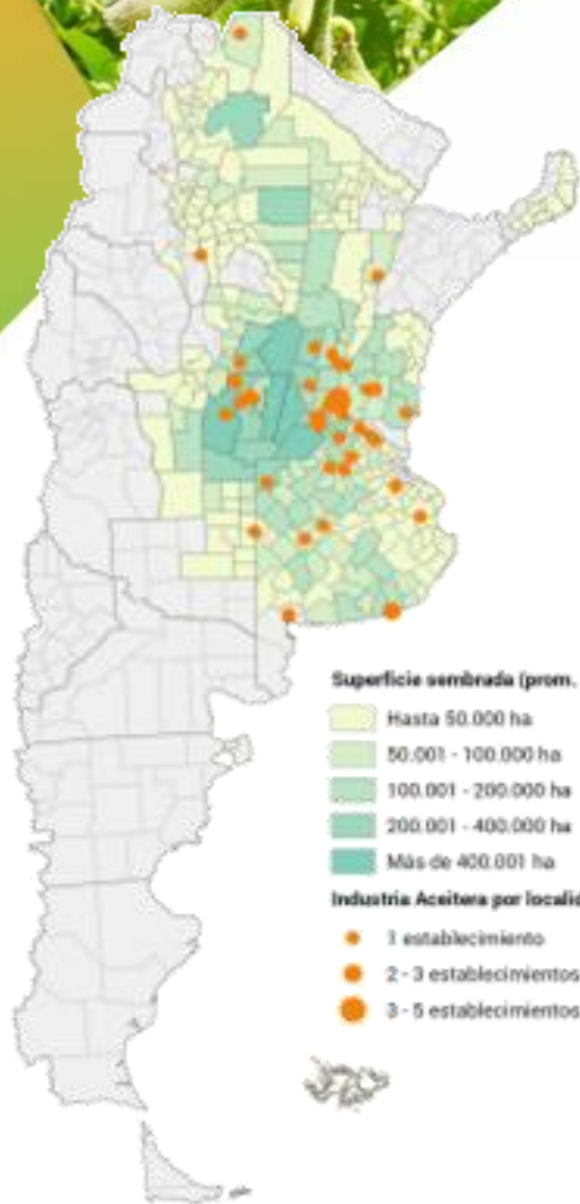
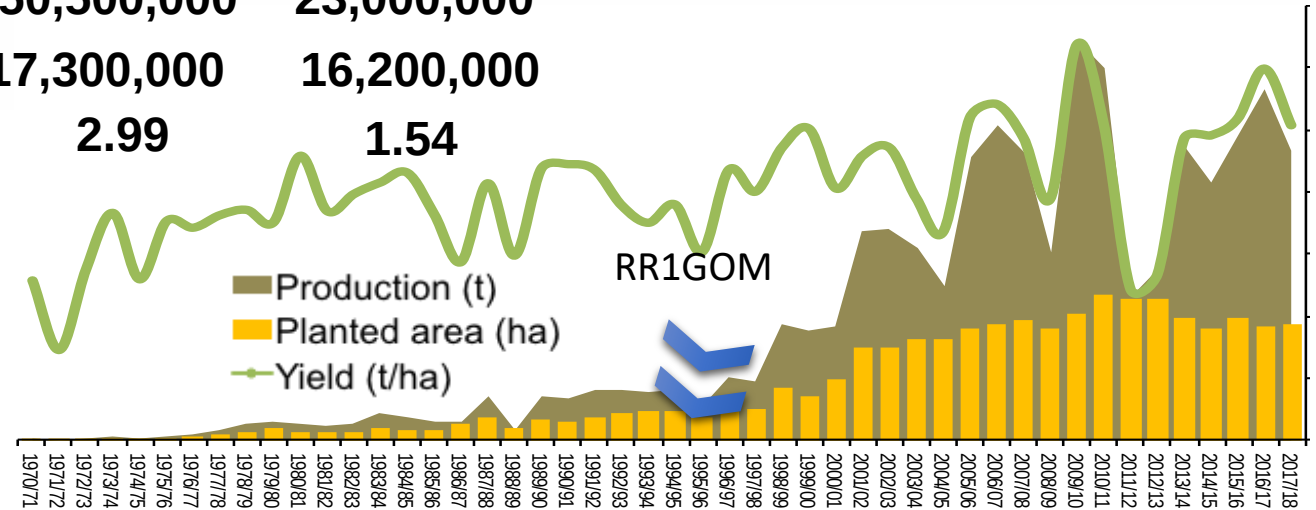
Soybean planted area, production and yield

Argentina

23/24

22/23

Production (t)	50,500,000	23,000,000
Planted area (ha)	17,300,000	16,200,000
Yield (t/ha)	2.99	1.54



NWA

22/23

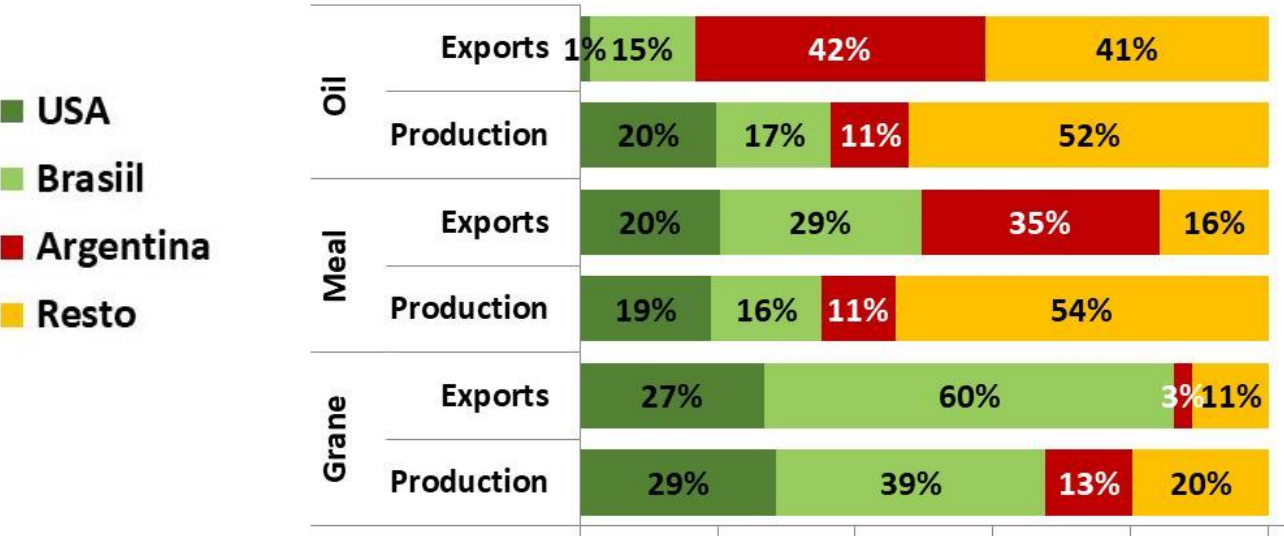
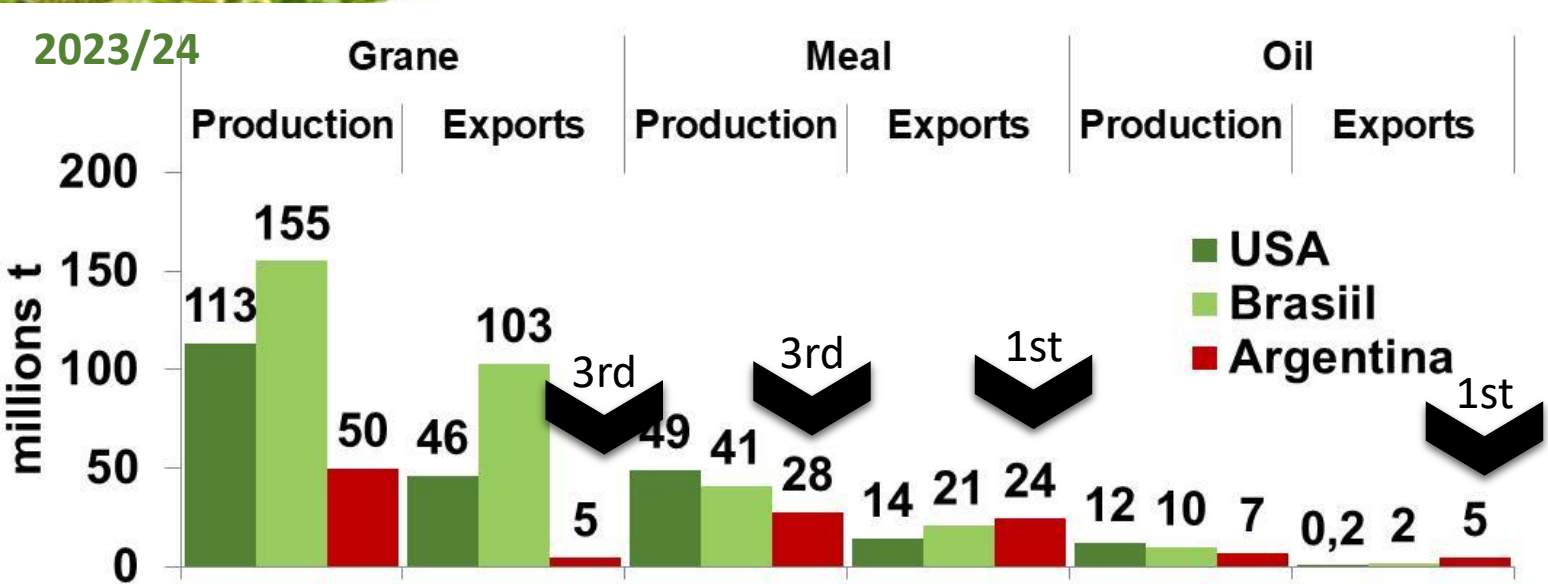
Production (t)	3,646,971
Planted area (ha)	1,654,391
Yield (t/ha)	1.7

Tucumán

23/24

Production (t)	550,000
Planted area (ha)	166,880
Yield (t/ha)	3.1

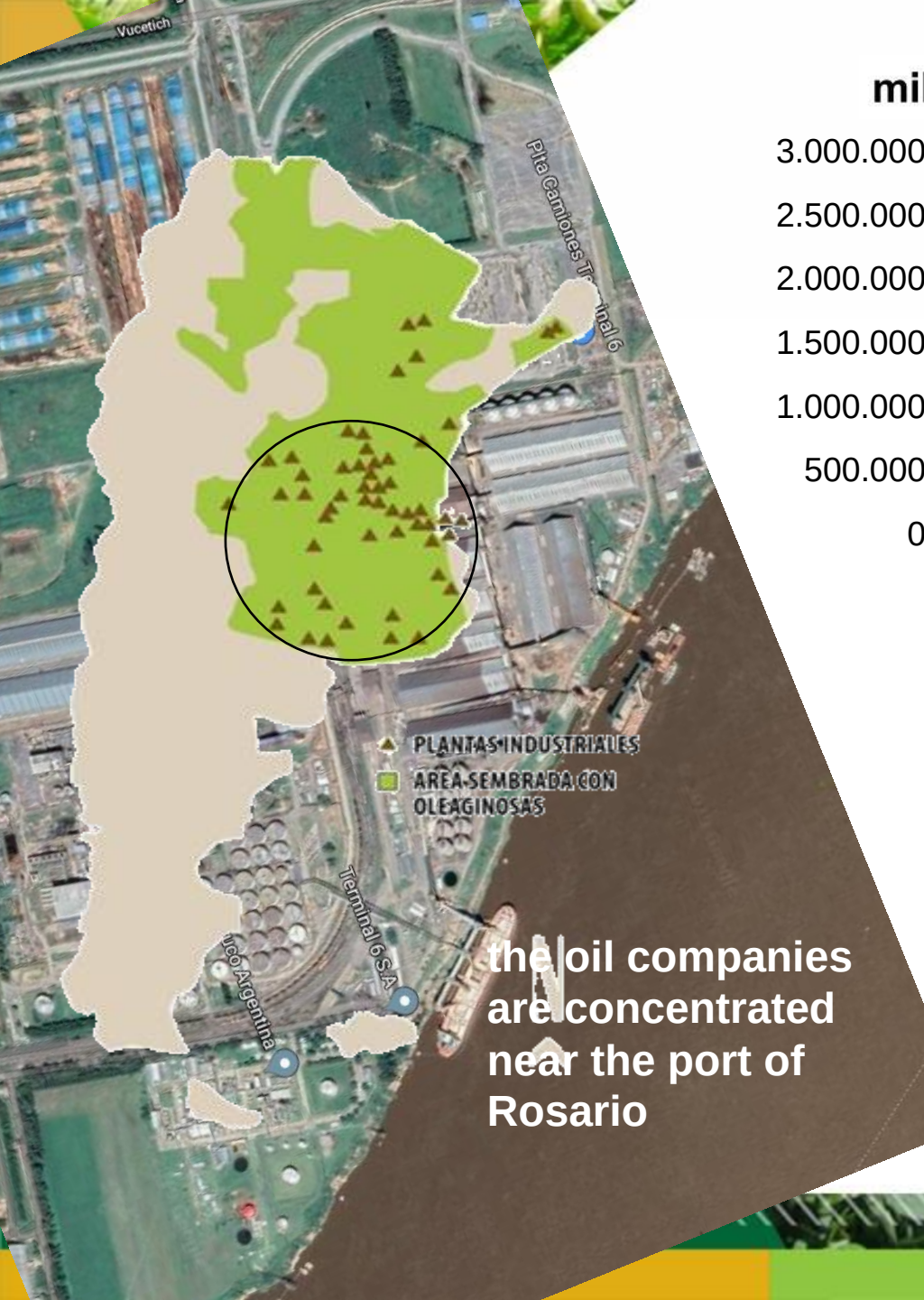
Argentina and the world of soybean



Crush and exports are expected to recover to 40 MMT and 7.3 MMT respectively, both up from the previous year.

Soymeal exports are forecast at 27 MMT in both MY2024/25 and MY2023/24 as Argentina retakes it's place as the largest soymeal exporter in the world. Soy oil exports are forecast to grow as well to 5.3 MMT.

Source: WASDE - USDA

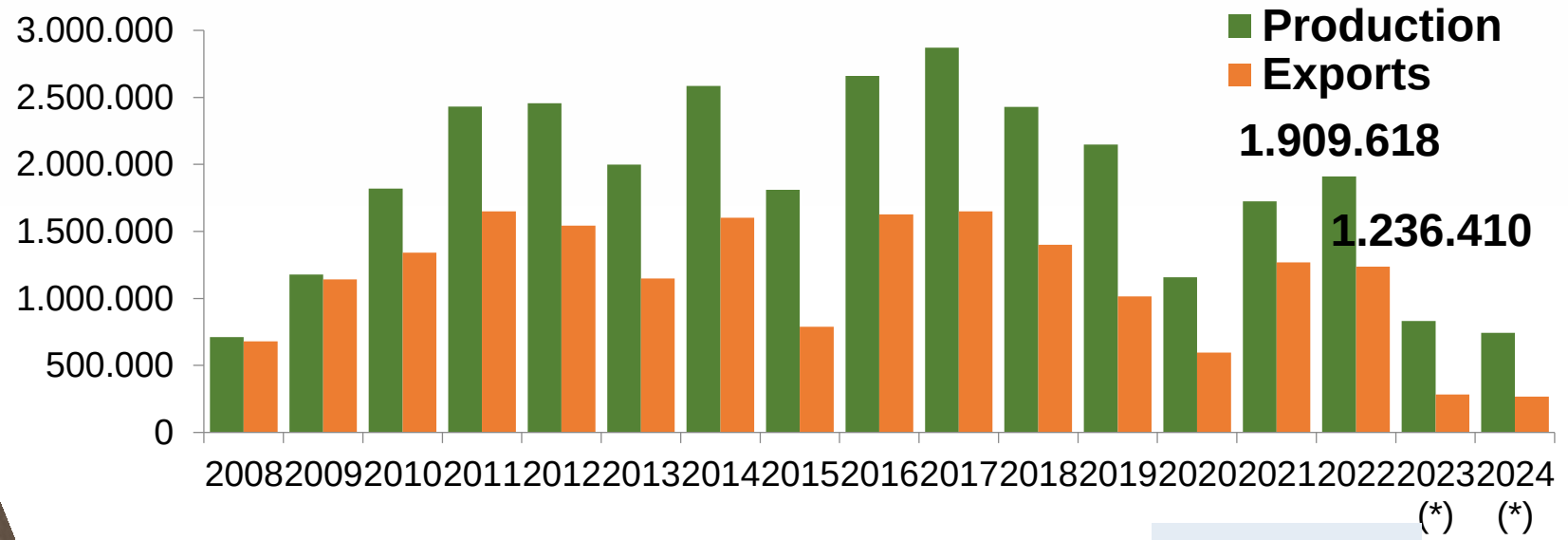


the oil companies
are concentrated
near the port of
Rosario



Soybean biodiesel

millions t



- PAÍSES BAJOS
- CANADÁ
- BÉLGICA

Argentina has the most modern biodiesel industry in the world
European Union approved the report on the greenhouse gas emissions values of soybean, which meets the highest quality standards in technical, economic and environmental terms.

What does the soy chain contribute to Argentina?

1

EMPLOYMENT

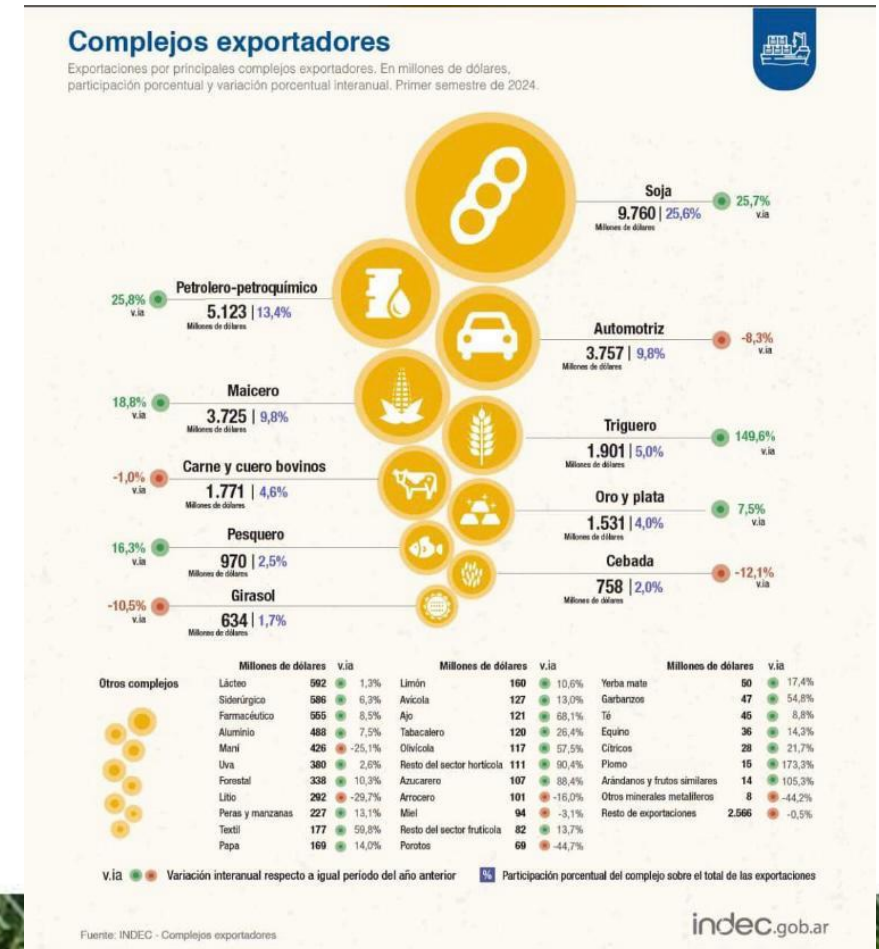
- The soybean agri-food chain generated 404,183 jobs
- 1 in 9 agro-industrial jobs
- 2.5% of total employment in Argentina

2024

2

EXPORTS

- The soybean complex generates
- 1 of every 3 USD entered into the country through exports
- 23,000 million USD
- represented 30% of the country's total exports



3

ACTIVITY

What does the soy chain contribute to Argentina?

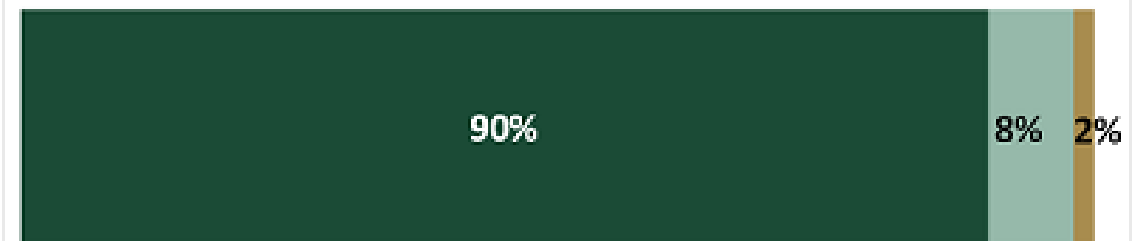
The soybean chain generates \$3.5 of every \$100 pesos of Argentine GDP
The soybean agri-food chain generated an added value of \$777,226 million in 2020
which is equivalent to 3.5% of the Argentine GDP of that anus.

90% of GVA is generated in primary production,
8% is generated in the manufacturing or industrialization stage
2% in the transportation stage

According to a work carried out by Agustín Lódola and Nicolás Picón entitled "Agri-food value chains in Argentina"

Valor Agregado de la Cadena Sojera por eslabón

@BCRmercados en base a Lódola et al

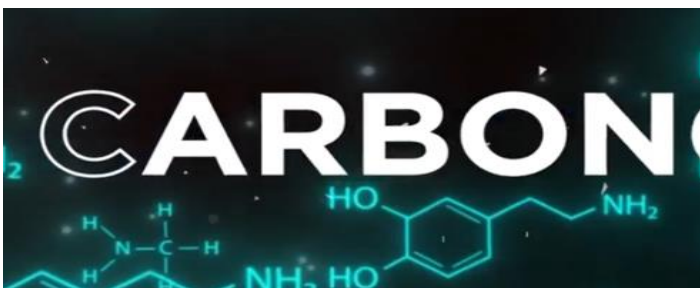


■ Primario ■ Manufacturero ■ Transporte

4

POTENTIAL

Carbon capture and utilization



BIODIVERSIDAD

Solutions that are inspired and supported by nature, which are cost-effective, simultaneously provide environmental, social and economic benefits and help build resilience. Such solutions bring more, and more diverse, nature and natural features and processes into cities, landscapes and seascapes, through locally adapted, resource-efficient and systemic interventions.

What does the soy chain contribute to Argentina?

- **NBS nature-based solutions**
- **Regenerative agriculture**
 - **no till system**
- **CO₂ eq footprint**

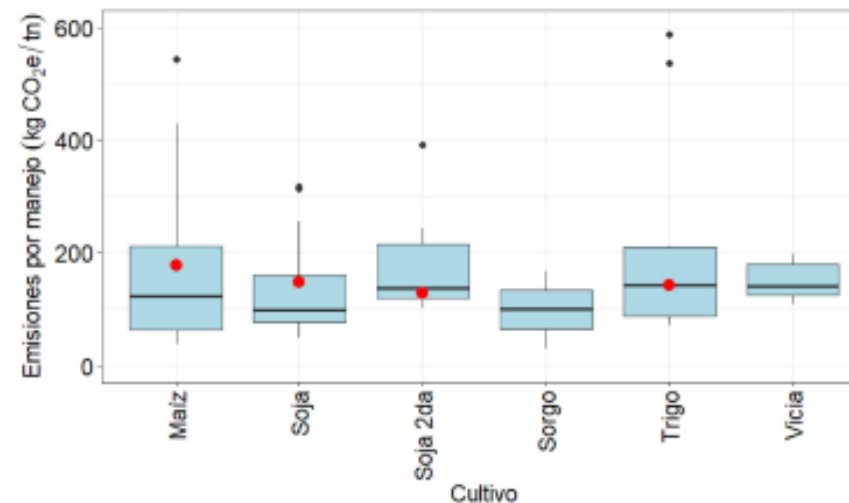


Figura 5. Emisiones totales asociadas al rendimiento.

4

POTENTIAL THOUSEND USES

Edible

- | | | |
|--|---|---|
| Semillas
Productos alimentarios p/ ganado
Brotes de soja
Porotos de soja cocido
Harina de soja entera | Sojas horneadas
- Caramelos
- Dulces
- Ingredientes para galletitas dulces / coberturas
- Galletitas de agua
- Productos para dieta
- Salsas para fuentes de soda
- Mantequilla para soja | Alimentos de soja tradicionales
- Miso
- Leche de soja |
|--|---|---|

Productos derivados del Poroto de Soja entero

GLICEROL. ÁCIDO GRASOS. ESTEROLES

Productos derivados del Aceite

- Sustituto de crema para café (no láctea)
- Aceites para cocinas
- Leches con agregado de grasas
- Margarina
- Mayonesa
- Productos farmacéuticos
- Aliños para ensaladas
- Aceites para ensaladas
- Margarina untable para sandwiches
- Mantecas

AGENTES EMULSIONANTES

- Productos para planificación
- Revestimiento para golosinas / chocolates
- Productos farmacéuticos

USOS NUTRICIONALES

- Dietario
- Médicos

LECITINA DE SOJA

AGENTES ANTI ESPUMA

- Alcohol
- Levadura

AGENTES ANTI SALPICADURAS

- Margarina

AGENTES ESTABILIZANTES

- Manteca

AGENTES HUMECTANTES

- Reemplazo de leche de ternero
- Cosméticos

Industrial

- | | |
|---|---|
| <ul style="list-style-type: none"> - Adhesivos - Reagentes analíticos - Antibióticos - Emulsiones asfálticas - Aglutinantes (madera/resina) - Materiales de limpieza - Composites - Cosméticos - Coadyuvantes de fermentación / nutrientes - Films para empaques - Sustitutos - Pinturas - Agentes anticorrosivos - Agentes anti-estática - Compuestos para calafateado - Aceites esenciales - Combustible diesel (gasóleo) - Desinfectantes - Agentes para control de polvo - Aislación eléctrica - Epoxys - Aditivos de combustible - Fungicidas - Tintas para impresión - Protector de linóleo - Lubricantes | <ul style="list-style-type: none"> - Poliésteres - Productos farmacéuticos - Pesticidas / Fungicidas - Textiles |
|---|---|

CONCENTRADOS Y EXTRACTO DE HARINA DE SOJA

Productos de proteínas de soja

LECITINA DE SOJA

AGENTES ANTI ESPUMA

- Alcohol
- Levadura

AGENTES ANTI SALPICADURAS

- Margarina

AGENTES DISPERSORES

- Pinturas
- Tintas
- Insecticidas
- Goma

AGENTES ESTABILIZANTES

- Manteca

AGENTES HUMECTANTES

- Reemplazo de leche de ternero
- Cosméticos



Oil, soy protein products, and lecithin are the most widespread soy derivatives in food production.

Soy sustainable industrialization for functional and high-quality human nutrition

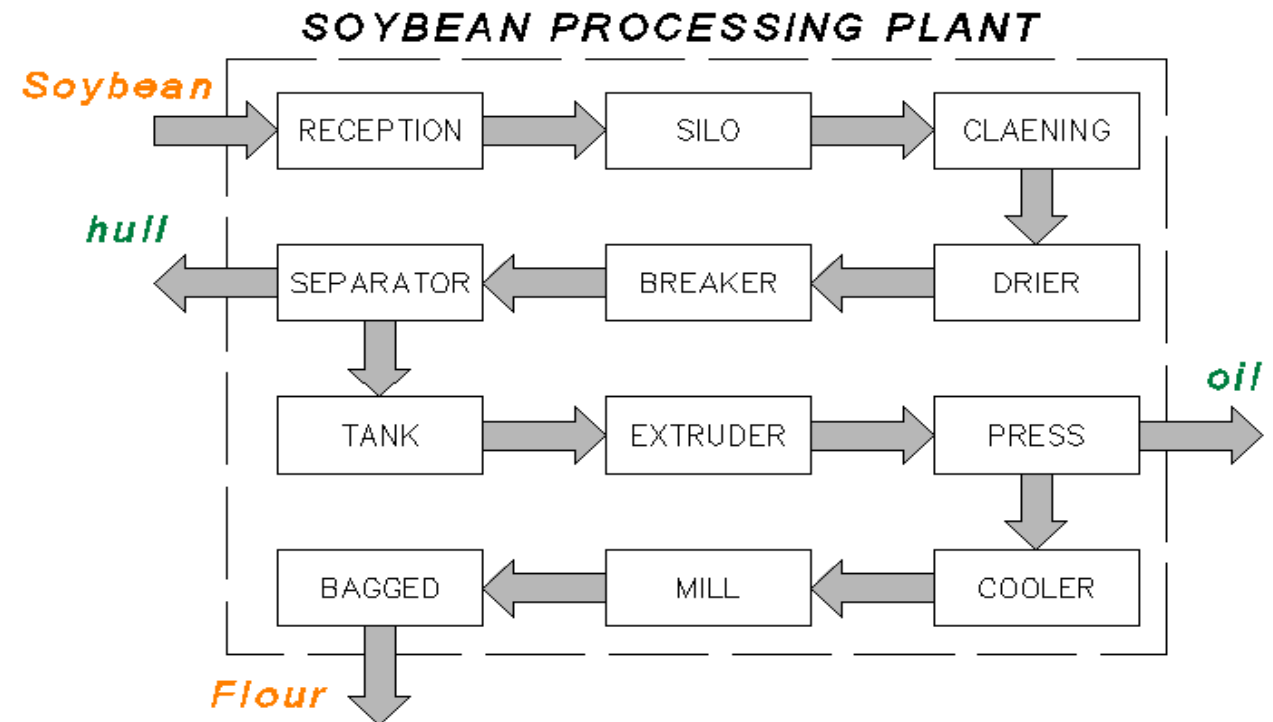
Through an extruding and pressing process, **without use of solvents**, deactivated soy flour is obtained, an ingredient with **high protein content** and low fat content. This flour will be used as **main ingredient** for the production of different foods with high nutritional value, such as cookies, soups, shakes, etc. This food constitutes a novel proposal and a technological development of great value, aiming to revalue sustainable development and the Bioeconomy of the region, giving added value to the cultivation of soybean and promoting sustainable production methods.

First prize ACSOJA 2023



INVENTION PATENT

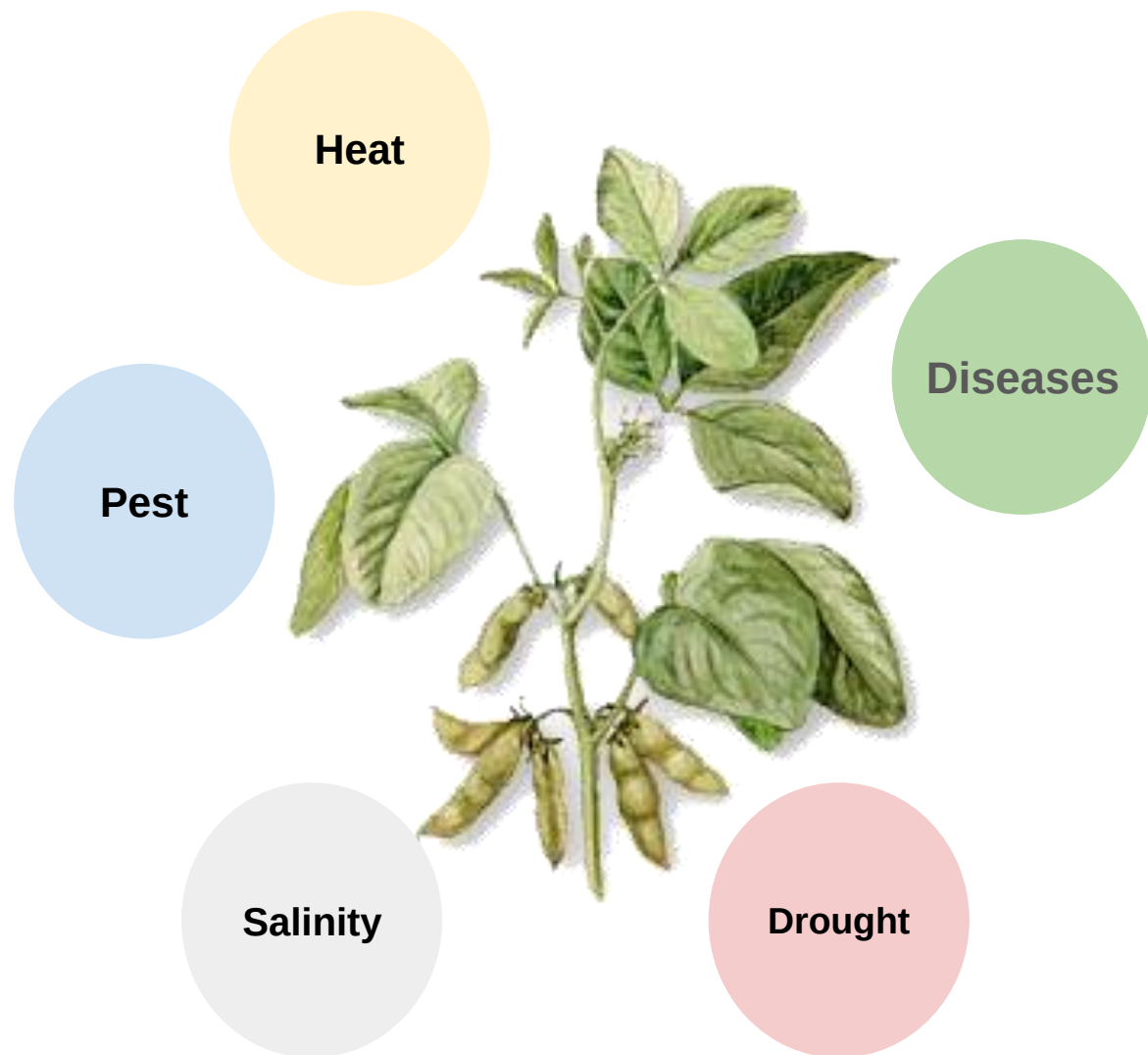
'SOY FLOUR, PREPARATION PROCEDURE, PREMIXES AND PRODUCTS OBTAINED WITH PREMIXES OR FLOUR'





*Muchas gracias
por su atención*

System Soybean Challenges



Biotechnology Lab

Provide support to the “PROGRAMA GRANOS” through the development and optimization of biotechnological tools with the aim of contributing to the crop sustainability



Breeding

Obtain soy varieties or genotypes with genetic tolerance / resistance to biotic and / or abiotic stress



Bioproducts development

Discovery and development
*Plant Defense Inducers
*Growth promoters

Biotech Team: Mariano Pardo, Gabriela García, Carla Rocha, Andrea Peña, Nadia Chalfoun, Pia Di Peto, Gabriela Michavila, Fernanda Trejo, Agustín Padilla



Contributions to the Soybean Breeding Program

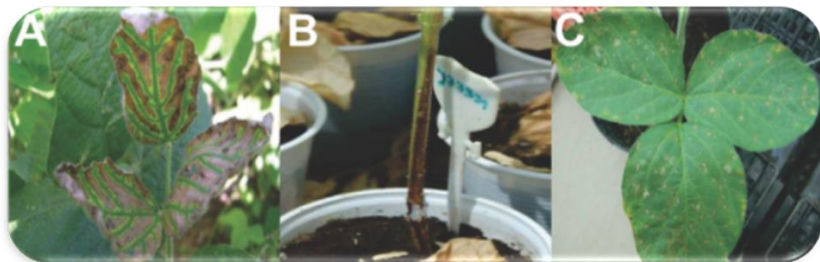
**Molecular
Marker Assisted
Selection
(MAS)**

**High-throughput
phenotyping
(Drought stress)**

**Gene and new
molecular
markers
discovery**

**Bioinsumes:
Discovery and
development**

Molecular Marker Assisted Selection (MAS)

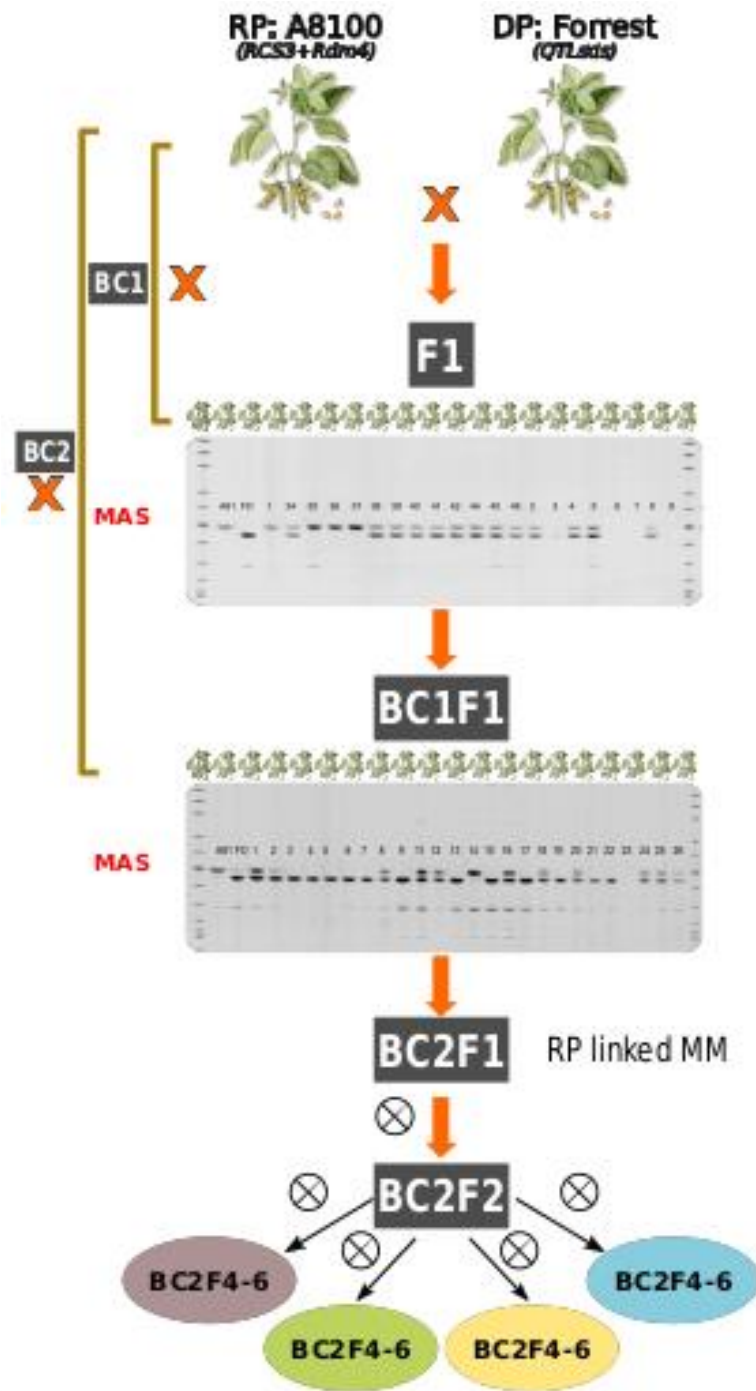
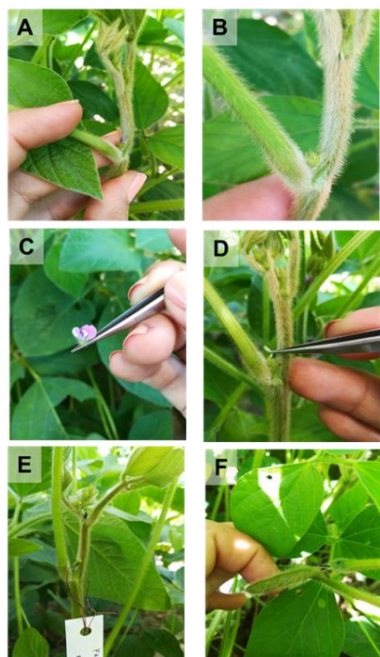


Goal: to stack resistance to 3 diseases in a new soybean variety

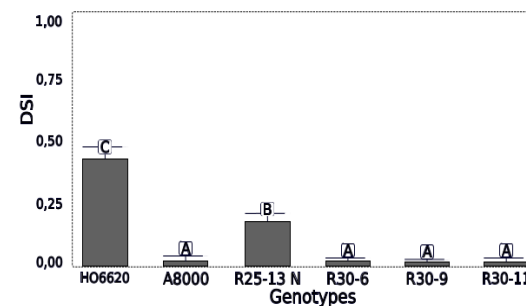
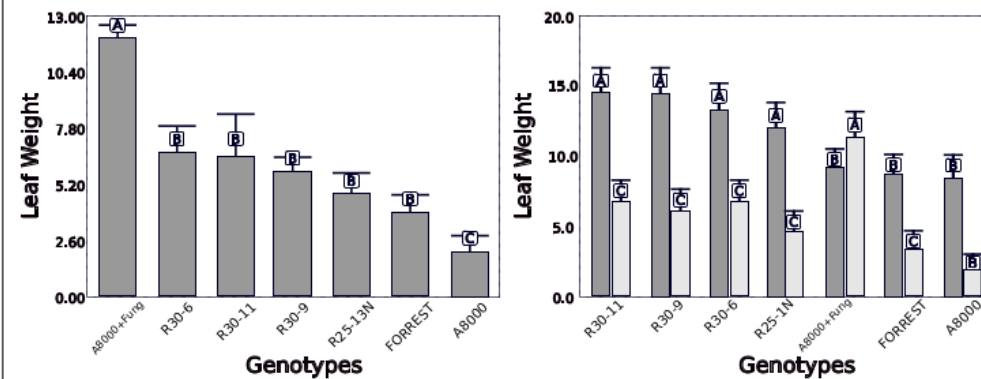
			CTS	CTS	CTS	MOR	MOR	MOR	SMS	SMS	SMS	SMS	SMS	SMS	SMS	SMS	SMS
			(Rdm4)	Rdm2	Rdm2	Rcs3	RcsMte red	Rcspek	GLG	GLG	GLG	GLC2	GLC2	GLC2	GLC2	GLC2	GLI
			Satt233	Sat_21151	Satt001	Satt244	Satt244	Satt244	Satt214	Satt309	Satt163	Satt371	Satt357	Satt202	Satt316	Satt307	Satt354
Carver C	CA	MR	x	x	x				23.60%	16.90%	18.10%	12%					12%
Nk Coker 6.6 RR	CK6	MR	x	x													
Stonewall C	ST	MR	x		x												
A4910 RG	A4	R	x	x													
A6401 RG	A5	R	x	x	x												
A6411 RG	A6	R	?	x	?												
A7636 RG	A7	R	x	x	x												
A8100 RG	A81	MR	R	x	x		x					x	x		x	x	
Agustina 49 RR	Ag49	R	x	x								x	x	x	x	x	
AW 4902	8AW	R	?	x	x												
AW 5522 RR	6AW	R	x	x	?												
AW 5581	1AW	R	x									x	x	x	x	x	
AW 7110	7AW	MR	x	x		x											
Berning C	BE	R	x	x	x												
Choska C	CHD	R	?	?													
Cook C	CO	R	x	x		x											
DM 2800 RR	DM1	R	?	?	x												
DM 4800 RR	DM2	R	R	x													
DM 59 RR	DM5.9	R	x	x	x												
DM 50048 RR	DM3	MR	x														
DM 5800	DM4	R	x	x	x												
DM 8002	DM02	R	MR	x			x										
Hartwing C	HA	R	x	x	x	x						x	x				x
Munatga RR	MNO	R	MR	x	x	x											
NA6126 RG	N6	R	x	x	x	x											
NA7708 RG	N5	R	x	x	x	x											
NA8010 RG	N8	R	x	x	x	x											
Natalia 49 RR	N49	R	?	x	x												
Nueva Andrea 66 RR	N46	R	MR	x	x	x						x	x	x	x		
Nueva Mercedes 70 RR	M70	R	MR	x	x	x											
Qayla RR	QA	R	MR	x	x	x						x	x	x			
RA516	RA3	R	x	x	x	x											
RA626	RA2	R	x	x	x	?											
TJ 2070 C	TJ2	R	?	x	?												
Mireya	MI	R	x	x	x	?											
Cristina	CR	R	x	x	x	?											
Coker	COK	R	x	x	x												
Laxr. Canoro C	LAX	R	x	x													
Nueva maria	NM	R	x	x	?												
Tracy-M	TRY	R	x	x	x												
Dowling	Dow	R	x	no amplificada													
Hutcherson	Hu	R	x	no amplificada													
Brim C	BR	S	x	x	x												
Delsoy 5710 C	2D	S	x	x	x												
Hagood C	H5	S	x	x													
Maxcy C	MX	S	x	x													
Tuc G16 C	TUC	S	x	x													
A8000	A8	R	MR			x						x	x	x			
Davis	Da	R				x											
RI Res Seq	PI3	R				x											
Buckshot	BU	R															
Yanasu	Ya	MR				x											
RA536	RA536	MR															
Tob 7800	Tob78	MR				x	x										
NA8009	N9	R				x											
NA8004	N8	MR				x											
TsB 24/19	T24	R				x											
DM 6200	DM13	MR															
Mte Red	MLR	R					x										
Pekin	Pe	R						x									
RMO 805	RMO1	MR					x										
PI 567374 C	PI1	MR							x								
Delsoy 4710 C	3D	R										x	x	x	x	x	
Forrest	FO	R								x	x	x	x	x	x	x	
MS 8080 RR (Estrela)	MS1	MR															
NA7708 RG	N5	S															
Omaha C	OMA	S															

Parents
identification

Molecular Marker Assisted Selection (MAS)

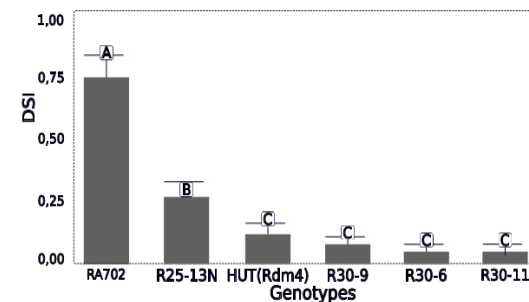


Sudden death syndrome

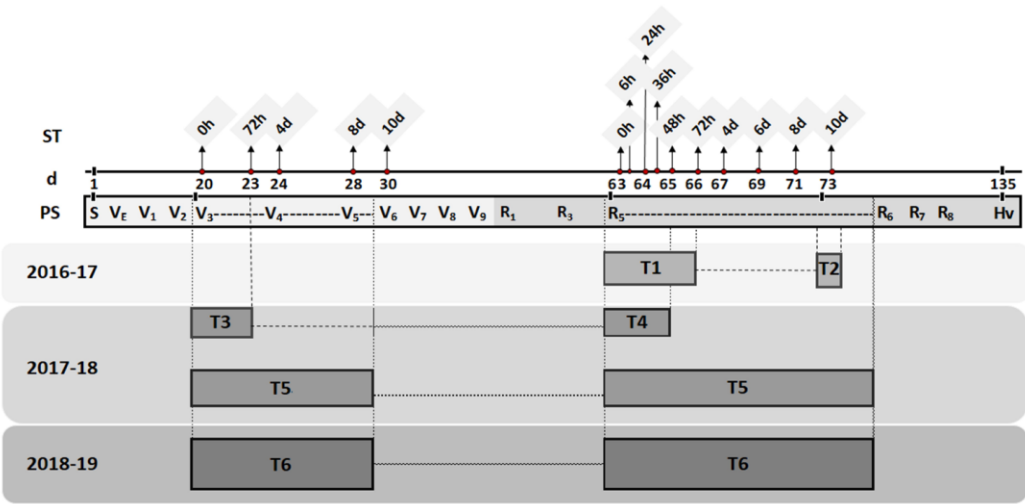


Frogeye leaf spot

Soybean stem canker

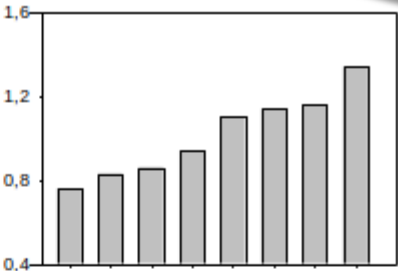


High-throughput phenotyping (Drought stress)

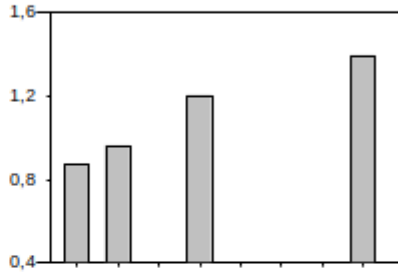


Pardo et al. 2015. Journal of Agronomy and Crop Science 201:95-104.

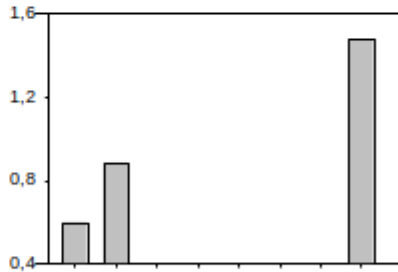
Greenhouse plant yields



Greenhouse plant yields

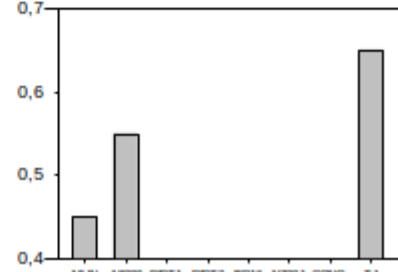


Field assays yield/h⁻¹

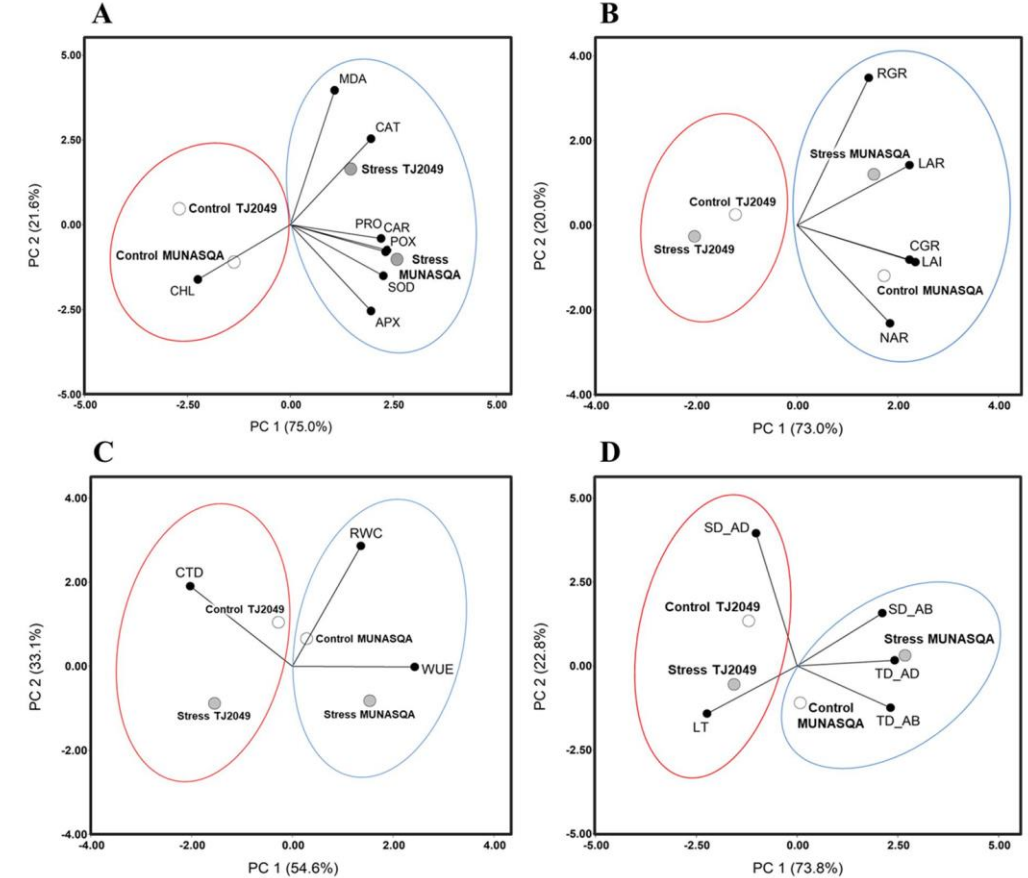
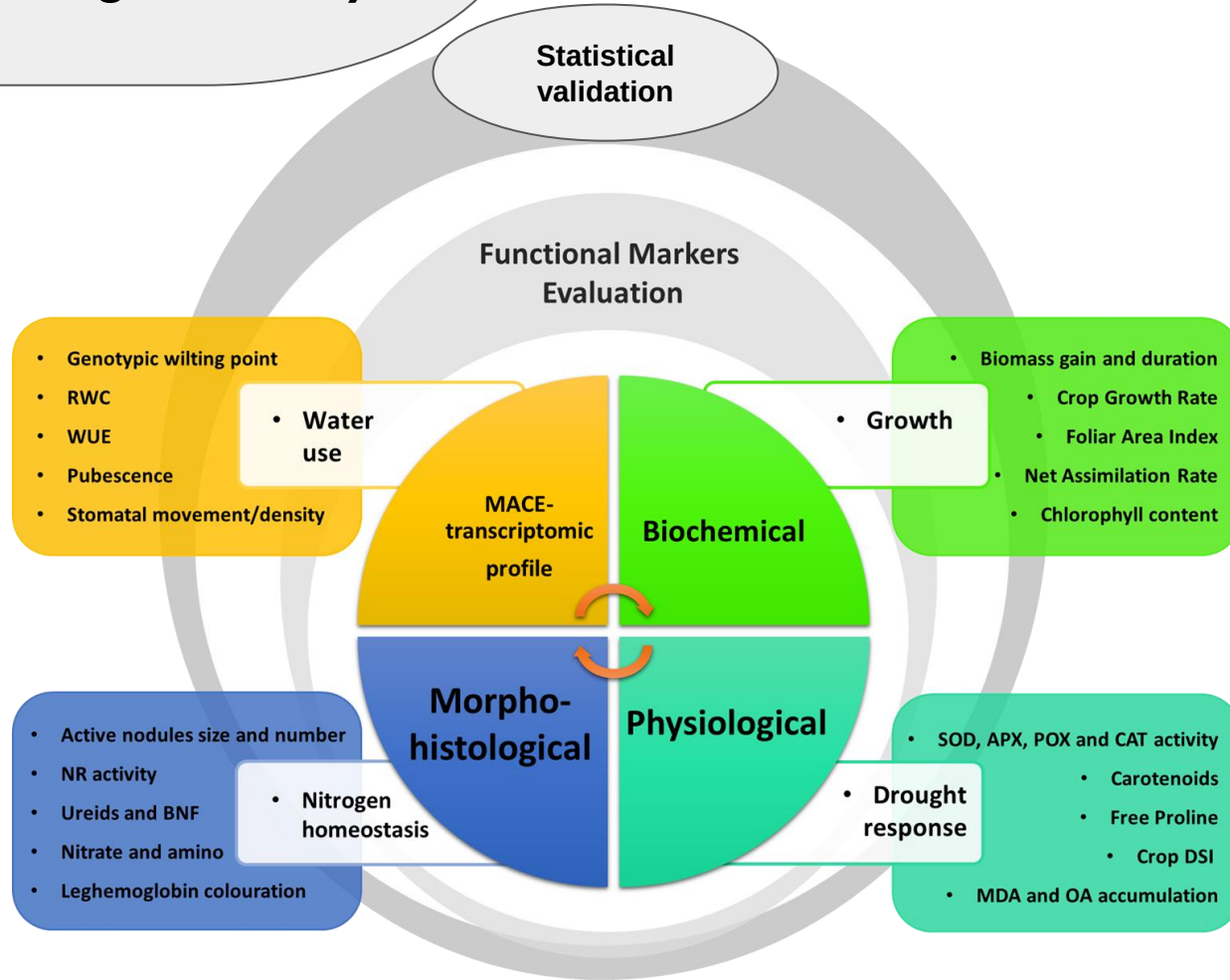


Pereyra-Irujo et al. 2012. Functional Plant Biology.

Glypt platform plant biomass



High-throughput phenotyping (Drought stress)



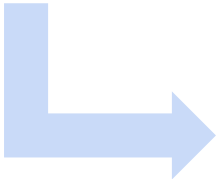
scientific reports

OPEN Selecting putative drought-tolerance markers in two contrasting soybeans

Laila Touni^{1,2}, Lucia Sandra Perez-Borroto^{3,4,5}, Andrea Natalia Peña-Malavera¹, Catalina Luque⁶, Bjorn Welin¹, Ariel Berenstein¹, Darío Fernández Do Porto⁶, Adrian Vojnov⁷, Atilio Pedro Castagnaro⁸ & Esteban Mariano Pardo^{9,10}

Gene and new molecular markers discovery

Genome sequencing



SNPs identification

Sample	Reads1	Reads2
MN9	99146443	99146443
TJ49	98870214	98870214
NS8282	110314512	110314512
N7001	40603824	40603824
DM5758	95393996	95393996



ref	gene	gpos	MN9_alt	MN9_ann	MN9_GT	MN9_AD		TJ49_alt	TJ49_ann	TJ49_GT	TJ49_AD	B2_alt	B2_ann	B2_GT	B2_AD
G	Glyma.10G158700	306	-	-	-	-		-	-	-	-	-	-	-	-
G	Glyma.10G158700	173	-	-	-	-		-	-	-	-	-	-	-	-
CT	Glyma.10G158700	11	-	-	-	-		-	-	-	-	-	-	-	-
T	Glyma.10G158700	3	-	-	-	-		-	-	-	-	-	-	-	-
G	Glyma.10G158700	1473	-	-	-	-		-	-	-	-	-	-	-	-
A	Glyma.10G158700	1458	-	-	-	-		-	-	-	-	-	-	-	-
G	Glyma.10G158700	1191	-	-	-	-		-	-	-	-	-	-	-	-
C	Glyma.10G158700	1152	A	splice_region_variant	1/1	0 16	histidina x glutamina	CAC x CAA	-	-	-	A	splice_region 1/1	0 11	
A	Glyma.10G158700	808	G	splice_region_variant	1/1	0 9	Intron	-	-	-	-	G	splice_region 1/1	0 20	
GGA	Glyma.10G158700	452	G	splice_region_variant	1 1	0 5		-	-	-	-	G	splice_region 1 1	0 7	
A	Glyma.10G158700	452	C	splice_region_variant	1 1	0 5	me da distinto - ver imagen IGV	-	-	-	-	C	splice_region 1 1	0 7	
A	Glyma.10G158700	293	-	-	-	-		-	-	-	-	-	-	-	-
G	Glyma.10G158700	293	A	intron_variant	1/1	0 6		-	-	-	-	A	intron_variar 1/1	0 6	
T	Glyma.10G158700	293	G	intron_variant	1 1	0 9		-	-	-	-	G	intron_variar 1 1	0 8	
T	Glyma.10G158700	293	G	intron_variant	1 1	0 13		-	-	-	-	G	intron_variar 1 1	0 11	
GA	Glyma.10G158700	175	-	-	-	-		-	-	-	-	-	-	-	-
T	Glyma.10G158700	175	-	-	-	-		-	-	-	-	-	-	-	-
A	Glyma.10G158700	24	C	synonymous_variant	1/1	0 5	glutamina x histidina	CAA x CAC	-	-	-	C	synonymous 1/1	0 12	
T	Glyma.10G158700	-158	-	-	-	-		-	-	-	-	-	-	-	-
A	Glyma.10G158700	-158	-	-	-	-		-	-	-	-	-	-	-	-
CTT	Glyma.10G158700	-272	C	5_prime_UTR_variant	1/1	0 9		-	-	-	-	C	5_prime_UTI 1/1	0 12	
A	Glyma.10G158700	-315	G	5_prime_UTR_variant	1 1	0 4		-	-	-	-	G	5_prime_UTI 1 1	0 8	
A	Glyma.10G158700	-316	G	5_prime_UTR_variant	1 1	0 3		-	-	-	-	G	5_prime_UTI 1 1	0 9	
C	Glyma.10G158700	-325	CA	5_prime_UTR_variant	1 1	0 4		-	-	-	-	CA	5_prime_UTI 1 1	0 9	
TAG	Glyma.10G158700	-499	T	5_prime_UTR_variant	1/1	0 7		-	-	-	-	T	5_prime_UTI 1/1	0 6	
GA	Glyma.10G158700	-561	G	5_prime_UTR_variant	1/1	0 9		-	-	-	-	G	5_prime_UTI 1/1	0 10	
GTGTGAGAT	Glyma.10G158700	-757	-	-	-	-		-	-	-	-	-	-	-	-
G	Glyma.10G158700	-698	T	5_prime_UTR_variant	1/1	0 8		-	-	-	-	T	5_prime_UTI 1/1	0 13	
A	Glyma.10G158700	-748	C	5_prime_UTR_variant	1/1	0 6		-	-	-	-	C	5_prime_UTI 1/1	0 17	

Bioinsumes: Discovery and development

biological origin
based on compounds and/or plant extracts or microorganisms
for crop stimulation and protection.

PSP1 development: Licensed (TAISEI)

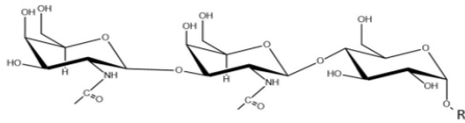


Sumitomo
Corporation

ANNUIT® S.A.

PSP1: plant defense
stimulator

PSP2: Biofungicide and
antiviral (vegetal origin)



compound identification



Patent



Industrial prototype



industry assays



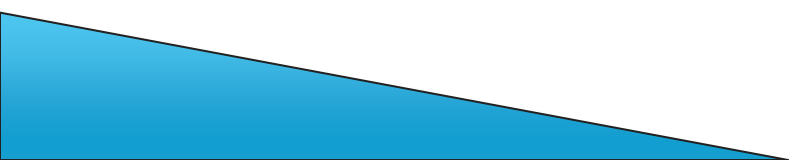
Seed treatments



PSP3: Soybean specific
bioestimulant

PSP4: Trichoderma-based fungal
pathogen biocontroller

PSP5: growth promoter in sugar
cane



Thank you very much!

Weed management for grain crops in Tucuman and NWA

Lic. Sebastián Sabaté



Evolution of herbicide resistance in Argentina



Herbicide resistance in SA

#	Year	Species	MOAs	Actives	Situations
1	1986	<i>Avena fatua</i>	Group 2 (Legacy B), Group 1 (Legacy A)	clodinafop-propargyl, diclofop-methyl, fluazifop-butyl, fenoxaprop-ethyl, sethoxydim, tralkoxydim, sulfosulfuron, imazamox, iodosulfuron-methyl-Na	Wheat
2	1993	<i>Lolium rigidum</i>	Group 2 (Legacy B), Group 1 (Legacy A)	haloxyfop-methyl, clodinafop-propargyl, diclofop-methyl, fluazifop-butyl, sethoxydim, tralkoxydim, imazamox	Wheat
3	1993	<i>Amaranthus hybridus (syn: quitensis)</i>	Group 5 (Legacy C1 C2)	atrazine	Corn (maize)
4	1997	<i>Raphanus raphanistrum</i>	Group 2 (Legacy B)	thifensulfuron-methyl, chlorsulfuron, tribenuron-methyl, metsulfuron-methyl, triasulfuron, iodosulfuron-methyl-Na	Spring Barley, Wheat
5	1999	<i>Phalaris minor</i>	Group 2 (Legacy B), Group 1 (Legacy A)	haloxyfop-methyl, clodinafop-propargyl, diclofop-methyl, propaquizafop, quizalofop-ethyl, fenoxaprop-ethyl, sulfosulfuron, iodosulfuron-methyl-Na, mesosulfuron-methyl	Pastures, Wheat
6	2001	<i>Lolium rigidum</i>	Group 9 (Legacy G)	glyphosate	Grapes
7	2002	<i>Lolium rigidum</i>	Group 22 (Legacy D)	paraquat	Grapes, Fruit
8	2002	<i>Stellaria media</i>	Group 2 (Legacy B)	thifensulfuron-methyl, chlorsulfuron, metsulfuron-methyl, triasulfuron	Cereals
9	2003	<i>Lolium rigidum</i>	Group 1 (Legacy A), Group 9 (Legacy G), Group 22 (Legacy D)	haloxyfop-methyl, paraquat, glyphosate, tepraloxym	Grapes
10	2003	<i>Conyza bonariensis</i>	Group 22 (Legacy D)	paraquat	Orchards, Grapes
11	2003	<i>Conyza bonariensis</i>	Group 9 (Legacy G)	glyphosate	Orchards, Grapes
12	2003	<i>Plantago lanceolata</i>	Group 9 (Legacy G)	glyphosate	Orchards, Grapes
13	2018	<i>Amaranthus palmeri</i>	Group 2 (Legacy B), Group 9 (Legacy G)	chlorimuron-ethyl, glyphosate	Cotton
14	2022	<i>Plantago lanceolata</i>	HRAC Group 9 (Legacy G), Group 22 (Legacy D)	paraquat, glyphosate	Grapes
15	2024	<i>Amaranthus hybridus (syn: quitensis)</i>	Group 9 (Legacy G)	glyphosate	Corn (maize), Soybean

Available www.weedscience.org



Ower objectives:

- Identify troublesome weeds.
- Determinate tolerance or resistance to different herbicide MOA.
- Study the biology and detect management opportunities
- Evaluate management tools according to different crops, weeds and environmental conditions.
- **Generate a variety of efficient strategies to diversify managements.**
- Evaluate application technologies to improve efficiency and safety
- Transfer technologies in a clear and precise way for its correct use and sustainability.

Herbicide resistant species we are working on:

Glyphosate resistant:

- *Sorghum halepense* (Johnson grass)
- Grass weeds annuals: *Echinochloa colona* (Junglerice), *Urochloa panicoides* (Liverseed Grass) y *Eleusine indica* (Goosegrass).
- Broadleaves annuals: *Amaranthus hybridus* (Smooth pigweed) y *A. palmeri* (Palmer amaranth).

ACCasa Resistance:

- *Eleusine indica* (Goosegrass)

ALS resistance:

- *Raphanus sativus* (Wild radish)

Main challenges at this time:

- Management of GR *Amaranthus* and annual grasses
- Burndown of perennials (Borreria, Johnson grass, Chloris)
- Corn weeds
- Invasive species (*Tithonia tubaeformis*)
- Management in winter crops and spring burndowns
- Preventing the selection of new herbicide-resistant biotypes
- Adaptation of new technologies
- Reduction of environmental impact

***Most troublesome weeds
in grain crops***

Sorghum halepense



Echinochloa colona

Eleusine indica



Urochloa panicoides



Chloris- Trichloris complex



Amaranthus hybridus



Amaranthus hybridus (smooth pigweed)

- Smooth inflorescences. No thorns
- Up to 2 m high



Amaranthus palmeri



Amaranthus palmeri (Palmer amaranth)





A. palmeri



A. hybridus

Conyza bonariensis



Raphanus sativus



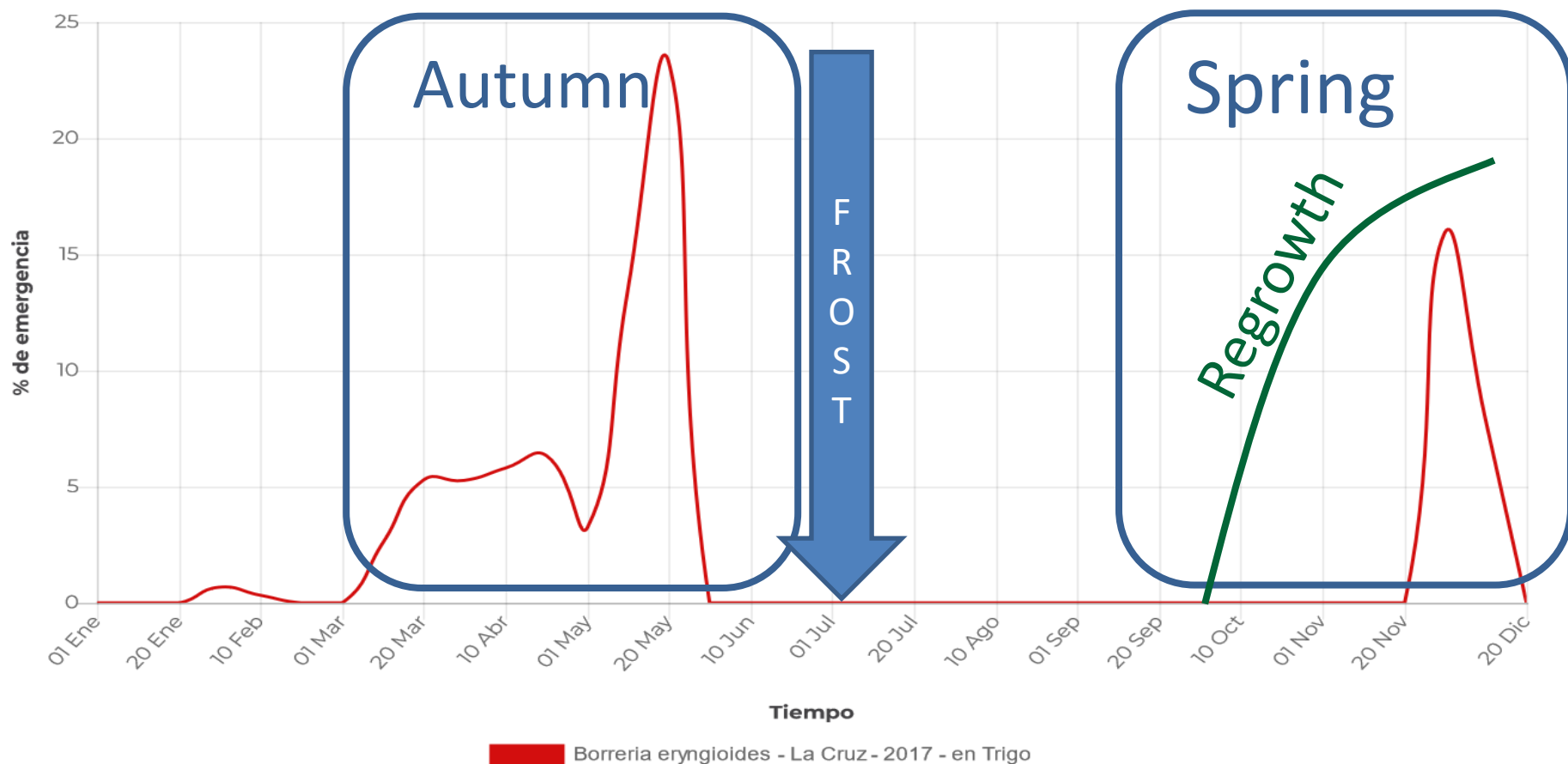
Borreria densiflora



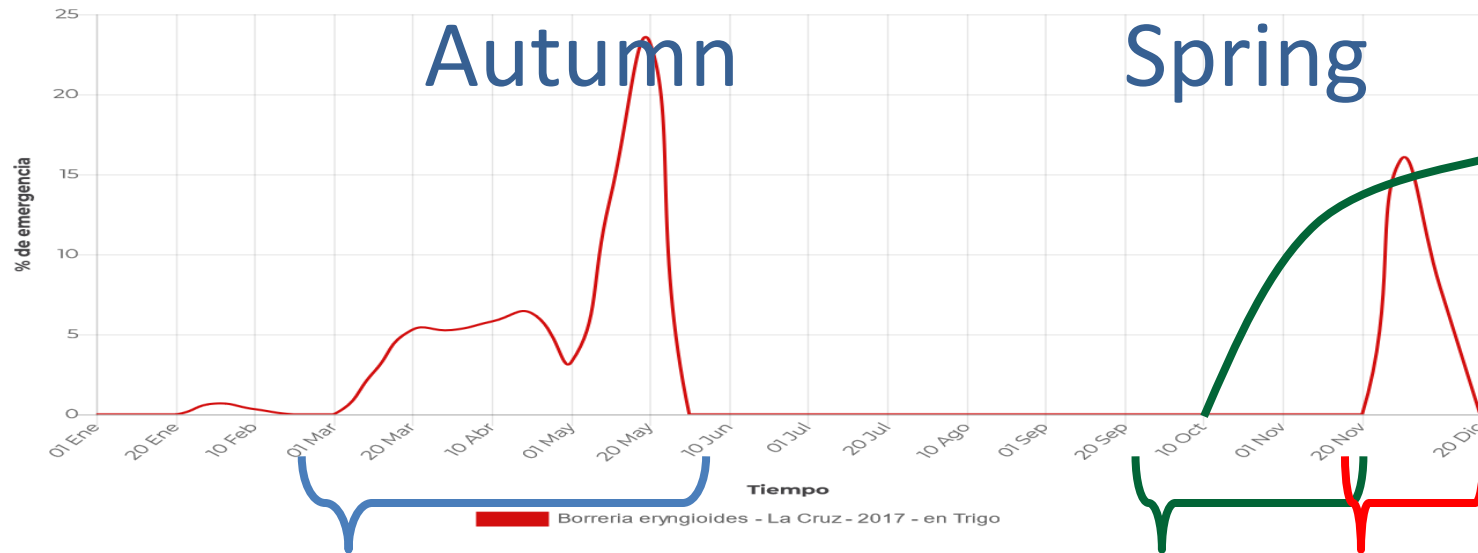
Borreria densiflora



Importance of biology studies



Importance of biology studies



Glyphosate + growth reg. + PPO
 Glyphosate + growth reg. + triazina
 Glufosinate-ammonium+ PPO
 Paraquat (+PSII)
 +
 INTENSIFICATION

Glyphosate + growth reg. + PPO
 Glyphosate + growth reg. →→ Paraquat
 Glufosinate-ammonium+ PPO
 Glufosinate-ammonium+ PSII
 Paraquat (+PSII)
 Imazapir →→ Glyphosate + growth reg. + PPO

Glyphosate + PPO
 Glyphosate + PPO + PDS
 Glufosinate-ammonium+ PPO

**Enlist Tech
 for post**

Managing Borreria

June



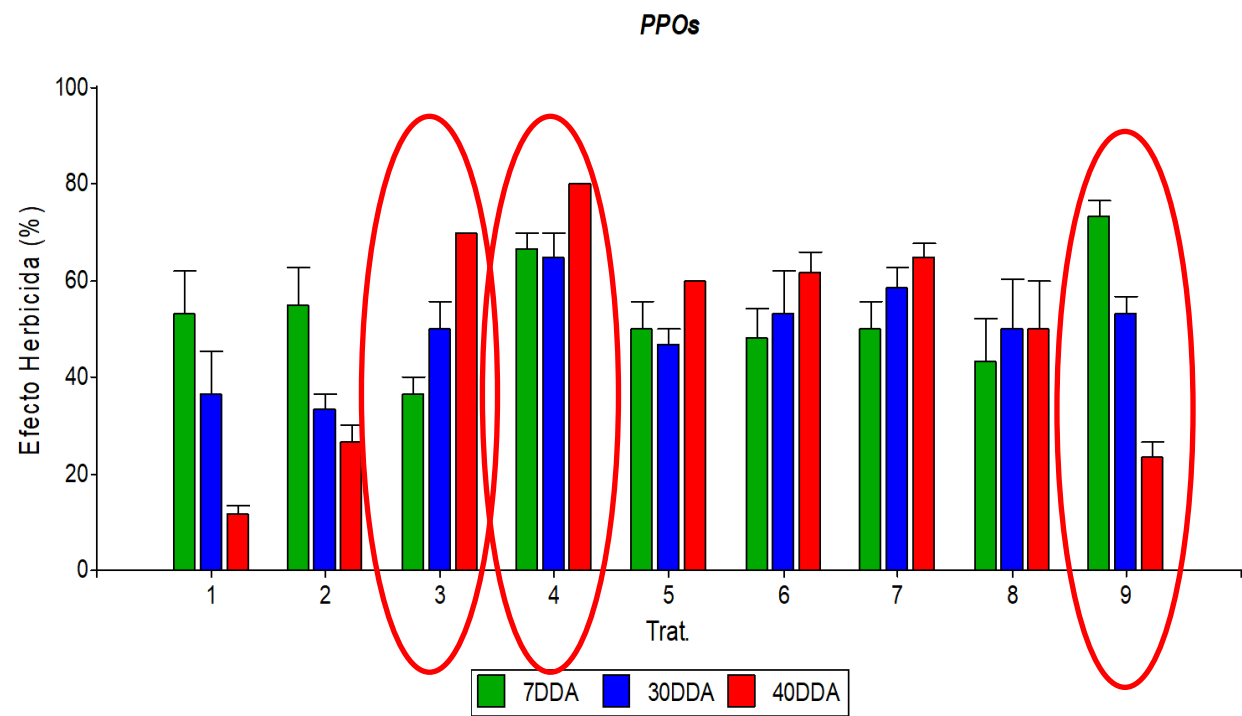
Borreria Burndown

Glufosinato + FSIs

Glufosinato + triazinas

Glufosinato + PPO

Borreria Burndown



Trat.	Herbicidas	Dosis (g o cm3 p.c./ha)
1	Paraquat	2500
2	Glufosinato	2500
3	Glufosinato Atrazina	2500 2000
4	Glufosinato Flumioxazin	2500 150
5	Glufosinato Saflufenacil	2500 50
6	Glufosinato Saflufenacil	2500 10
7	Glufosinato Saflufenacil	2500 1
8	Glufosinato Saflufenacil	1500 1
9	Paraquat	4000

Borreria spp

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Trat.	Herbicidas	Nom. Com.	Dosis (p.c/ha)	M.A .
T1	Imazaquin 15%	Topgan	0.6 l	B
T2	Clorimuron 25%	Classic	40 g	B
T3	Diclosulam 84 %	Spider	40 g	B
T4	Imazetapir 10.5 %	Pivot	1 l	B
T5	Isoxaflutole 22.5 % + Tiencarbozone-metil 9%	Adengo	0.3 l	F2 B
T6	Sulfometuron metil 15% + Clorimuron etil 20%	Ligate	100 g	B
T7	Atrazina 50 %	Atranex	3 l	C1
T8	Metribuzim 48%	Sencorex	1 l	C1
T9	Amicarbazone 70%	Dinamic	140 g	C1
T10	Diuron 80%	Diurex	1.5 l	C2
T11	Diflufenican 50%	Pelican	0,35 l	F1
T12	Biciclopirona 20%	Acuron	1 l	F2
T13	S-Metolacoloro 96%	Dual gold	1.5 l	K3
T14	Piroxasulfone 85%	Yamato	0,4 l	F2
T15	Fomesafen 25 %	Flex	1l	E
T16	Flumioxazin 48 %	Sumisoya	0.15 l	E
T17	Sulfentrazone 50%	Capaz	0.5 l	E
T18	Testigo	-----	-----	-----

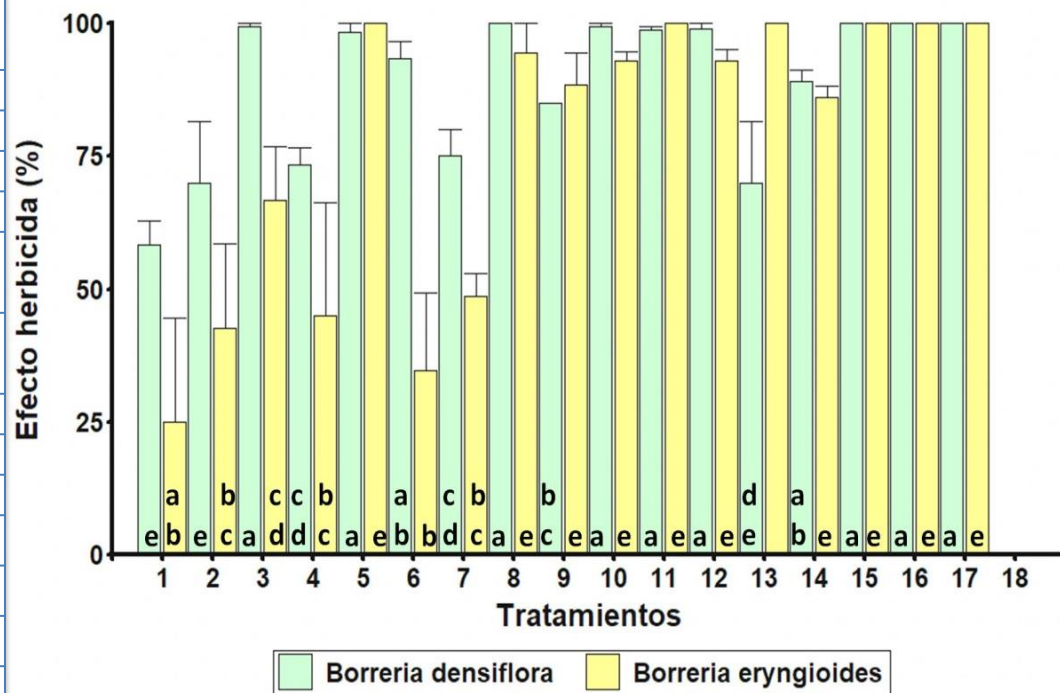
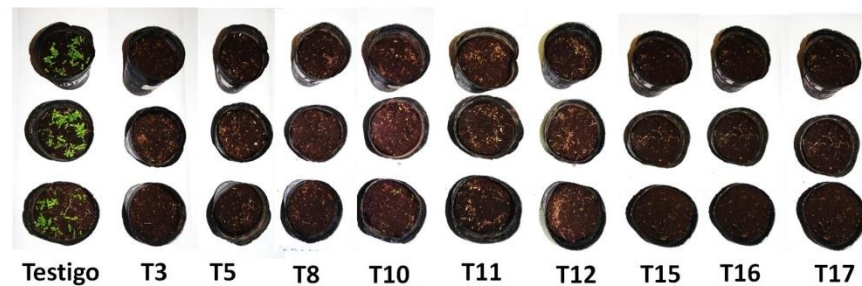


Figura 1. Efecto de herbicida (%) para el control de *Borreria densiflora* y *Borreria eryngioides*, con herbicidas residuales en condiciones controladas a los 21 DDA. Letras distintas indican diferencias significativas entre medias, obtenidas al utilizar el test de Fisher ($p \leq 0,05$).



GT Borrerias facts

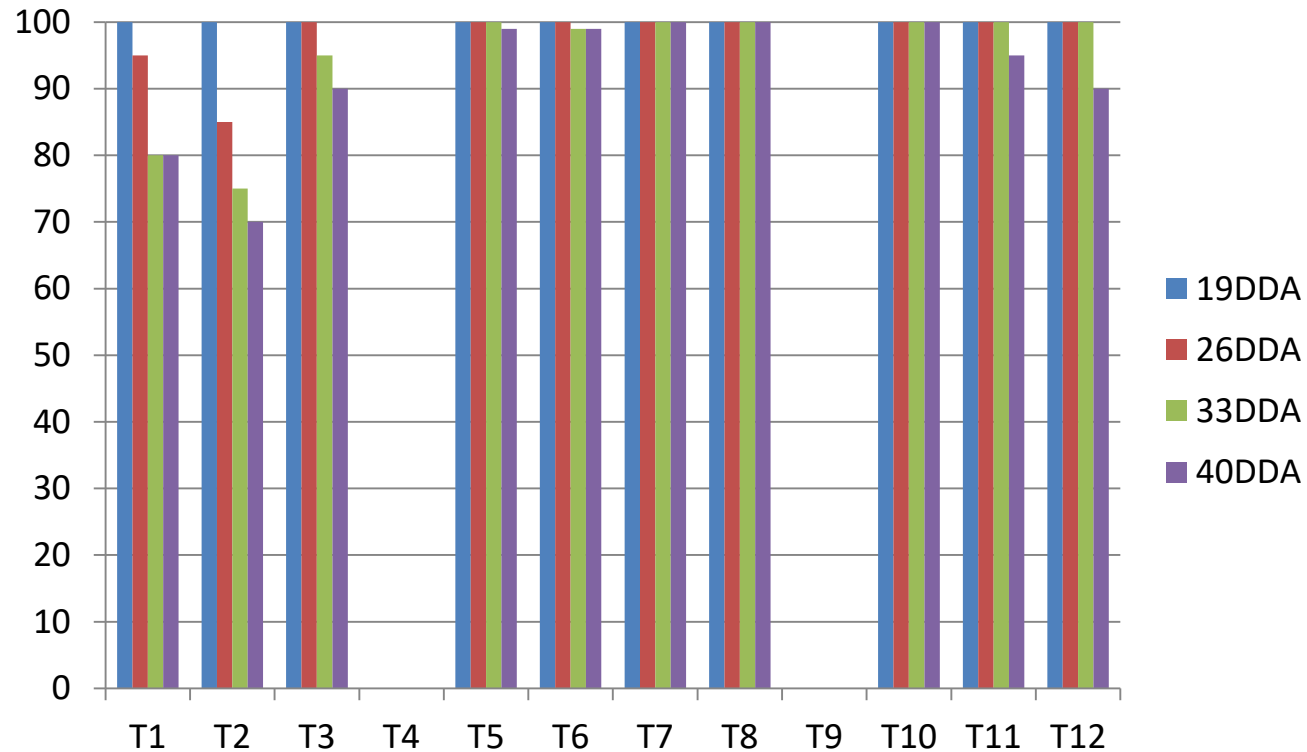


Distribution and level of infestation	Widely distributed in NW Argentina. High levels of infestation in poor soils
Main management challenges	Germination in different seasons Fast establishment of perennial plants Adapted to poor soil conditions
Risk factors	Difficult to control the established plants No systemic herbicides yet High seed production and movement
Main management strategies	Prevent arrival Herbicide overlapping Cover crops Crop competition

Short and long term management strategies

Importance of tank-mix for the control of *A. palmeri*

Trat.	Productos	Dosis	Un
1	S- Metolacoloro 96%	1	l/ha
2	Metribuzin 48%	1	l/ha
3	Imazetapir 10 %	1	l/ha
4	Testigo	-----	
5	Flumioxazin 48%	0,15	l/ha
6	Flumioxazin 48%	0,15	l/ha
	S- Metolacoloro 96%	1	
7	Pyroxasulfone	0,5	l/ha
	Flumioxazin		
8	Sulfentrazone 50%	0,5	l/ha
9	Testigo	-----	
10	Sulfentrazone 50%	0,5	l/ha
	Metribuzin 48%	1	
11	S-metolacoloro 51,8%	3	l/ha
	Fomesafen 11.95%		
12	S-metolacoloro 62,8%	2,5	l/ha
	Metribuzin 14.9%		



Residuals for Amaranth control



81 DDA

Post-emergence timing

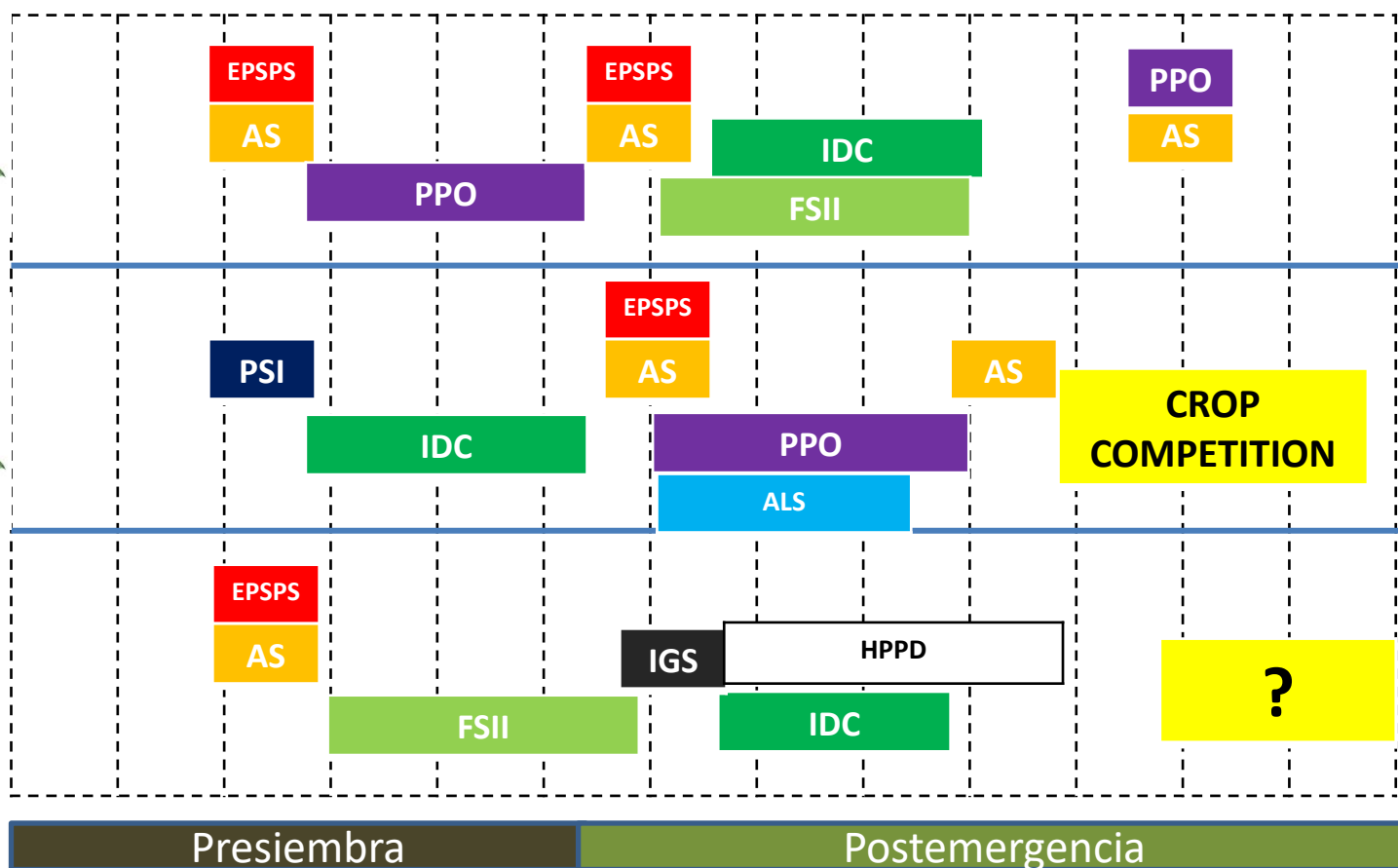
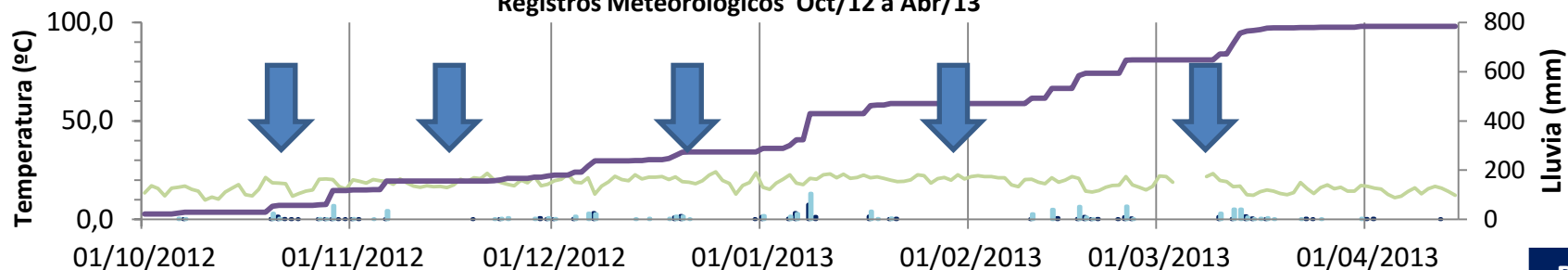
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Fomesafen – Lactofen - Benazolin

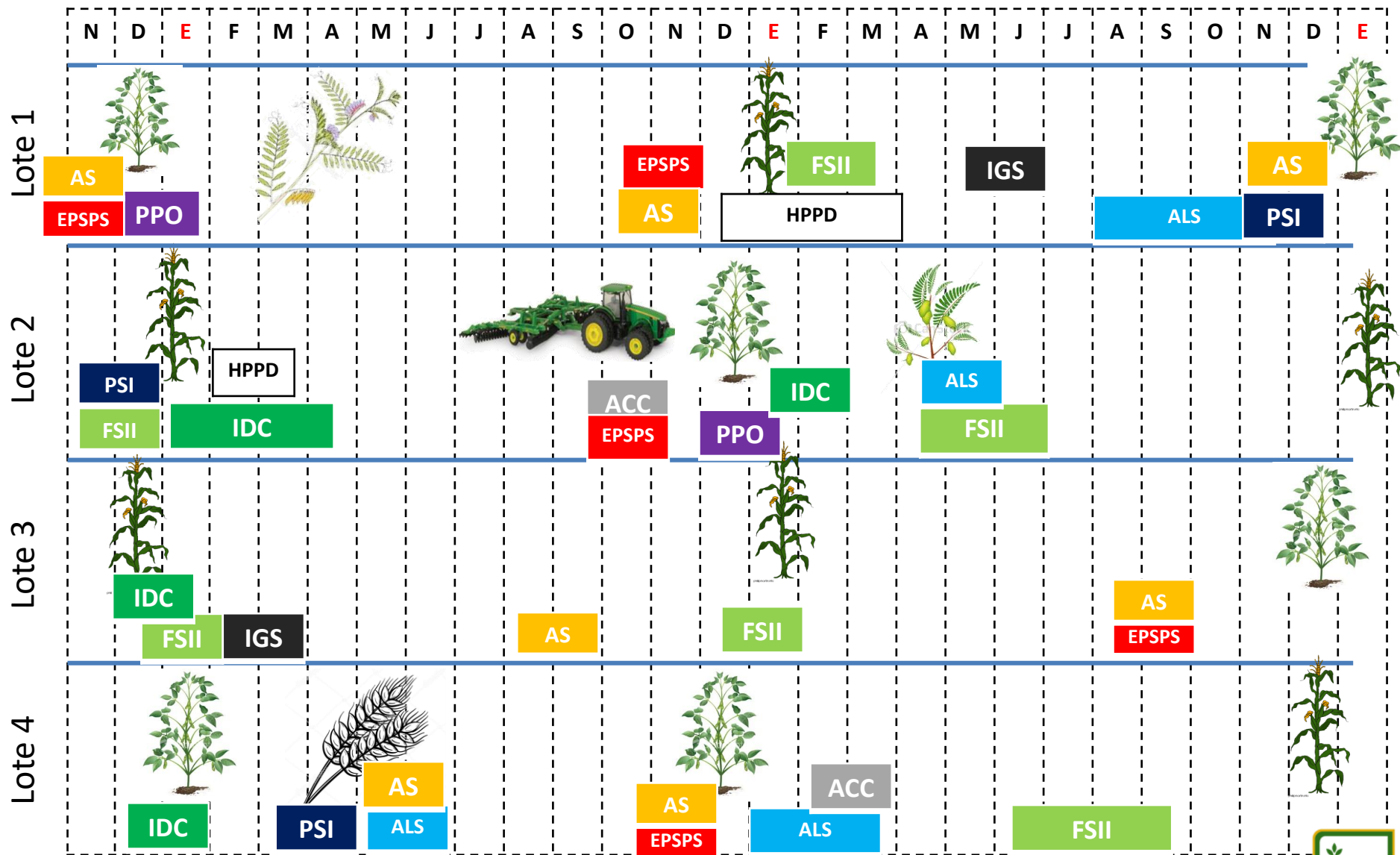
Short-term managements

Registros Meteorológicos Oct/12 a Abr/13



- PSI
- AS
- IDC
- PPO
- FSII
- HPPD
- ALS
- EPSPS
- IGS

Long-term managements



The main challenge

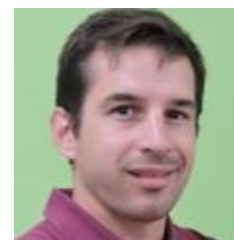
Our main challenge is to reduce selection pressure over glyphosate (and other herbicides) resistant biotypes. We need to be able to manage them under a profitable system, along with tolerant and susceptible species

For that, we need to acknowledge the present conditions of the fields (SCOUTING**), avoid infestation of clean paddocks (**PREVENTION**) and keep population levels under control (**MANAGEMENT**)**

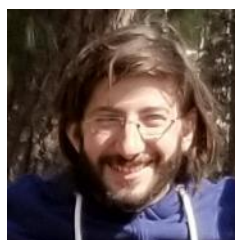
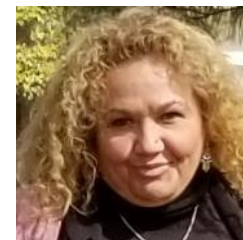
Thanks so much for your attention!



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Sr. Nelson Robles



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