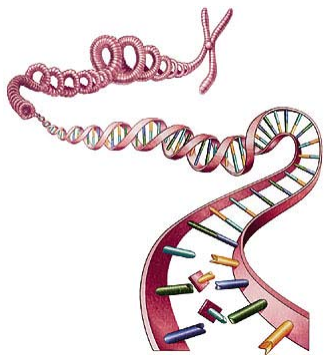
“Biotechnological tools applied to increase competitiveness and sustainability in wheat chain”

PAE 37108



PI Marcelo Helguera INTA

CoPI Viviana Echenique UNS - CERZOS

Team Leaders:

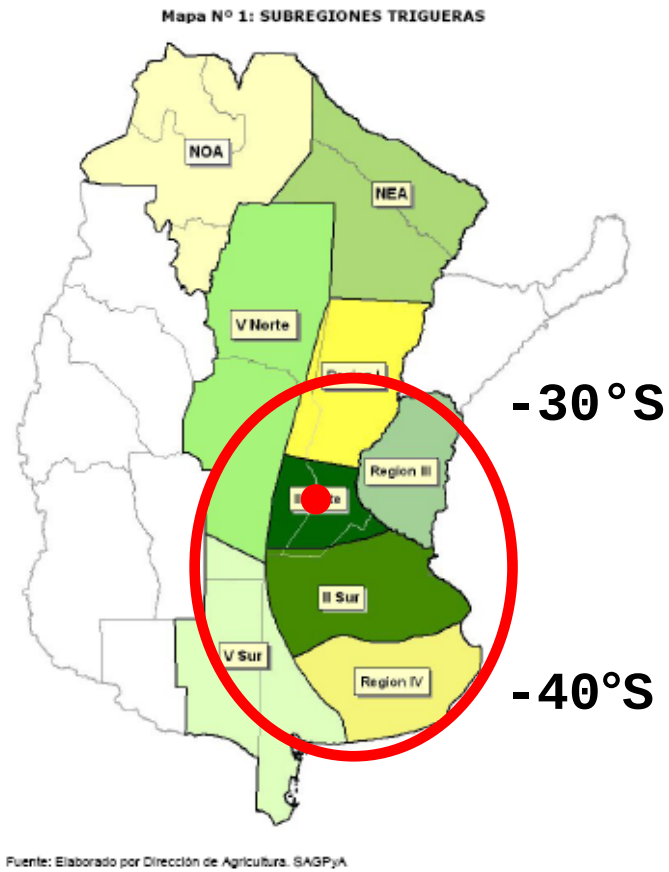
- Gabriela Tranquilli INTA
- Alicia Carrera UNS
- Graciela Truol INTA
- Francisco Sacco INTA
- Daniel Miralles FAUBA

Institutions

- Scientific and Technological Research Fund (FONCYT) - National Institute for Agricultural Technology (INTA)
- Agronomy Department, National University of the South, Buenos Aires (UNS)
- National Council on Scientific and Technical Research (CONICET) - Centre of Natural Resources of the Semi-Arid Region (CERZOS-CONICET)
- School of Agronomy, University of Buenos Aires (FAUBA)
- Biochemical and Physiological Research Institute (IBYF-CONICET) – National University of Rio Cuarto (UNRC) – Argentinean Seed-traders Association (ASA)

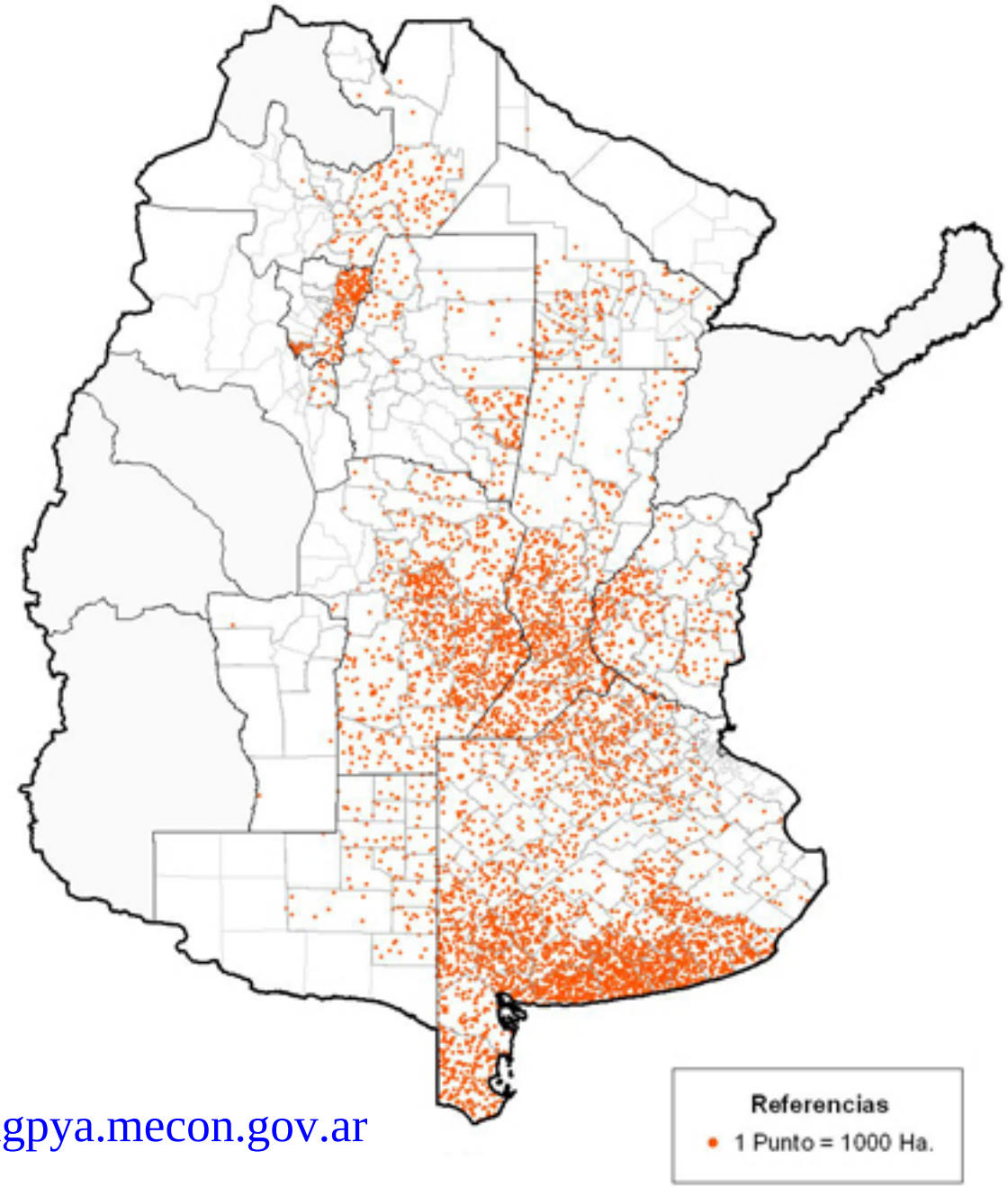
International Partner: Jorge Dubcosvky, UCDavis

Wheat in numbers in Argentina



- 6.1 M ha planted every year
- 2.5 Tn/ha yield
- 14.8 M Tn per year
- 4.8 M Tn internal market
- 10 M Tn for export
- Two crops every year
- Wheat is the main winter crop

- Mean yield of 3.5 T/Ha (3.0 T/Ha soybean in summer)



http://www.sagpya.mecon.gov.ar

2006-2007

Situation of wheat in Argentina

- The increase of commodities in latest years has been performed through the substitution of cereal crops by soybean.

- Such a substitution process has increased the incomes by ha. with a dramatical reduction in soil carbon content.

- Extending this process in time will probably affect negatively the sustainability of the productive environment.

- The introduction of wheat as carbon donor in crop rotation is critical.

- To get that, wheat has to be a more competitive crop for the farmer in terms of yield and also end-use quality.

- Commercial cultivars are being developed by traditional breeding

- Recent advances in molecular biology, genomics, gene discovery and transformation in cereals are not being widely used in our programs.

Our goals:

1) to create a network of groups with expertise in DNA based technologies (genomics, molecular markers, transformation, TILLING, VIGS, etc), ecophysiology, end-use quality and phytopathology focused on wheat.

2) To transfer the technology to Argentinean seed companies, promoting a fluid communication between public and private sectors

Specific objectives

- 1- To characterize, evaluate and develop germplasm with increased disease resistance, yield, adaptability and end-use quality.
- 2- To develop molecular markers to introgress new traits into adapted germplasm by MAS.
- 3- To stimulate the adoption of MAS as a routinary tool in breeding programs.
- 4- To develop protocols for transformation, VIGS and TILLING
- 6- To create a web site to publicly display main activities and products
- 7- To train students at different levels: MSc, PhD, short visits.
- 9- To promote the active interaction between different actors of the wheat chain (farmers, breeders, industry, scientists) through the organization of workshops and seminars.

Organization and methology

- **Module 1:** Introgression of leaf rust resistance genes in wheat cultivars by MAS **(PI: Francisco Sacco, INTA Castelar)**

- **Module 2:** Development of molecular and biological tools to evaluate resistance to wheat streak mosaic virus (WSMV) and to its vector **(PI: Graciela Truol, INTA-IFFIVE)**

- **Module 3:** Use of genetic variability associated with potential end-use quality to develop germplasm for specific purposes (specialties) **(PI: Grabriela Tranquilli, INTA Castelar)**

- **Module 4:** Identification and introgression of genes associated with semolina and pasta quality and resistance to biotic and abiotic stresses in durum wheat **(PI: Alicia Carrera UNS – CERZOS)**

• **Module 5:** Development of technologies based on DNA manipulation **(PI: Marcelo Helguera, INTA Marcos Juárez)**

• **Module 6:** Improvement of malt quality modifying dormancy mechanisms and endogenous nitrogen content in barley grains. **(PI: Daniel Miralles, FAUBA)**

• **PME:** laboratory equipment for the network **(PI: Viviana Echenique CERZOS-UNS)**

Additional Research Topics
(not included in PAE 37108)

- Physical mapping of an adult plant leaf rust resistance gene in the 3BS wheat chromosome (INTA)
- Development of populations for QTL mapping of traits like heading time, spike fertility, and fusarium head blight resistance in hexaploid wheat (INTA)
- Association mapping for EPS, yield and quality in hexaploid and tetraploid wheat (UNS-CERZOS, INTA, ACA, Buck Semillas)
- Soft wheats (INTA)
- Abiotic stress tolerance (INTA)

Resources (Fundings)

- PAE project
- FONCYT: $1.804.919,52
- Private companies (ASA): $120000
- Other research projects
- INTA: $ 500000 (estimated)
- UNIVERSITIES: $ 300000 (estimated)
- CONICET: $ 300000 (estimated)

Expected outcomes

- A solid network of research groups with expertise in fields like DNA based technologies (genomics, molecular markers, transformation, TILLING, VIGS, etc), ecophysiology, end-use quality and phytopathology focused on wheat.
- A technological platform with validated markers for a wide set of agronomic traits with high demand in wheat breeding.
- Routinary use of molecular markers in breeding programs
- New DNA based technologies adapted for wheat
- Students and junior researchers trained in molecular and conventional breeding

General expectation from the twinning workshop

- To identify common research topics for counterparts.
- To define a research program, with agendas and tentative budgets for future twinning activities.

Mainly related to:

- Physical mapping of an adult plant leaf rust resistance gene located on 3BS wheat chromosome. Development of mapping populations for traits of common interest (yield, EPS, fusarium head blight, quality).
- Association mapping.
- Abiotic stress resistance.
- Exchange between researchers and students from Argentina and Europe.
- Exchange of information, genes, germplasm and markers

PAE 37108

Biotecnología y mejoramiento de trigo

CARACTERÍSTICAS NOVEDADES CONTACTOS

INICIO

PAE

Proyecto de Área Estratégica

El principal objetivo de los PAE es promover la integración y el fortalecimiento del Sistema Nacional de Ciencia y Tecnologia, a través de la interacción sinérgica de instituciones dedicadas a la producción de conocimientos.

El financiamiento PAE está destinado a Proyectos en Áreas Estratégicas orientados hacia el desarrollo del conocimiento en temas prioritarios, la resolución de problemas prioritarios, y/o el aprovechamiento de oportunidades emergentes en los sectores de producción de bienes y prestación de servicios.

Acerca PAE

- Inicio
- Objetivo General
- Objetivos particulares
- Responsables
- Participantes
- Proyectos
- Presupuesto

buscar...

Participantes

AGENCIA

CERZOS

CONICET

INTA

UNRC

ASA Asociación Semilleros Argentinos

Asociación de Cooperativas Argentinas

BIOCERES

BUCK

KLEIN

DONMARIO

Relmó

NIDERA SEMILLAS

http://www.criba.edu.ar/pae