European Cooperative Programme for Plant Genetic Resources
ECP/GR

MAIZE IN PORTUGAL CONSTRAINTS, EXISTING USE, VALORIZATION

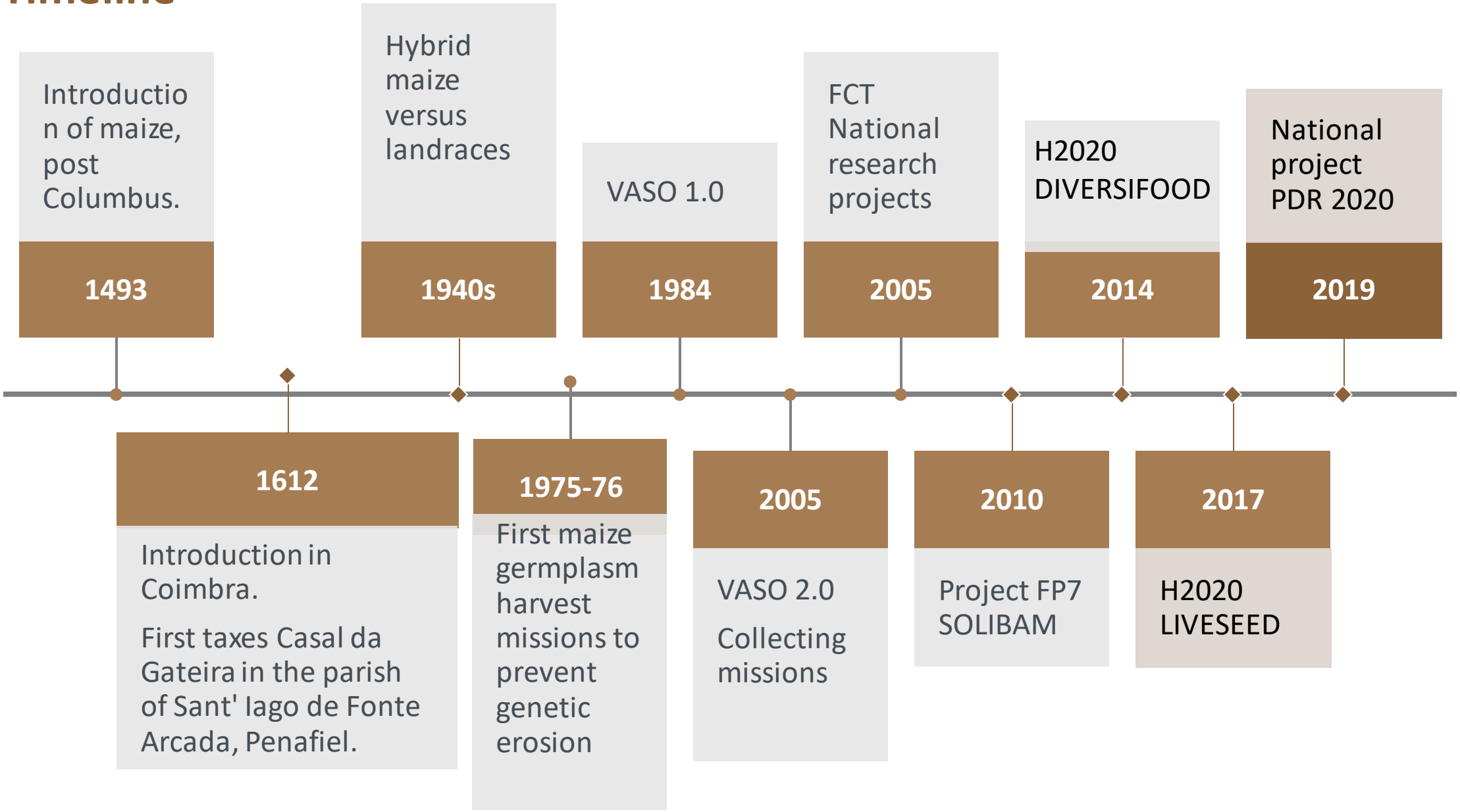
Pedro Mendes Moreira

2-3 December 2019 in Belgrade, Serbia

ESAC
ESCOLA SUPERIOR AGRÁRIA
POLITÉCNICO DE COIMBRA

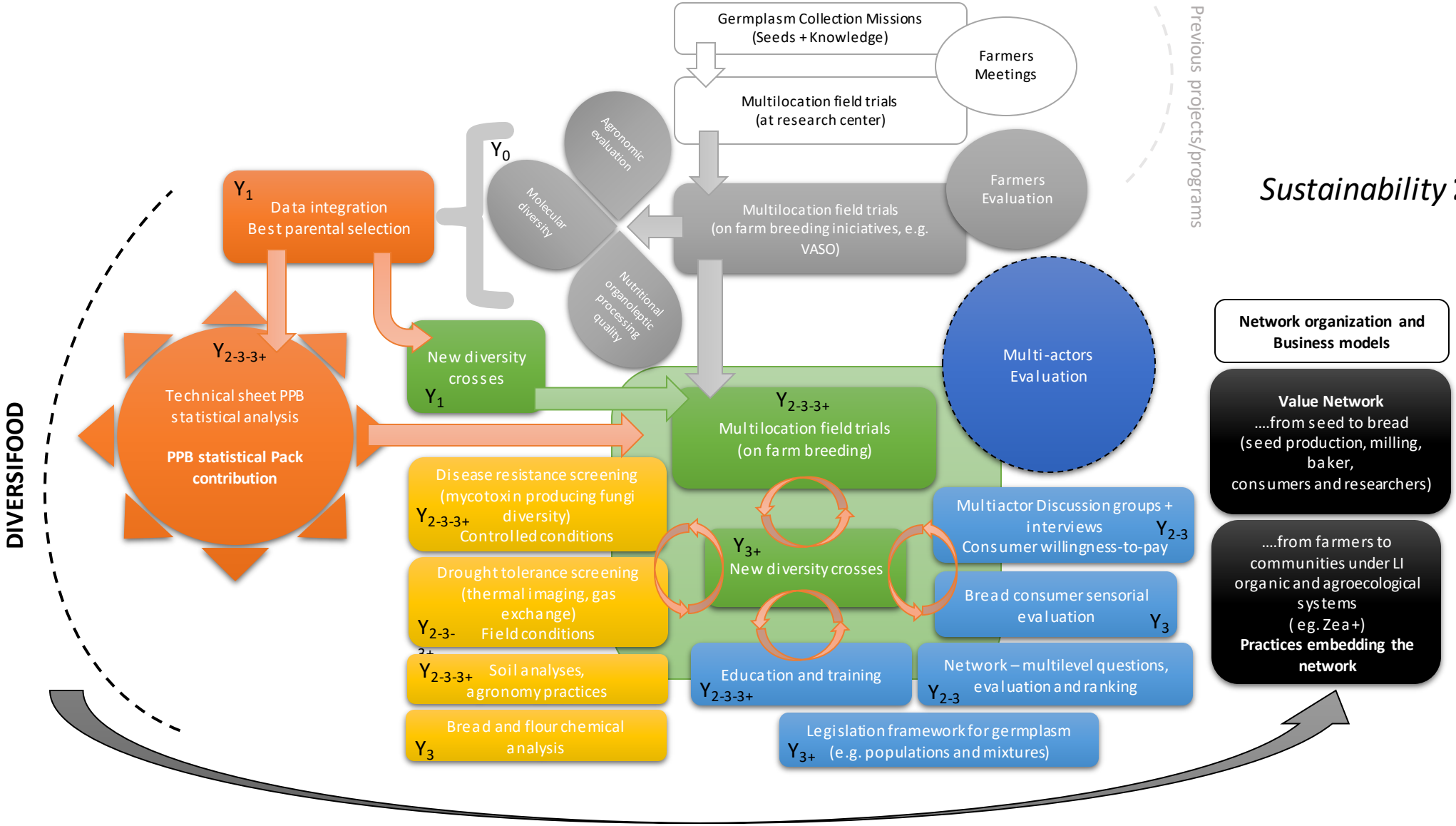

Pesquisar no Google Maps
Ver tempos de viagem, trânsito e locais próximos
Satélite
Corunha
Santiago
Pontevedra
Vigo
Porto
Portugal
Lisboa
Badajoz
Toledo
Espanha
Valência
la Plana
Mallorca
Palma
ILLES BALEARS
Benidorm
Alicante
Múrcia
Córdoba
Sevilha
Huelva
Albufeira
Faro
Granada
Almería
Málaga
Google
ESAC
ESCOLA SUPERIOR AGRÁRIA
POLITÉCNICO DE COIMBRA
IPC | Internacional | Contactos | Suporte | Mapa | Login
Pesquisa
Inicio
A ESAC
Candidaturas
Cursos
Alunos
I&D
International Relations
130 anos ESAC
Serviços
Loja da Agrária
Agricultura biológica
Agropecuária
Alimentar
Biotecnologia
Gastronomia
Ambiente
Florestas
Natureza e Ecoturismo
Agrária de Coimbra
Escola Superior Agrária - Politécnico de Coimbra
MESTRADOS
LICENCIATURAS
CTeSP´S
AGRICULTURA
ENSINO SUPERIOR
COIMBRA
ESAC.IPC
www.esac.pt

Timeline


Introductio n of maize, post Columbus.
1493
1612
Introduction in Coimbra.
First taxes Casal da Gateira in the parish of Sant' Iago de Fonte Arcada, Penafiel.
Hybrid maize versus landraces
1940s
1975-76
First maize germplasm harvest missions to prevent genetic erosion
VASO 1.0
1984
2005
VASO 2.0
Collecting missions
FCT National research projects
2005
2010
Project FP7 SOLIBAM
H2020 DIVERSIFOOD
2014
2017
H2020 LIVESEED
National project PDR 2020
2019

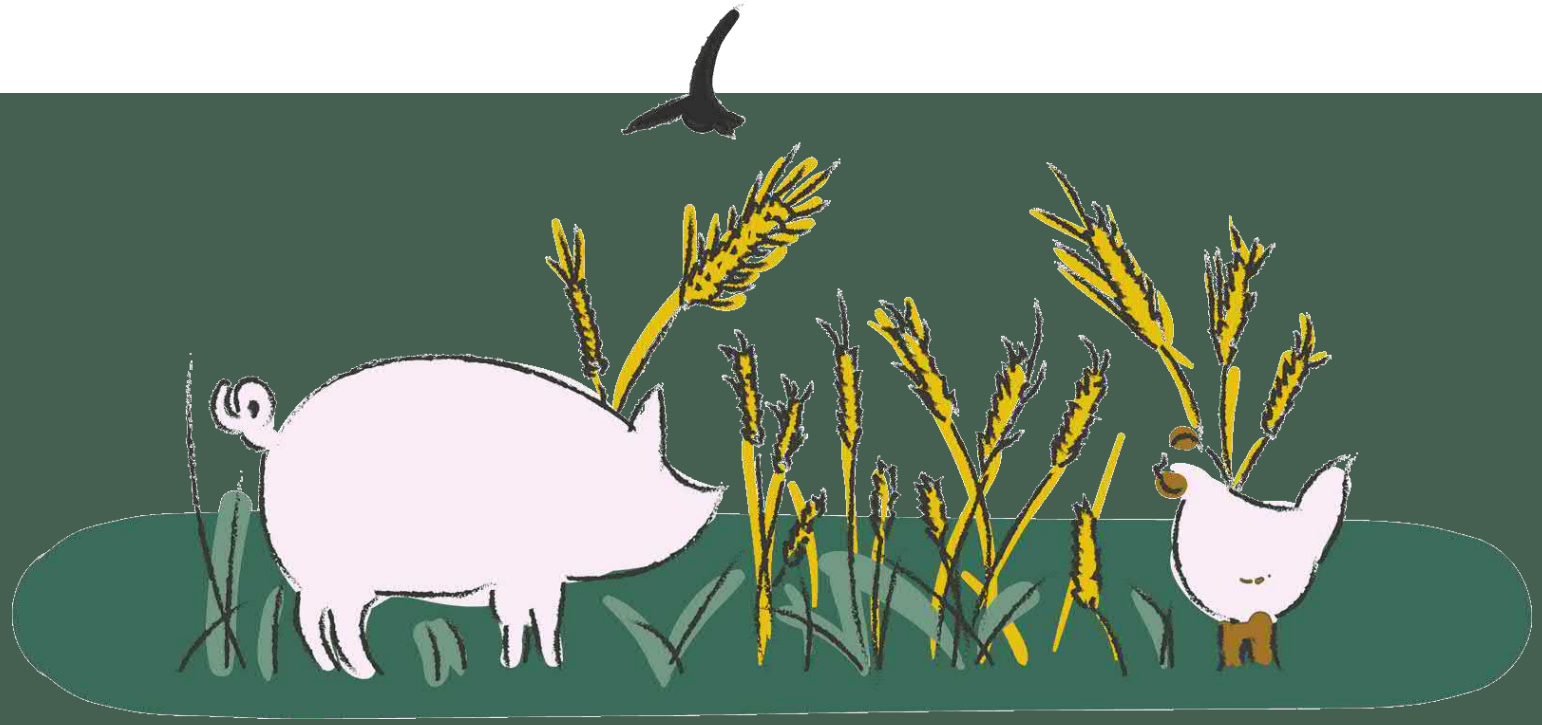
Research operationalisation of participatory agronomic and quality data integration on the development of innovative, more resilient diverse maize populations with “breadability”

challenge is to improve production traits maintaining diverse and rare qualities



Sustainability **2020**, *12*, 784

E-Compendium



Initiating valorisation projects for plant and animal genetic resources in agriculture

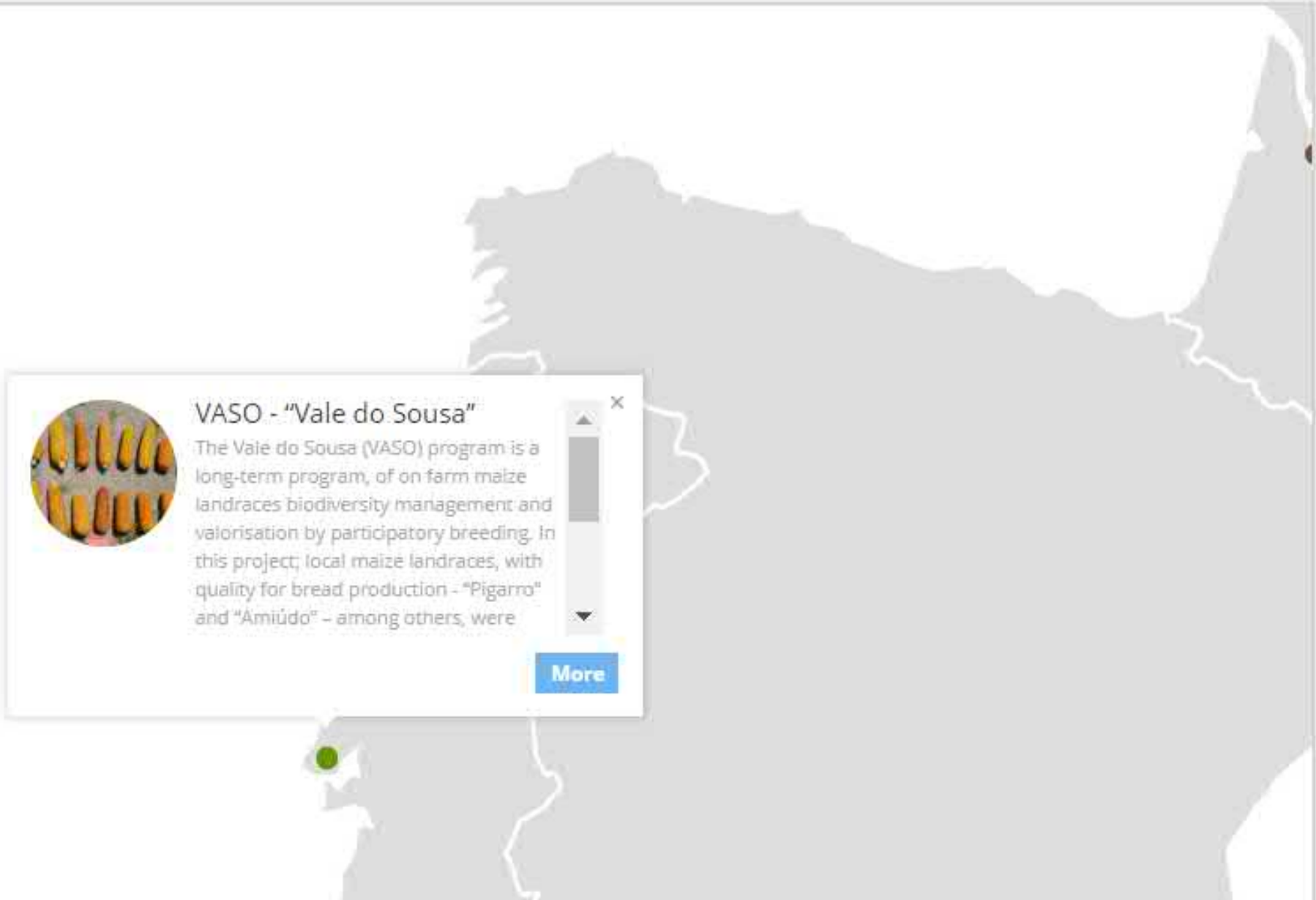
E-Compendium of valorisation projects

eCompendium of Valorisation Projects

Search...

Animals 28

Plants 28



1. VASO 1.0

ESAC
ESCOLA SUPERIOR AGRÁRIA
POLITÉCNICO DE COIMBRA

VASO 1.0

- Reasons for the genesis of the VASO project?
- The creators?
- The innovative implicit philosophy – PPB

VASO 1.0 - REASONS FOR THE GENESIS

- Solving the problem of small Portuguese farmers where there is a shortage of land and a high population density, where the productivist model is not the answer and where the large multinationals have no market

Moreira, P. M. R. M. (2006). Participatory maize breeding in Portugal. A case study. *Acta Agronomica Hungarica*, *54*(4), 431-439.


PIGARRO
POPULAÇÃO EM POLINIZAÇÃO LIVRE
1999
FAO 300


PIGARRO
Co-07
2007 10 11

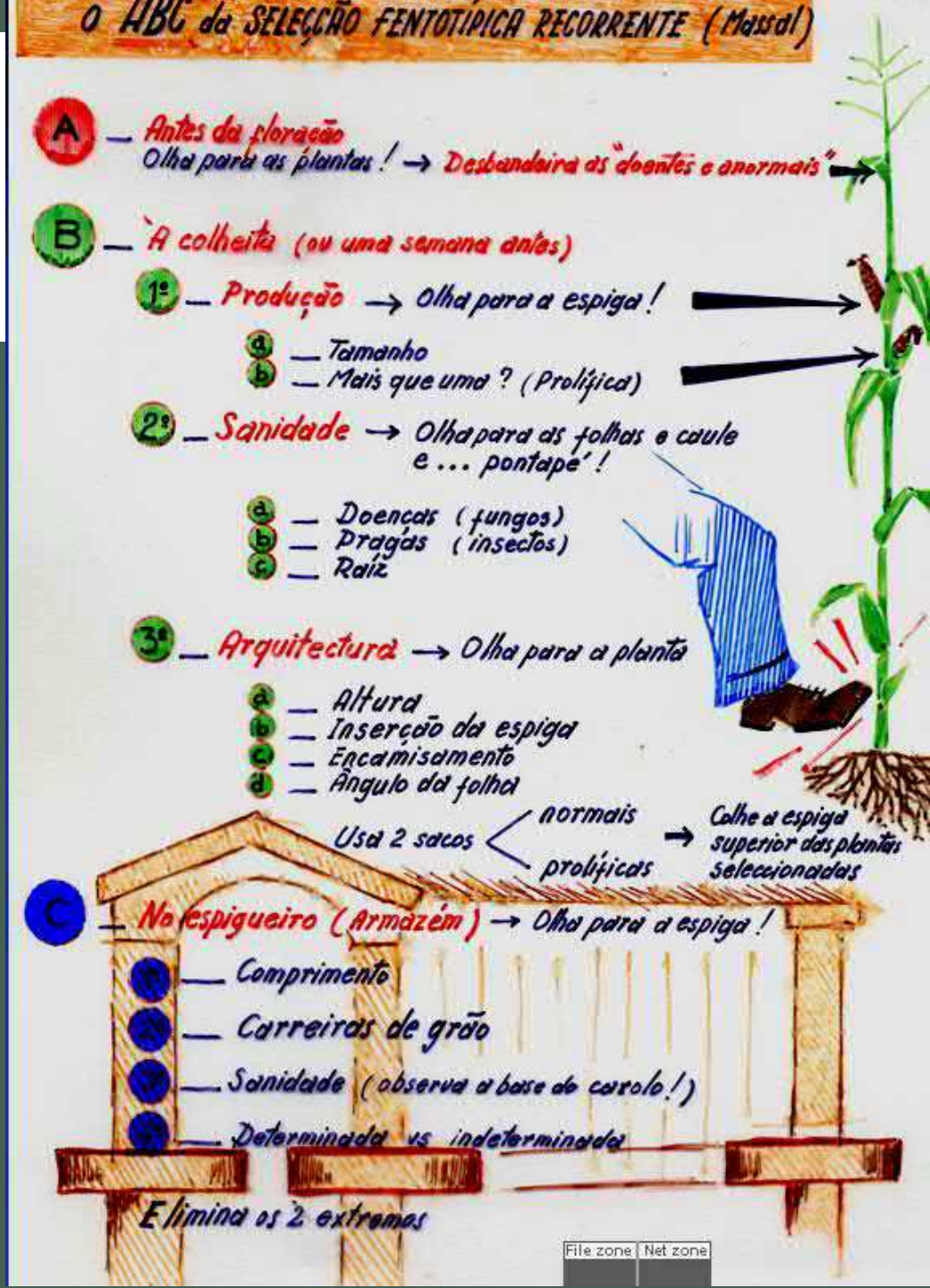
THE ABC OF RECURRENT PHENOTYPIC SELECTION

Two parental control selections:

in the field

- **before the anthesis**
- **before harvest**

- In the storage



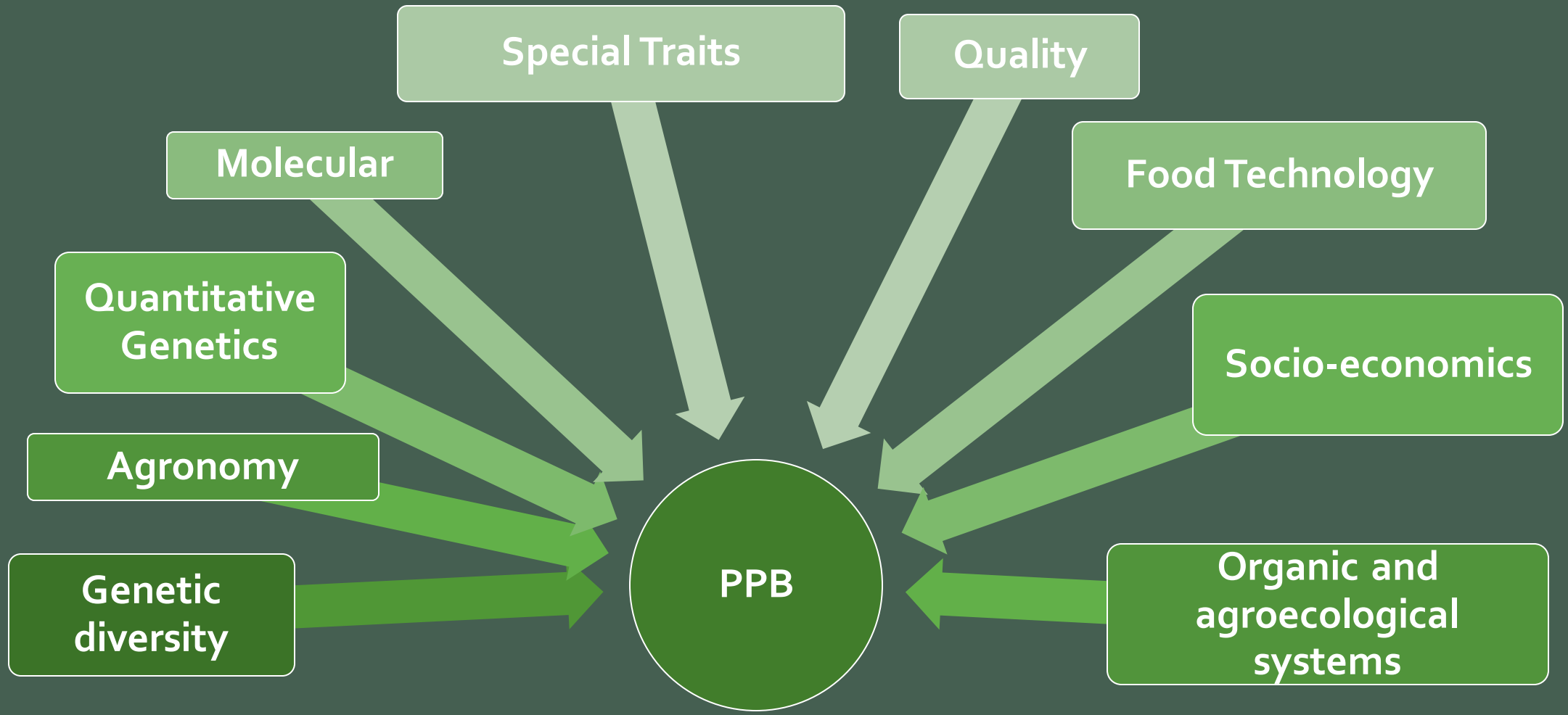
2. VASO 2.0

ESAC
ESCOLA SUPERIOR AGRÁRIA
POLITÉCNICO DE COIMBRA

VASO 2.0

- Transdisciplinarity, multiactor
- Appreciation of genetic and other resources
- Issues and challenges

TRANSDISCIPLINARIDADE, CONCEITO MULTIATOR



TEAM

ESAC
ESCOLA SUPERIOR AGRÁRIA
POLITÉCNICO DE COIMBRA

1. PPB Quantitative Genetics

2. Soil

3. Socioeconomics

1. P. Mendes Moreira
2. D. Santos
3. Isabel Dinis

Multidisciplinarity

UFLA
UNIVERSIDADE FEDERAL DE LAVRAS

Winter nursery

FEUP

Data mining
João Mendes Moreira

associação
ZEAmais

ZEA+

Transdisciplinarity

ITQB-UNL

Molecular

Carlota Vaz Patto

Quality

Rosário Bronze

PARTICIPATION, "FROM SEED TO PLATE"

Multidisciplinarity

Transdisciplinarity

PPBM
Mixcropping

Food quality
and genetics


Genetic diversity

AGRONOMY AND QUANTITATIVE GENETICS

Harvesting

Tests

Pre-breeding

Dialel

Hybrid populations

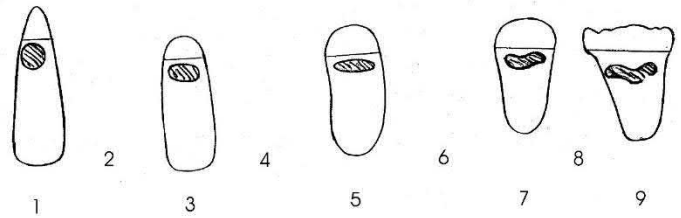
Evolutionary Populations

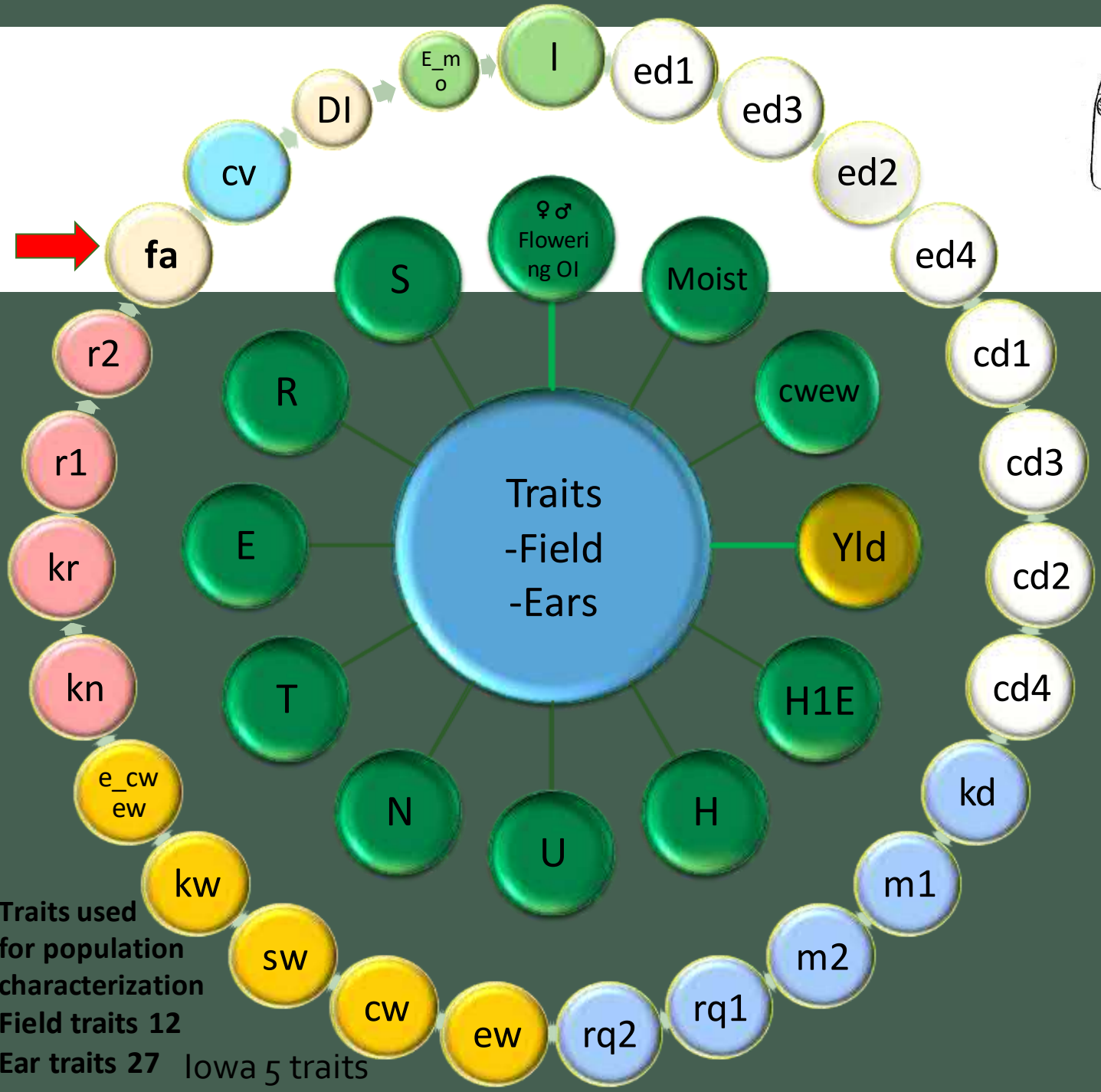
Composite populations

Co-improvement in polycrop systems and Agroforestry Systems

TRIALS


Monção
Ponte de Lima
Viana do Castelo
Chaves
Bragança
Braga
Vimioso
Vila Nova de Famalicão
Guimarães
Mogadouro
Amarante
Porto
Paredes
Santa Maria Da Feira
Aveiro
Viseu
Guarda
Ciudad Rodrigo
Águeda
Tondela
Covilhã
Figueira da Foz
Coimbra
Coria
Pombal
Castelo Branco
Leiria
Alcobaça
Torres Novas
Abrantes
Cáceres
Rio Maior
Torres Vedras
Santarém
Alenquer
Montijo
Mérida
Loures
Elvas
Badajoz
Lisboa
Montijo
Almendralejo
Évora
Setúbal
Zafra
Santiago do Cacém
Beja
Sines
Odemira
Ourique
Portimão
Loulé
Tavira
Huelva
Vila do Bispo
Lagos
Albufeira
Faro
Sanlúcar de Barrameda
Cádiz
100 km
50 mi





Traits used for population characterization
Field traits 12
Ear traits 27

Iowa 5 traits

Análise Estatística

ANOVA
Sheffé test
Response to selection
BS vs FS for Iowa and Pt

Pollinations

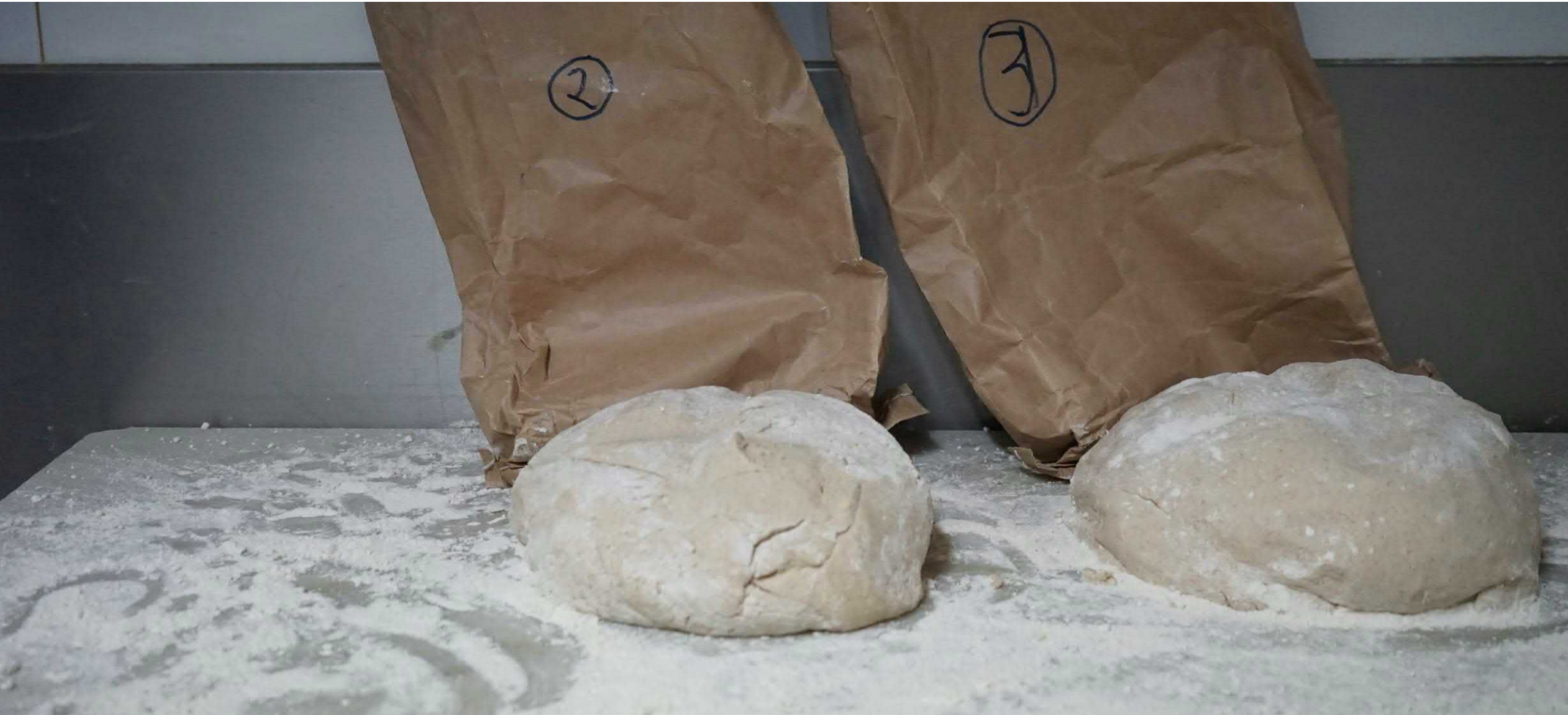
MOLECULAR DATA

Genome-wide association study for kernel composition and flour pasting behavior in wholemeal maize flour
BMC Plant Biology
2019 | journal-article

- DOI: 10.1186/s12870-019-1729-7
- EID: 2-s2.0-85063803006

Source: Carlota Vaz Patto *via* Scopus - Elsevier

FOOD TECHNOLOGY



FOOD TECHNOLOGY

The Portuguese free pollination varieties showed significantly higher levels of protein, lower amylose content and lower viscosity than the commercial hybrid varieties, Vaz Patto *et al.* (2009)

SOCIO-ECONOMIC

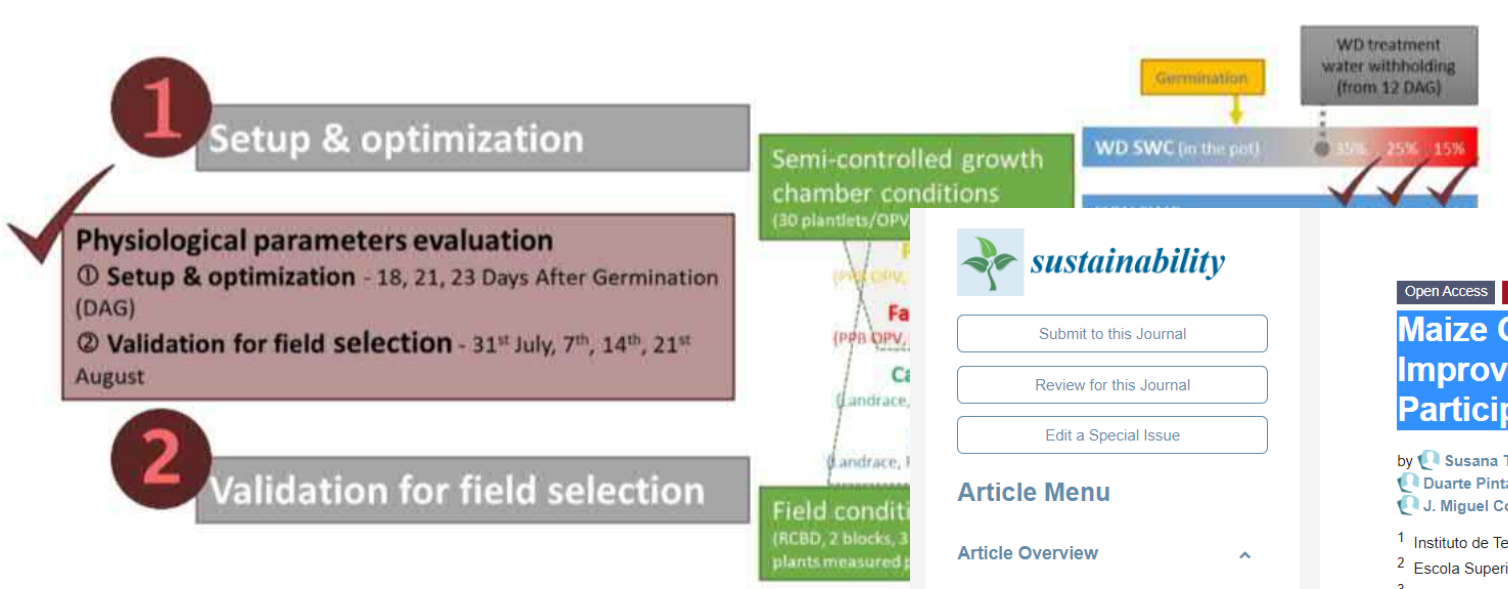
Multiactor approach in defining objectives

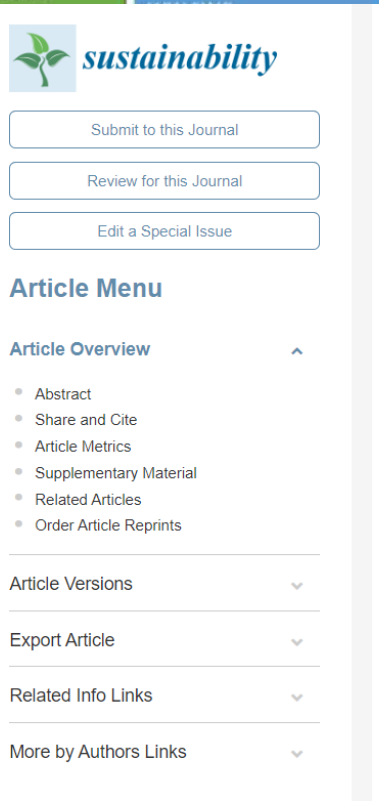

OMSPH3
Broa 164
VA 2005

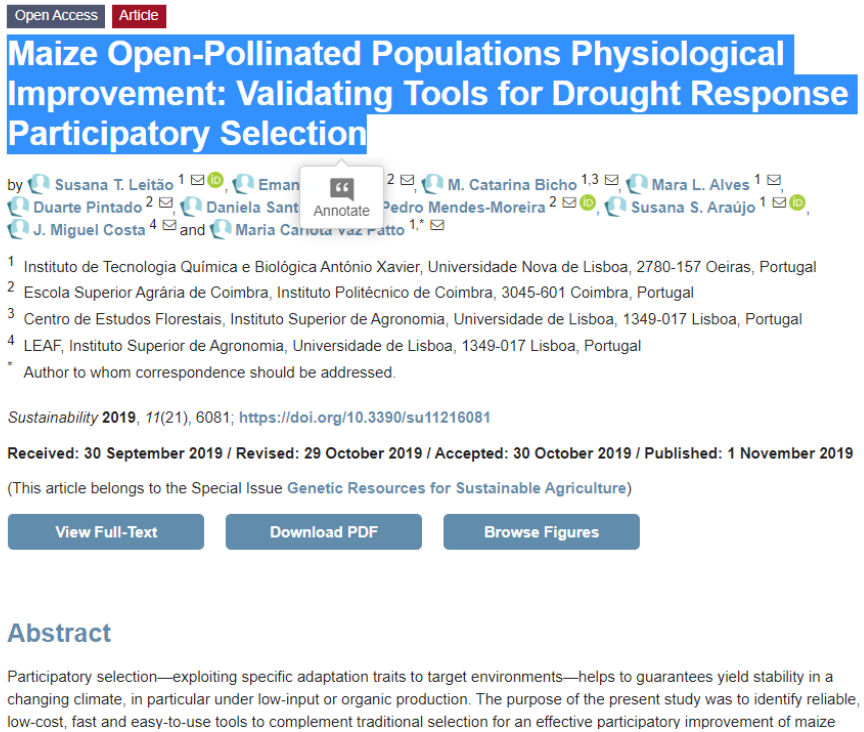
Maize Open-Pollinated Populations Physiological Improvement: Validating Tools for Drought Response Participatory Selection

Objectives and Approach

Objective: Development of rapid screening approaches for drought responses







ITQB UNIVERSIDADE NOVA DE LISBOA
POLITÉCNICO DE COIMBRA ESCOLA SUPERIOR AGRÁRIA

DIVERSIFOOD

Booklet #1
Toolkit to foster multi-actor research
www.diversifood.eu

SOCIO-ECONOMICS

Multi-stakeholder approach in defining objectives, individual and structured interviews

Publication in the Proceedings of the Rural Development 2017 Conference

Dinis, I; Mendes Moreira, P. Padel S.Developing marketing strategies for food diversity: a case-study in northern Portugal

This project has received funding from the European Union's H2020 Programme under grant agreement no 633571

SOCIO-ECONOMICS

- Contribution to local initiatives that can help in the recognition of participatory improvement
- "Best Ear of Sousa Valley competition" providing adequate measurements, indicate best traits for selection and prediction

$$EVA = \text{mlr.varsEV} = -7.030877 + 0.031605 \times KW + 0.387825 \times L + 0.337015 \times R12 - 0.008875 \times KN \quad (13 \text{ and } 14)$$

Mendes-Moreira, P. M., Mendes-Moreira, J., Fernandes, A., Andrade, E., Hallauer, A. R., Pêgo, S. E., & Vaz Patto, M. (2014). Is ear value an effective indicator for maize yield evaluation? Field Crops Research, 161, 75-86. doi:10.1016/j.fcr.2014.02.015

SENSE BUS

VALORIZATION OF GENETIC RESOURCES AND NOT ONLY…

- Empirical knowledge
- Education and training
- Knowledge sharing
- Plant improvement
- PPBMTests

Associação Zea Mais

Promoção da Agrobiodiversidade e do Património Rural

Biodiversidade

Promover a agrobiodiversidade e os serviços ecológicos

Agroecologia

Integrar as ciências modernas com os conhecimentos tradicionais

Saber-fazer

Valorizar o saber-fazer e o património e promover o desenvolvimento

3. CONCLUSIONS

ESAC
ESCOLA SUPERIOR AGRÁRIA
POLITÉCNICO DE COIMBRA

CONCLUSIONS

- There is a discontinuity of the production network gaps that prevent the connection between actors such as the farmer and the consumer;
- Prebreeding are quite important and tools such screening in different locations, heterotic groups and molecular associations can be very important;
- Economic models that have to be created and adapted;
- Need for innovation projects and their national and international connection (e.g. LIVESEED) (Organic Seed Production);
- The VASO programme seeks to improve germplasm and its use so that varieties are attractive to consumers, the processing industry and farmers, responding to public concerns related to health and the environment, increasing the sustainability of agricultural systems and contributing to the short chain and well-being of farmers, but needs greater involvement of national and local actors. (GO)

WE NEED INTERNATIONAL, NATIONAL AND LOCAL SUPPORT

- Placing the importance of maize on the European agenda as a food alternative (vegetarianism can help)
- Legislation that follows from variety to consumer
- Pilot projects that can gain scale
- Projects to gather information and disseminate it
- Recognition of farmers who value diversity and prepare us for climate change, including direct support measures for farmers using traditional varieties under agri-environmental measures.
- Sustainable Feeding Systems - Support the creation of short circuits for the production and marketing of maize in Agroecological and organic systems.

ACKNOWLEDGEMENTS

- **H2020 LIVESEED GA number:** 727230
- **H2020-SFS-2014-2 project DIVERSIFOOD** 633571 and FP7 SOLIBAM
- National Projects: FCT e PDR2020
- **Farmers: Sr. Francisco Meireles**, Engº Luis Tiago Silva, Sr. José António Rocha, Engº Sérgio Pereira, Engº Marco Gaga Nunes
- ADERSOUSA, COPAGRI, CMLousada
- **Researchers**: Silas Pêgo, Carlota Vaz Patto (ITQB), Rosário Bronze (ITQB), Carla Brites (INIAV); João Mendes Moreira (FEUP)
- **Technicians**: João Vaz Patto, Luis Valério
- **Research fellows and thesis work:** (Cláudia Brites, Daniel Gaspar, Manuel Paulo, Emanuel Amaral, Duarte Pintado, Carolina Joaquim, Dario Giglio, Mara Alves, Elsa Mecha, Andreia Bento da Silva, Catarina Bicho, Beatriz Oliveira, Bruna Carbas).

Evolutionary Applications
Open Access
Evolutionary approaches to environmental, biomedical and socio-economic issues

ORIGINAL ARTICLE | Open Access

Long-term on-farm participatory maize breeding by stratified mass selection retains molecular diversity while improving agronomic performance

Mara Lisa Alves, Maria Belo, Bruna Carbas, Cláudia Brites, Manuel Paulo, Pedro Mendes-Moreira, Carla Brites, Maria do Rosário Bronze, Zlatko Šatović, Maria Carlota Vaz Patto

First published: 10 September 2017 | https://doi.org/10.1111/eva.12549 | Cited by: 3

Abstract

Plant Breeding

ORIGINAL ARTICLE

Plant Breeding homepage

Maize participatory breeding in Portugal: Comparison of farmer's and breeder's on-farm selection

Pedro Mendes-Moreira, Zlatko Satovic, João Mendes-Moreira, João Pedro Santos, João Pedro Nina Santos, Silas Pêgo, Maria Carlota Vaz Patto

First published: 17 December 2017 | https://doi.org/10.1111/pbr.12551 | Cited by: 1

Abstract

frontiers in Plant Science | Plant Breeding

ORIGINAL RESEARCH ARTICLE

Front. Plant Sci., 22 December 2017 | https://doi.org/10.3389/fpls.2017.02203

Setting Up Decision-Making Tools toward a Quality-Oriented Participatory Maize Breeding Program

Mara L. Alves[1], Cláudia Brites[2], Manuel Paulo[2], Bruna Carbas[3], Maria Belo[1], Pedro M. R. Mendes-Moreira[2], Carla Brites[3], Maria do Rosário Bronze[1,4,5], Jerko Gunjača[6,7], Zlatko Šatović[6,7] and Maria C. Vaz Patto[1*]

[1]Instituto de Tecnologia Química e Biológica António Xavier, Universidade Nova de Lisboa, Oeiras, Portugal