BRESOV

Breeding for Resilient, Efficient and Sustainable Organic Vegetable production

Project presentation

Breeding for Resilient, Efficient and Sustainable Organic Vegetable production (GA 774244)

'Mejora genética para una produción vegetal sostenible, orgánica y eficiente'

- Dr. Juan Jose Ferreira, Head of Plant Genetic Group, SERIDA

- 4 december 2018, Llanera, Asturias, Spain

The BRESOV project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 774244.

Main questions

- Why the BRESOV project?
- What are the objectives?
- SERIDA partner;

What are we doing in the BRESOV project?

BRESOV

www.bresov.ue

Tweets by @BRESOV_EU

Food production challenges

Adaptation to climatic change

Sustainable production in agriculture

Healthy production in agriculture

Social demand on food quality and quantity

Organic production

'Organic production is a farming system which avoids the use of man-made fertilisers, pesticides; growth regulators, irradiation and the use of genetically modified organisms (GMOs) or products produced from or by GMOs'

Increasing the competitiveness of the organic

Common bean uses

Phaseolus vulgaris L.

Snap bean

dry bean

Bean is a legume, fixed nitrogen

fresh consumption

consumption in pre-cooked

H2020: **Work Programme 2016 - 2017**

Societal Challenges 2. *Food security, sustainable agriculture and forestry, marine and maritime and inland water research and the bioeconomy*

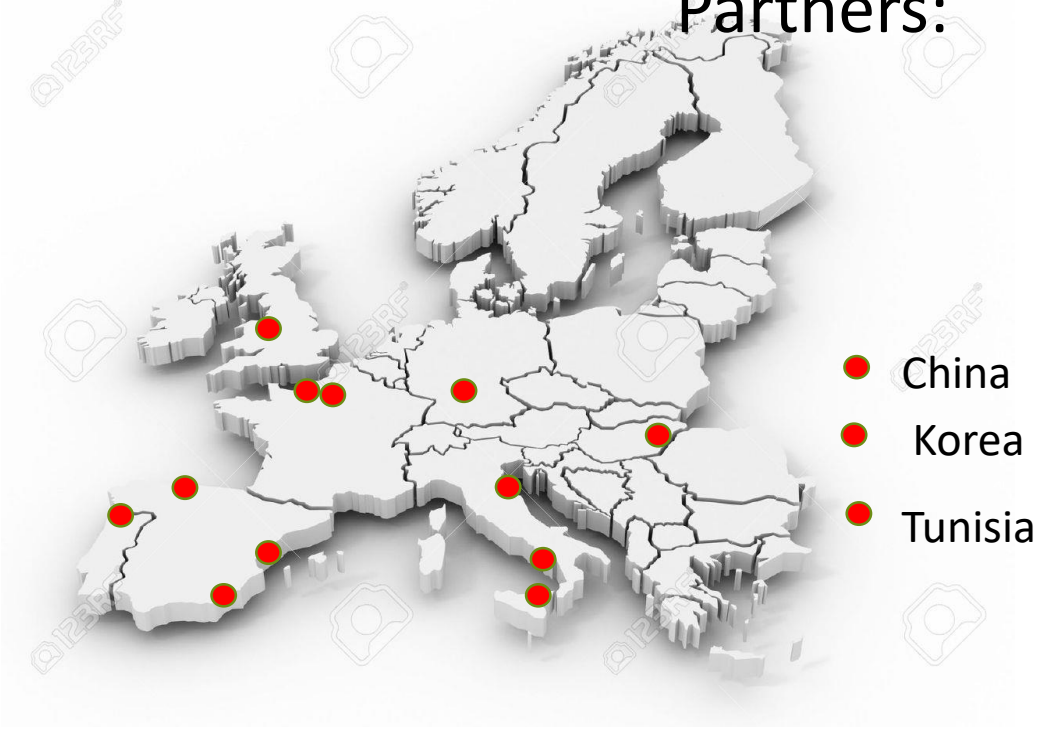
SFS-07-2016-2017: Organic breeding – Increasing the competitiveness of the organic breeding and farming sectors

Scope: Proposals will develop a range of measures to **increase the availability of organic seeds and varieties for the organic sector.** Work will allow **identifying relevant combinations of traits suited to organic farming conditions, make better use of genetic resources, test existing varieties for organic production, and initiate breeding programmes in response to identified needs of the sector.** Proposed activities will be based on partnerships between the breeding, farming and research sectors and fall under the concept of **the multi-actor approach**. Particular attention will be given **to demonstration, testing and training activities** in particular in EU Member States where the organic sector is less developed and has particular needs. The topic is open to all types of organic farming systems (e.g. arable farming, horticulture including aromatic and herbs, fruit trees, grasslands, mixed) in various geographical and pedo-climatic and conditions. Selected projects will be requested to work together closely and link up with (the) project(s) funded under SFS-7-2016 topic.

http://ec.europa.eu/programmes/horizon2020/en/h2020-section/

Consortium BRESOV ‘Breeding for Resilient, Efficient and Sustainable Organic Vegetable production’

Partners:



1	UNICT	**UNIVERSITA DEGLI STUDI DI CATANIA (coord)**	IT
2	ESA	EUROPEAN SEED ASSOCIATION	BE
3	UAL	UNIVERSIDAD DE ALMERIA	ES
4	UTAD	UNIVERSIDADE DE TRAS-OS-MONTES E ALTO DOURO	PT
5	VURV	VYZKUMNY USTAV ROSTLINNE VYROBY VVI	CZ
6	FiBL	FORSCHUNGSINSTITUT FUR BIOLOGISCHENLANDBAU STIFTUNG	CN
7	UNIVPM	UNIVERSITA POLITECNICA DELLE MARCHE	IT
8	VEG	Vegenov-BBV FR	FR
9	UNILIV	THE UNIVERSITY OF LIVERPOOL	UK
10	UPV	UNIVERSITAT POLITECNICA DE VALENCIA	ES
11	VRDS	Vegetable Research and Development Station, Bacau	RO
12	CREA	CONSIGLIO PER LA RICERCA IN AGRICOLTURA E L'ANALISI DELL'ECONOMIA AGRARIA	IT
13	BVRC	Beijing Vegetable Research Center of Beijing Academy of Agriculture and Forestry Sciences	CN
14	ZAAS	ZHEJIANG ACADEMY OF AGRICULTURAL SCIENCES	CN
15	UTM	UNIVERSITE DE TUNIS EL MANAR	TN
16	SERIDA	**Agri-Food Research and Development Regional Service**	ES
17	PSR	PROSPECIERARA	CH
18	ITAKA	ITAKA SRL	IT
19	INRA I	NSTITUT NATIONAL DE LA RECHERCHE AGRONOMIQUE	FR
20	UNICHU	Chungnam National University	KR
21	SECL	Station essais en cultures légumières du 22	FR
22	EURICE	EURICE EUROPEAN RESEARCH AND PROJECT OFFICE GMBH	DE

22 partners ; 13 countries

Objetives:

The main aim of the project is to improve the competitiveness of three of the most economically important vegetable crop families (*Brassicaceae*, *Fabaceae*, *Solanaceae* species) when grown in an organic production system; **broccoli, common bean and tomato**:

- **exploring the genetic** diversity with advanced genomic and phenomic approaches and applying novel markers and traits discovered in the selection of new breeding material for organic breeding.

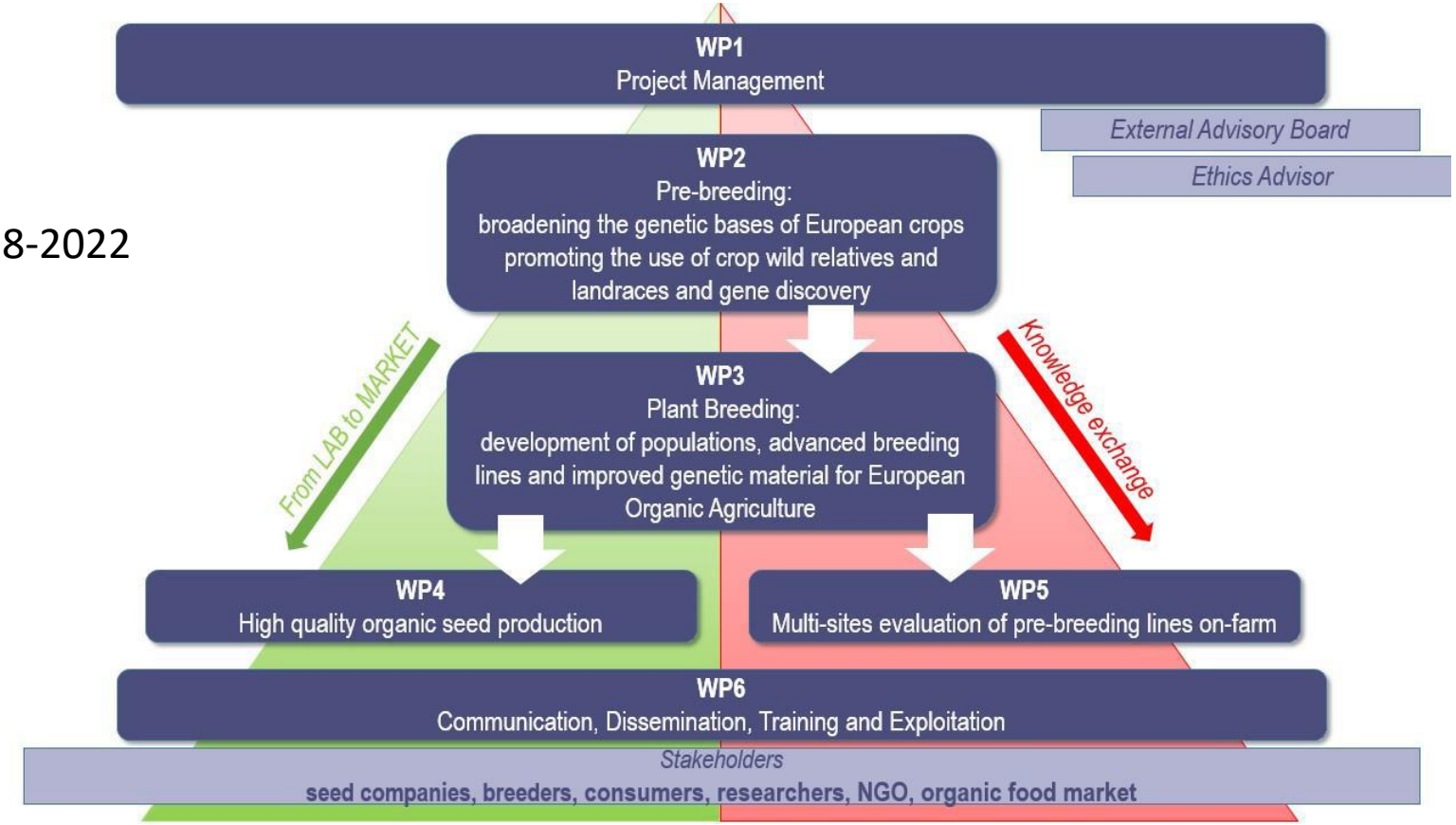
- **Investigating the adaptation** of germplasm to organic production and the response to biotic and abiotic stresses.

- **creating a pipeline for** crop improvement that will accelerate breeding activities and production of high quality organic seed.

Organization

Six specific objetives → Six work packages → 42 deliverables

2018-2022



WP2. Genetic resources and prebreeding: Tasks 2.1, 2.2, 2.3, 2.4 and 2.5

European institutions, genebanks and companies

→ Local germoplasm (landraces)

→ -breeding lines

→ -Elite cultivars

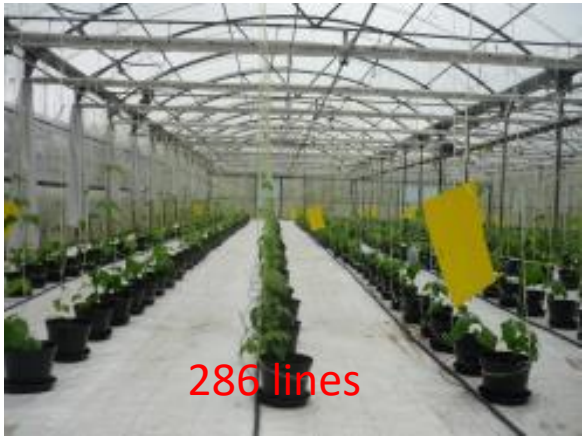
Hiper Core collection (HCC)

Snap Bean Panel (SBP)

WP2. Genetic resources and prebreeding: Tasks 2.1, 2.2, 2.3, 2.4 and 2.5

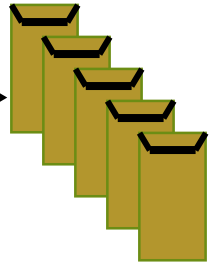
SNAP BEAN PANEL (300) + Hyper Core Collection (80)

Self-crossing of individual plants



Multiplication of lines (july-novembre 2018)

Seed distribution to partners



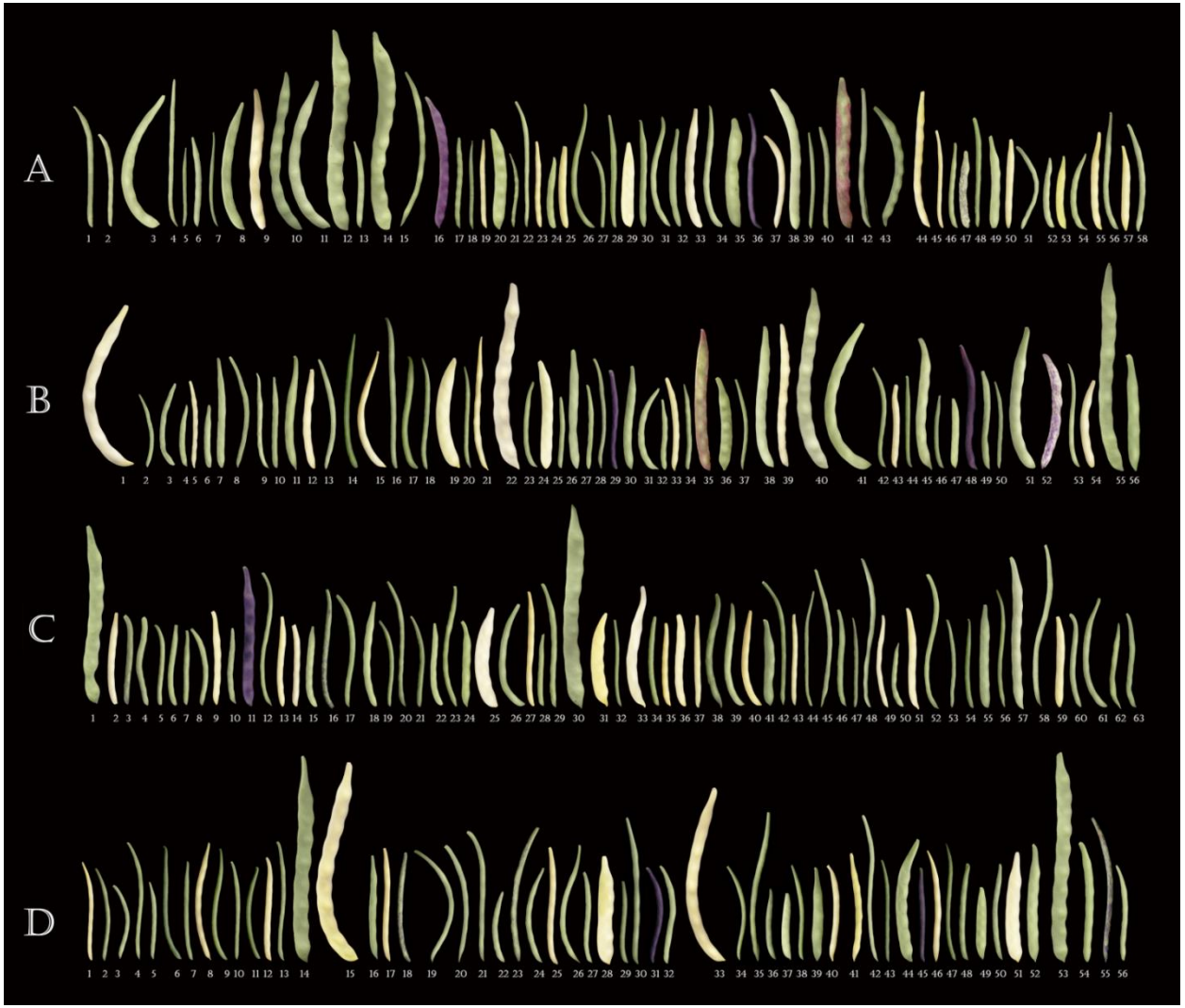
INRA-Paris
UNIVPM
VRDS Bacau
SERIDA

DNA isolation → **UNIVPM** → Masive Genotyping (GBS)

Preliminar phenotyping (qualitative) → Phenotyping → Database

245 lines, one pod per line

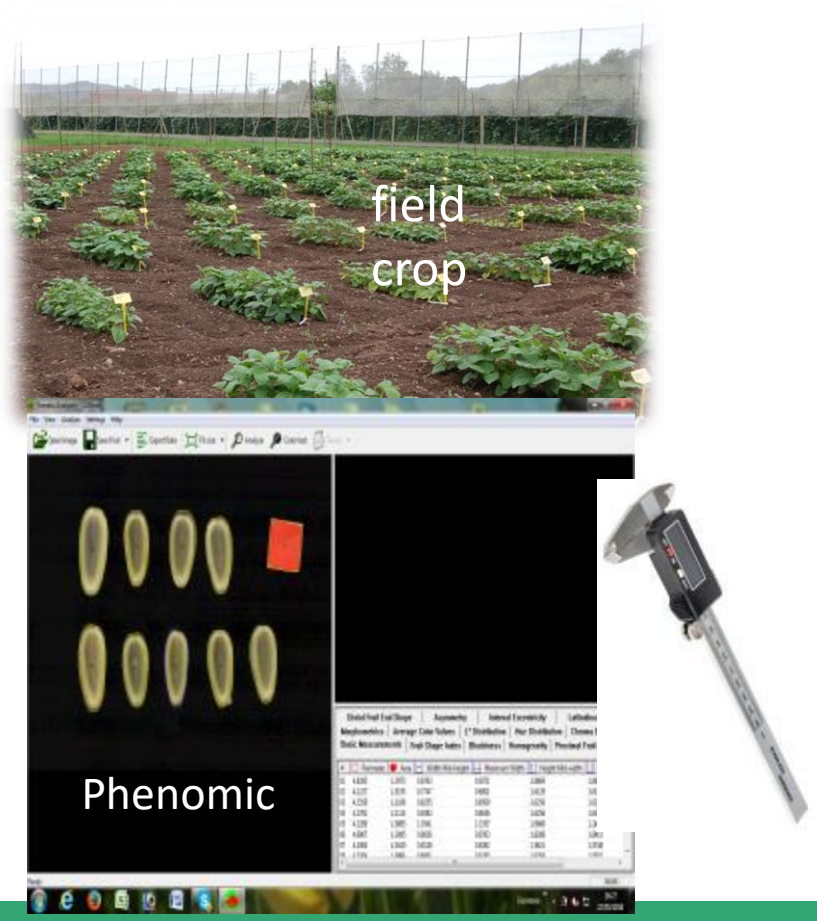
Snap Bean Panel.
Pod phenotypic
Diversity



Type of variation??:
-Growth habit
-Gene pol
-Response to pathogens
-Fiber
-Sugar conten
-Polyphenol contents
…

WP2. Genetic resources and prebreeding : Phenotyping

Morpho-agronomic traits



Results:

Data base including phenotypic traits to classification

Data to forward genetic analysis (GWAS)

Adaptation to organic system (Europe)

Identification of the best genotypes for organic production in Europe

↓

Use of genetic resources

Accelerating the breeding process

WP2. Genetic resources and prebreeding : Phenotyping

Resistance to disease

Results:

Data to forward genetic analysis

Identification of resistance sources to plant breeding

Investigation of causes of adaptation to organic system

↓

> Use of genetic resources
> Identifying relevant combinations of traits suited to organic farming condition

Snap bean panel (SBP) - > selections

The best cultivars will be tested in Asturias, in organic fields of local farmers (COPAE)

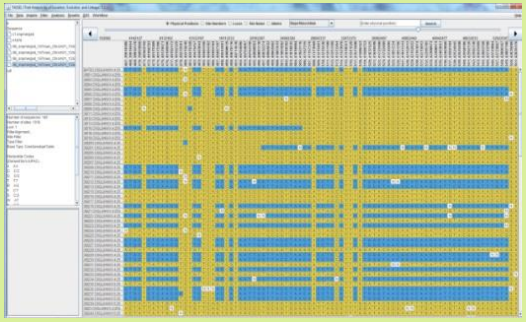
Field days to farmers, students and cooks → Dissemination to local organic farmers

WP2. Genetic resources and prebreeding: Tasks 2.1, 2.2, 2.3, 2.4 and 2.5

Panels

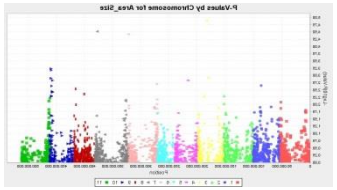
Snap Bean Panel (SBP)

* Genotyping

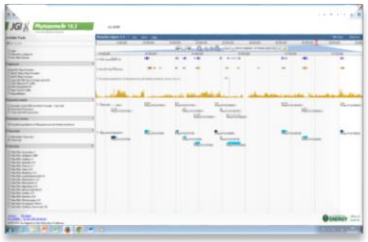


* Phenotyping

Assotiation mapping (GWAS)



Candidate gene



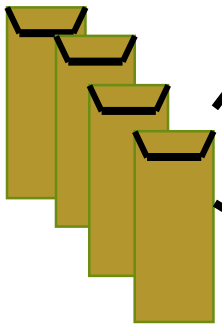
Validation and use

WP2. Genetic resources and prebreeding: Tasks 2.1, 2.2, 2.3, 2.4 and 2.5

Musica TU

TUM RIL population->

X

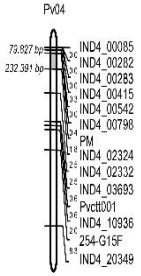


TUM RIL population
180 F2:6 lines

Genotyping (GBS)
98503 SNPs

Pod morphological phenotyping in field

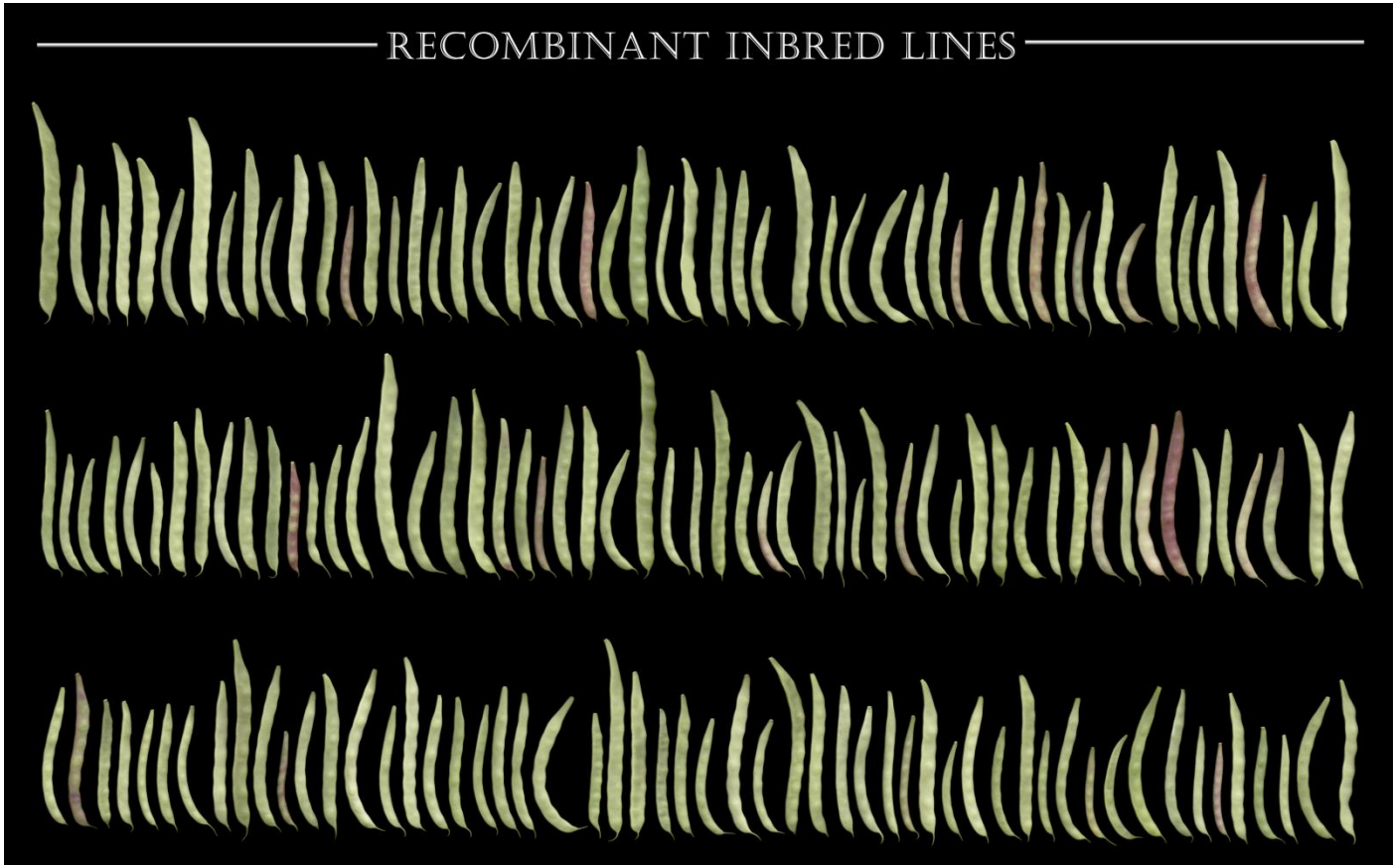
Pod chemical phenotyping; sugars and fiber



QTL mapping

Tools to plant breeding

Pod phenotypic variation observed in the recombinant inbred population TUM



Why is a line snap bean?

WP2. Genetic resources and prebreeding: Tasks 2.1, 2.2, 2.3, 2.4 and 2.5

GWAS in snap bean panel ↓

TUM RIL population ↓

Results; **new tools to plant breeding:**

- Identification of genes or QTL assotiated to morphological pod traits
- Identification of genes or QTL assotiated to chemical pod traits
- Identification of putative genes involved in snap bean traits
- Selection of markers to genomic assisted selection

→ Companies and breeders

→ **Accelerating the breeding process**

WP3. Breeding : Tasks 3.2, 3.3, 3.4

INTROGRESION LINES

300 introgresion lines, 2 parents (MIDAS + MG38) a 6 advance lines supplied by **UNIVPM**

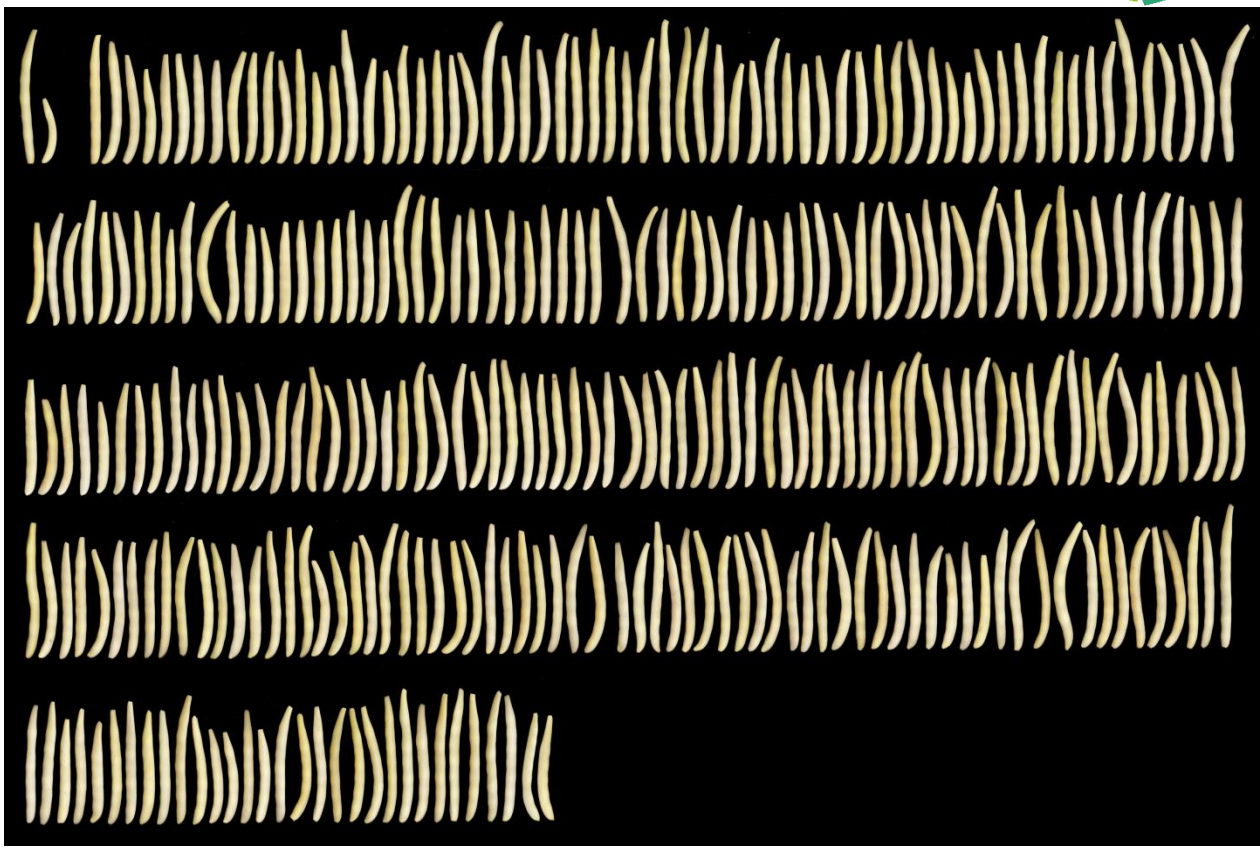
Seedlings

Transplanting

Field in organic management

Morpho agronomic phenotyping ➡ Adaptation to organic production

Pod phenotypic variation in introgresion lines (2018) obtained from the cross Midas x MG38



Results

> Lines to plant breeding or new cultivars adaptated to organic production -> **Initiate breeding programmes**

> Identification of QTL assotiated to pod traits (mophological) and markers to breeding **->Accelerating the breeding process to organic production**

Partner 16: SERIDA

Plant genetic

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SUPPORTER

CONSEJO DE LA PRODUCCIÓN AGRARIA ECOLÓGICA
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COPAE
PRINCIPADO DE ASTURIAS

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