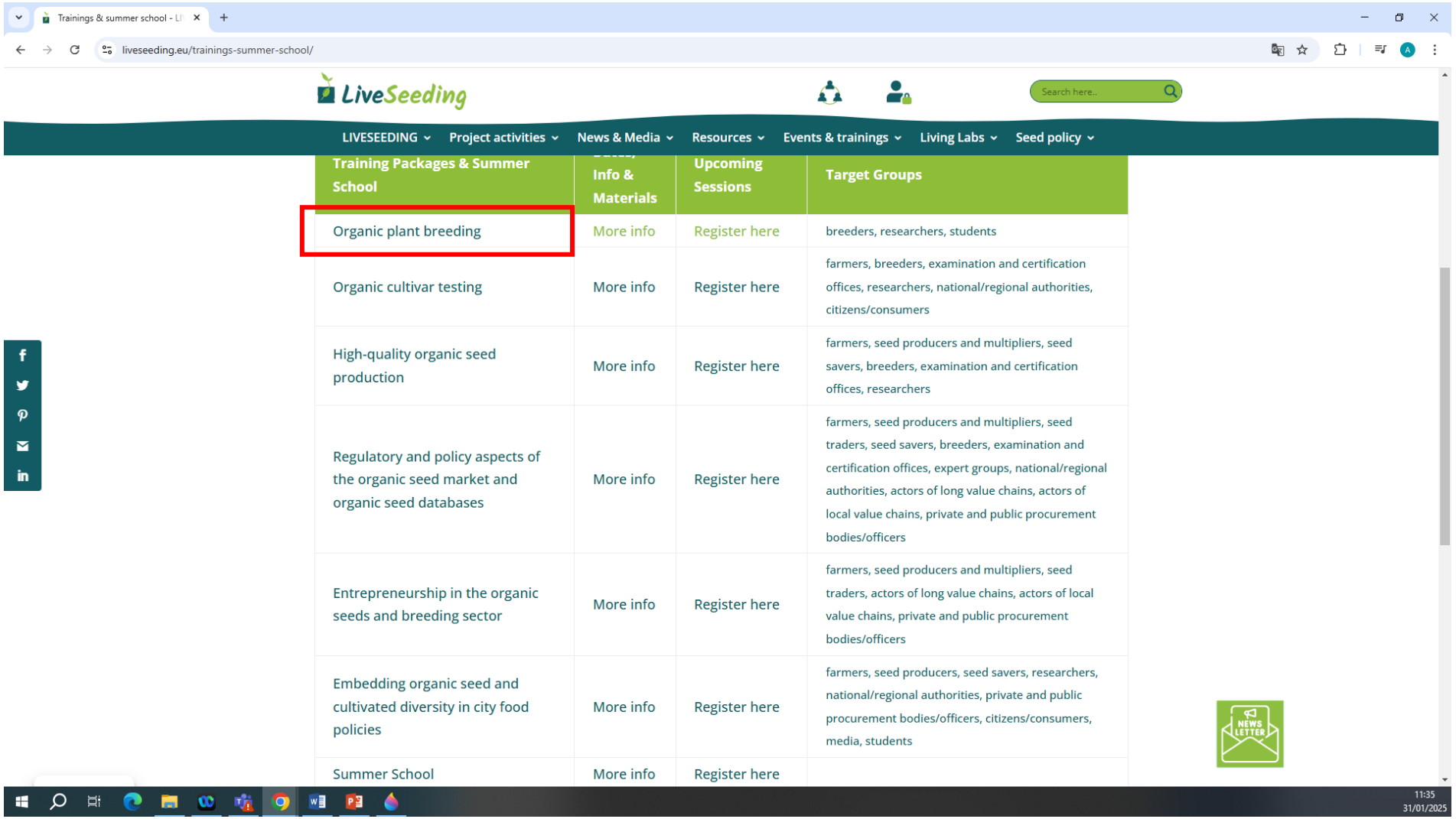


TRAINING IN ORGANIC BREEDING!

LiveSeeding

CONTEXT: Training in LIVESEEDING project

https://liveseeding.eu/trainings-summer-school/



Training Packages & Summer School	Info & Materials	Upcoming Sessions	Target Groups
Organic plant breeding	More info	Register here	breeders, researchers, students
Organic cultivar testing	More info	Register here	farmers, breeders, examination and certification offices, researchers, national/regional authorities, citizens/consumers
High-quality organic seed production	More info	Register here	farmers, seed producers and multipliers, seed savers, breeders, examination and certification offices, researchers
Regulatory and policy aspects of the organic seed market and organic seed databases	More info	Register here	farmers, seed producers and multipliers, seed traders, seed savers, breeders, examination and certification offices, expert groups, national/regional authorities, actors of long value chains, actors of local value chains, private and public procurement bodies/officers
Entrepreneurship in the organic seeds and breeding sector	More info	Register here	farmers, seed producers and multipliers, seed traders, actors of long value chains, actors of local value chains, private and public procurement bodies/officers
Embedding organic seed and cultivated diversity in city food policies	More info	Register here	farmers, seed producers, seed savers, researchers, national/regional authorities, private and public procurement bodies/officers, citizens/consumers, media, students
Summer School	More info	Register here	

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Training in organic breeding organized in 5 Modules

1. **Module 1** - Plant Genetic Resources (PGRs): collection, conservation and exchange to support the increase of agrobiodiversity in farming systems
2. **Module 2 - Phenomics: approaches and tools for genetic resources and breeding material characterization - FEBRUARY 3rd 2025, 9:00 to 17:30 CET**
3. **Module 3** - Breeding methods fundamentals - FEBRUARY 13th 2025, 9:00 to 18:00 CET
4. **Module 4** - Development and application of molecular methods in organic breeding - MARCH 4th 2025, 9:00 to 18:00 CET
5. **Module 5** - Organic heterogeneous material (OHM) design and development - MARCH 7th 2025, 9:00 to 18:00 CET

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February 3rd 2025 - 9:00 to 17:30 CET

Unit 2.1: Main descriptors used worldwide in characterizing plant genetic resources

- 9:00-10:30 - UPV (Adrian Rodríguez-Burruezo)
- 10:30-11:00 Break

Unit 2.2: Intro to ShineMas: a web tool dedicated to Seed Lots History, Phenotyping and Cultural Practices[1]

- 11:00-12:30 - INRAe (Yannick de Oliveira, Isabelle Goldringer)
- 12:30-14:00 Lunch Break

Unit 2.3: Guidelines and examples of good practices in data management

- 14:00-15:30 - INRAe (Yannick de Oliveira, Isabelle Goldringer)
- 15:30-16:00 Break

Unit 2.4: Methods for phenotyping and selection of agronomic traits of interest in organic farming

- 16:00-17:30 - IPC (Pedro Mendes Moreira)

1 - An extra practical session to use the tool with own data is scheduled for FEB 10th (9-12h)

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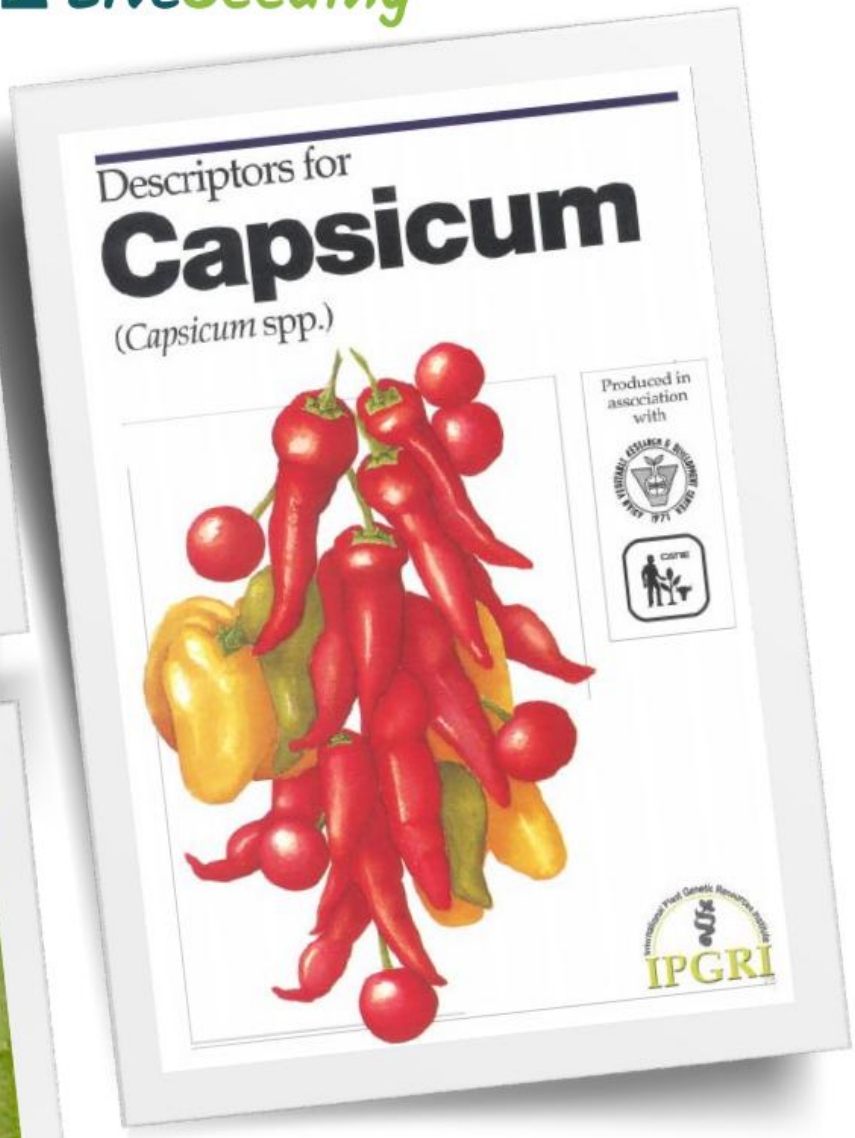

Training in organic breeding

Module 2: Phenomics: approaches and tools for genetic resources and breeding material characterisation

Unit 2.1: Main descriptors used worldwide in characterizing plant genetic resources

Author: Adrian Rodríguez-Burruezo

Co-funded by the European Union

Funded by the European Union, the Swiss State Secretariat for Education, Research and Innovation (SERI) and UK Research and Innovation (UKRI).

UK Research and Innovation

Module 2 – Unit 1 Phenomics: approaches and tools

Planned for today

DYNAMIC MIXTURE OF:

1. *Presentation about main topics on phenomic descriptors: utility, types, examples of descriptors, management of data, knowledge, additional material (50 min)*
2. Guided virtual visits (about 10-15 min)
3. Fast quiz (about 10 min) ***
4. Debate, Wrap up & Proposed homework (about 10 min) ***
5. QUESTIONS: THROUGH THE CHAT (Petra Jelincic will manage)

*** = IMPORTANT for CERTIFICATES

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SEND TO BOTH: adrodbur@doctor.upv.es petra.jelincic@ips-konzalting.hr

Module 2 – Unit 1 Phenomics: approaches and tools

Characterization of plant genetic resources (PGRs)

- PGRs can be: Landraces/heirlooms, breeding lines, wild relatives,...
- For their efficient management, it is of paramount importance… being aware of their diversity
- HOW? Catalogue PGRs based on objective description
- Actors using:

Seedbanks (essential) Level 2 info: “Characterization data”

Breeders, farmers

Seed companies

Module 2 – Unit 1 Phenomics: approaches and tools

Descriptors?

- Many ways to describe variation:…… ¿?
- *DESCRIPTORS = Phenological traits**
- *High inheritance (which means…..??)
- Compiled in a list, ordered by blocks

1. Plant vegetative traits:

General development

Branches

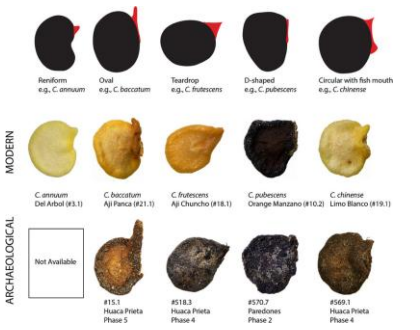
Leaves

2. Plant reproductive traits:

Flowers/inflorescences

Fruits/infrutescences

Seeds



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Descriptors. Why?

- *Essential to manage agrobiodiversity/PGRs in hands of:*
  - *Seedbanks (germplasm collections)*
  - *Breeders (germplasm, prebreeding materials, breeding lines, etc.)*
  - *Farmers (landraces, traditional varieties, ecotypes, etc.)*
- *Being aware of the materials you have*
- *Check the level of diversity you have*
- *Comparison to other collections in hands of other actors*
- *Detecting duplicates, establishing core collections, know the types you need to enrich the diversity of your collections*
- *LIMITATION: there are many descriptors, but better to work with those which best encompass the diversity present on a crop and its relatives (comprehensive & discriminating ability)*

Module 2 – Unit 1 Phenomics: approaches and tools

Examples of descriptors

- *BIOVERSITY International (former IPGRI)*

https://alliancebioversityciat.org/

Alliance

Bioversity International

CIAT
International Center for Tropical Agriculture
Since 1967 Science to cultivate change

- *High throughput digital tools*

e.g. Tomato analyser

Developed in E. Van der Knapp lab

https://vanderknaaplab.uga.edu/tomato-analyzer/

- *Online tools: e.g. Seedlinked*

SeedLinked

"We connect plant growers and their data to help breed, source, and harvest the best seeds"

https://seedlinked.com

Module 1 – Unit 1 Public/Institutional Seedbanks

PRACTICAL:

1. Guided visit to BIOVERSITY Descriptors
   + example with excel compiled data
2. Guided visit to TOMATO ANALYZER webpage
   + example of UPV lab results with own data
3. Seedlinked (short)

Module 1 – Unit 1 Public/Institutional Seedbanks

1. VISIT TO:

Alliance

Bioversity International

CIAT
International Center for Tropical Agriculture
Since 1967 Science to cultivate change

https://alliancebioversityciat.org/

PLEASE.

STILL DO NOT ENTER!!!

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Module 1 – Unit 1 Public/Institutional Seedbanks

1. VISIT TO:

EXAMPLE UPV

Alliance

Bioversity International

CIAT
International Center for Tropical Agriculture
Since 1967 Science to cultivate change

frontiers | Frontiers in Plant Science

TYPE Original Research
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OPEN ACCESS

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Genetic diversity, population structure, and phylogeny of insular Spanish pepper landraces (*Capsicum annuum* L.) through phenotyping and genotyping-by-sequencing

Neus Ortega-Albero[1], Lorenzo Barchi[2], Ana Fita[1], Miguel Díaz[1], Felipe Martínez[1], Joana-Maria Luna-Prohens[3] and Adrián Rodríguez-Burruezo[1*]

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Module 1 – Unit 1 Public/Institutional Seedbanks

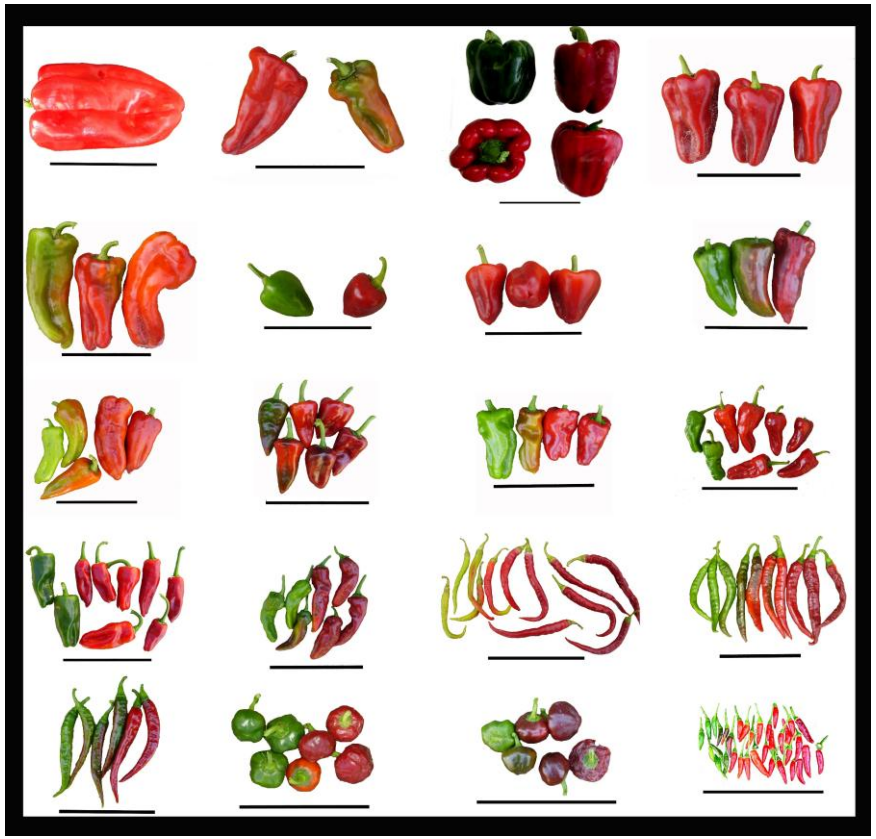
1. VISIT TO:

Alliance

Bioversity International

CIAT
International Center for Tropical Agriculture
Since 1967 Science to cultivate change

Example fruit characterization. *Capsicum* peppers COMAV -UPV



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Module 1 – Unit 1 Public/Institutional Seedbanks

2. VISIT TO:

TOMATO ANALYZER

https://vanderknaaplab.uga.edu/tomato-analyzer/

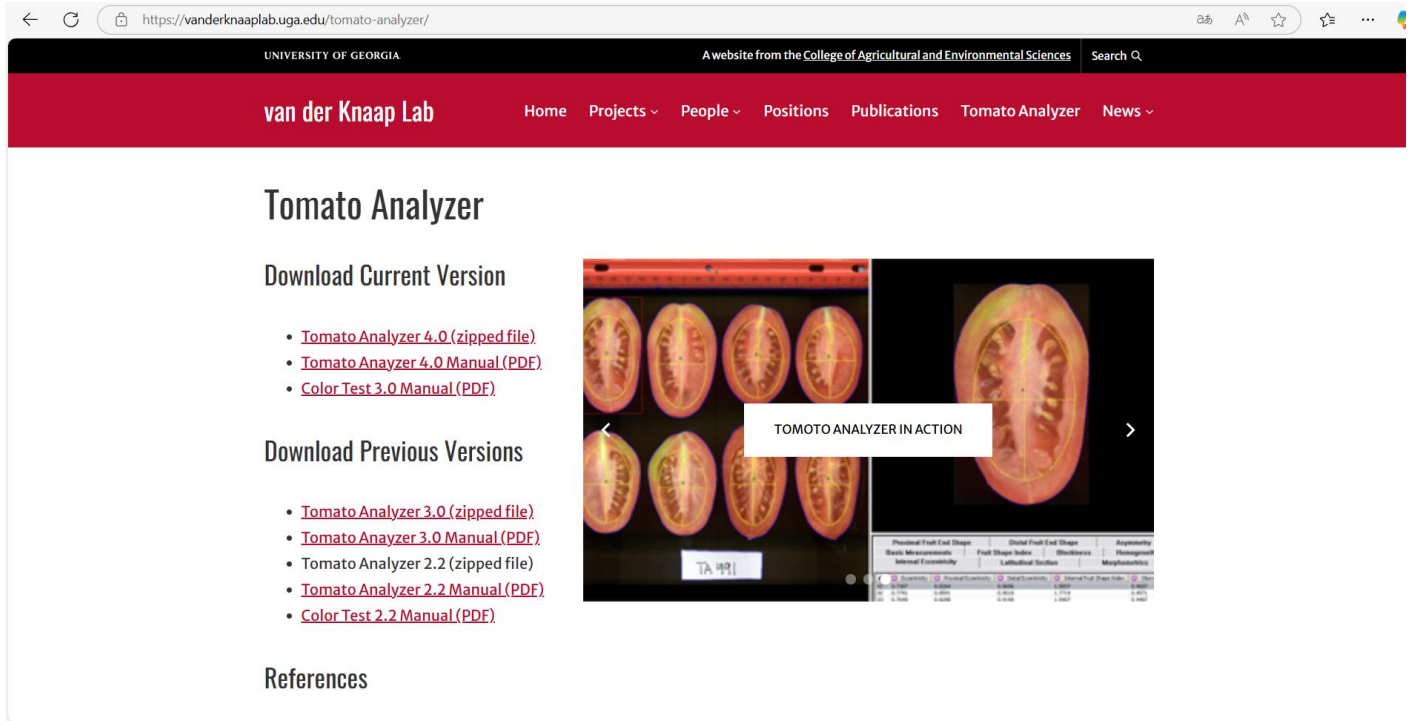
Developed in E. Van der Knapp lab

PLEASE.

STILL DO NOT ENTER!!!

BASED ON:

CUT FRUIT SCANNED PICTURES



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Module 2 – Unit 1 Phenomics: approaches and tools

OTHER EXAMPLES OF Tomato Analyzer:

Scientia Horticulturae 164 (2013) 625–632

Contents lists available at ScienceDirect

Scientia Horticulturae

journal homepage: www.elsevier.com/locate/scihorti

Phenomics of fruit shape in eggplant (*Solanum melongena* L.) using Tomato Analyzer software

Maria Hurtado, Santiago Vilanova, Mariola Plazas, Pietro Gramazio, F. Javier Herraiz, Isabel Andújar, Jaime Prohens *

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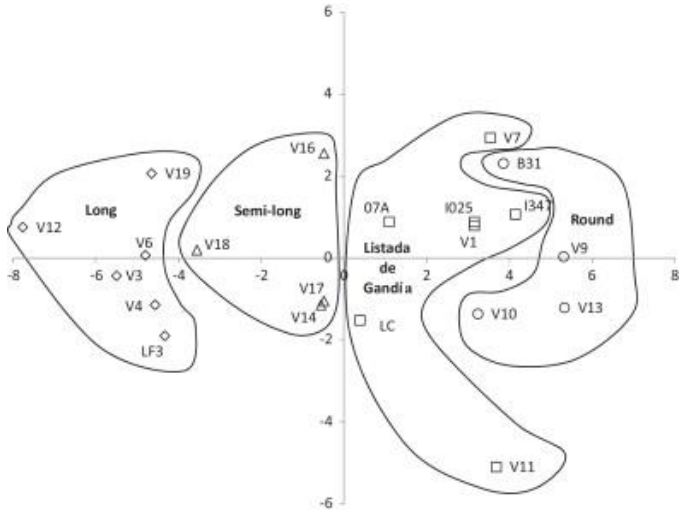

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Module 1 – Unit 1 Public/Institutional Seedbanks

3. SHORT VISIT TO:

SeedLinked https://seedlinked.com

PLEASE.

STILL DO NOT ENTER!!!

Module 2 – Unit 1 Phenomics: approaches and tools

EXAMPLE OF UTILITY BY USING BOTH:

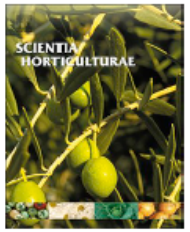
Descriptors & Tomato Analyzer (alone and together)

Scientia Horticulturae 265 (2020) 109245

Contents lists available at ScienceDirect

Scientia Horticulturae

journal homepage: www.elsevier.com/locate/scihorti



Phenomics of elite heirlooms of peppers (*Capsicum annuum* L.) from the Spanish centre of diversity: Conventional and high-throughput digital tools towards varietal typification

Leandro Pereira-Dias[a], Ana Fita[a,*], Santiago Vilanova[a], Elena Sánchez-López[b], Adrián Rodríguez-Burruezo[b]

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[b] *Instituto Murciano de Investigación Agraria y Alimentaria, C/Mayor s/n, La Alberca-Murcia, 30150, Spain*

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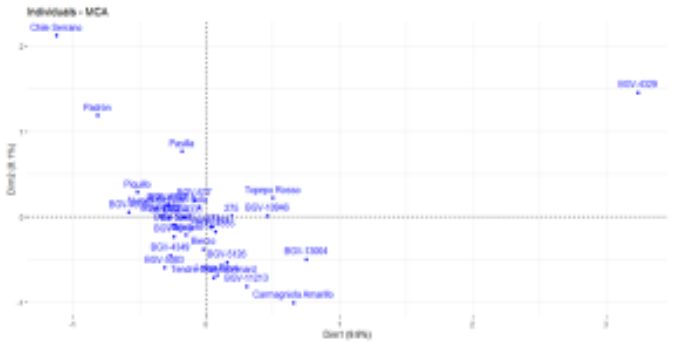
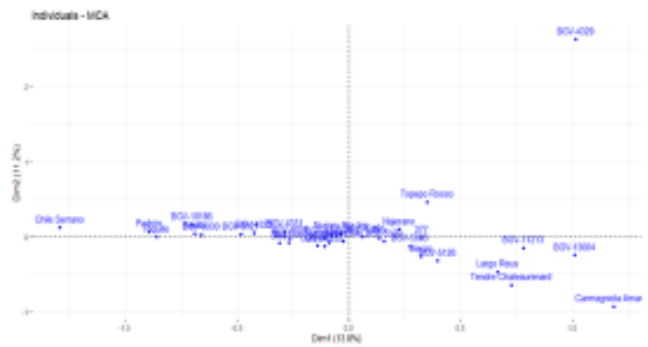
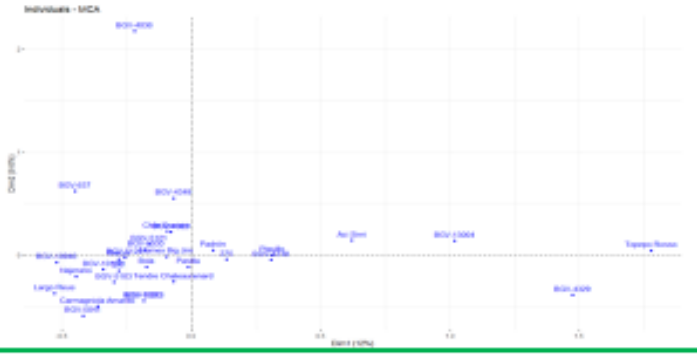
EXAMPLE OF UTILITY BY USING BOTH:

Descriptors & SeedLinked (alone and together)

Module 2 – Unit 1 Phenomics: approaches and tools

Peppers, 40 varieties

	Location 1 - Meliana	Location 2 - Picassent
Conventional descriptors		
SeedLinked		

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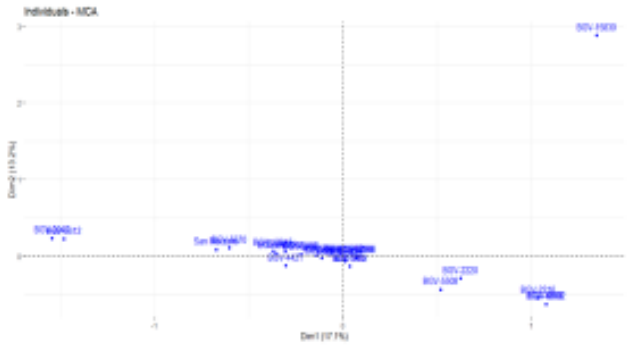
Module 2 – Unit 1 Phenomics: approaches and tools

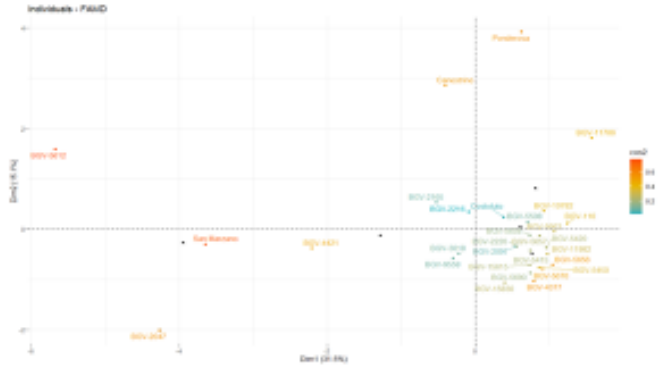
Tomatoes, 40 varieties

Location 1 - Meliana

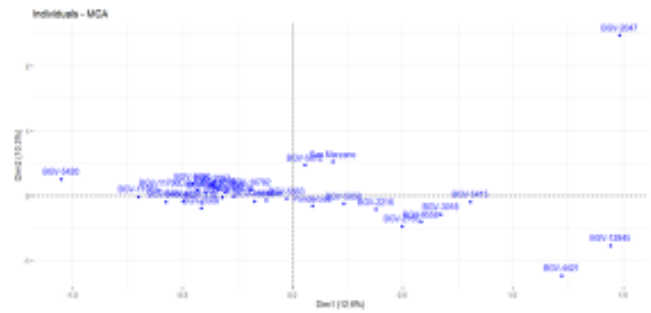
Location 2 - Picassent

Conventional descriptors





SeedLinked



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Module 1 – Unit 1 Public/Institutional Seedbanks

FAST QUIZ

- *Question 1: Why are descriptors useful?*
- *Question 2: Name 5 species covered by BIOVERSITY descriptors*
- *Question 3: What raw info is essential to work with Tomato Analyzer*
- *Question 4: What is SEEDLINKED?*

Send to :

adrodbur@doctor.upv.es and petra.jelincic@ips-konzalting.hr

In 10 min

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Module 1 – Unit 1 Public/Institutional Seedbanks

DEBATE

- *Revise the quiz in common*
- *Have you heard about these tools before?*
- *What´s the most useful for your work at this moment*
- *Other questions and doubts*

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WRAP UP

- *What we have learned today?*
- *Proposed homework: Case of study. 2-3 accessions of one species of your interest, close to you, and characterise as much as possible, according to the corresponding BIOVERSITY descriptors. Prepare an excel with the data compiled.*

And send to :

adrodbur@doctor.upv.es and petra.jelincic@ips-konzalting.hr

By next Monday 10th february

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Additional available materials

1. Operational Genebank Manual. Centre for Genetic Resources, The Netherlands (CGN-WUR). And others manuals: https://www.ecpgr.org/aegis/aquas/genebank-manuals
2. IPGRI/Bioversity international descriptors: https://cgspace.cgiar.org/collections/835fa638-0167-4669-9532-ffc488facc94
3. Gotor, E., Alercia, A., Rao, V.R., Watts, J., Caracciolo, F., 2008. The scientific information activity of Bioversity International: the descriptor lists. Genet. Resour. Crop Evol. 55: 757–772. https://doi.org/10.1007/s10722-008-9342-x
4. Tomato Analyzer: https://vanderknaaplab.uga.edu/tomato-analyzer/
5. Tomato Analyzer VIDEO REFERENCE: Rodriguez, G.R., Moyseenko, J.B., Robbins, M.D., Huarachi Morejon, .N, Francis, D.M., van der Knaap, E.(2010). Tomato Analyzer: A Useful Software Application to Collect Accurate and Detailed Morphological and Colorimetric Data from Two-dimensional Objects. JoVE 37.
5. Seedlinked: https://seedlinked.com/
6. Ortega-Albero N, Barchi L, Fita A, Diaz M, Martinez F, Luna-Prohens J-M and Rodriguez-Burruezo A (2024) Genetic diversity, population structure, and phylogeny of insular Spanish pepper landraces (Capsicum annuum L.) through phenotyping and genotyping-by-sequencing. Front. Plant Sci. 15:1435427. doi: 10.3389/fpls.2024.1435427
7. Pereira-Dias L, Fita A, Vilanova S, Sánchez-López E, Rodríguez-Burruezo A. 2020. Phenomics of elite heirlooms of peppers (Capsicum annuum L.) from the Spanish centre of diversity: Conventional and high-throughput digital tools towards varietal typification. Scientia Horticulturae 265: 109245. https://doi.org/10.1016/j.scienta.2020.109245.

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