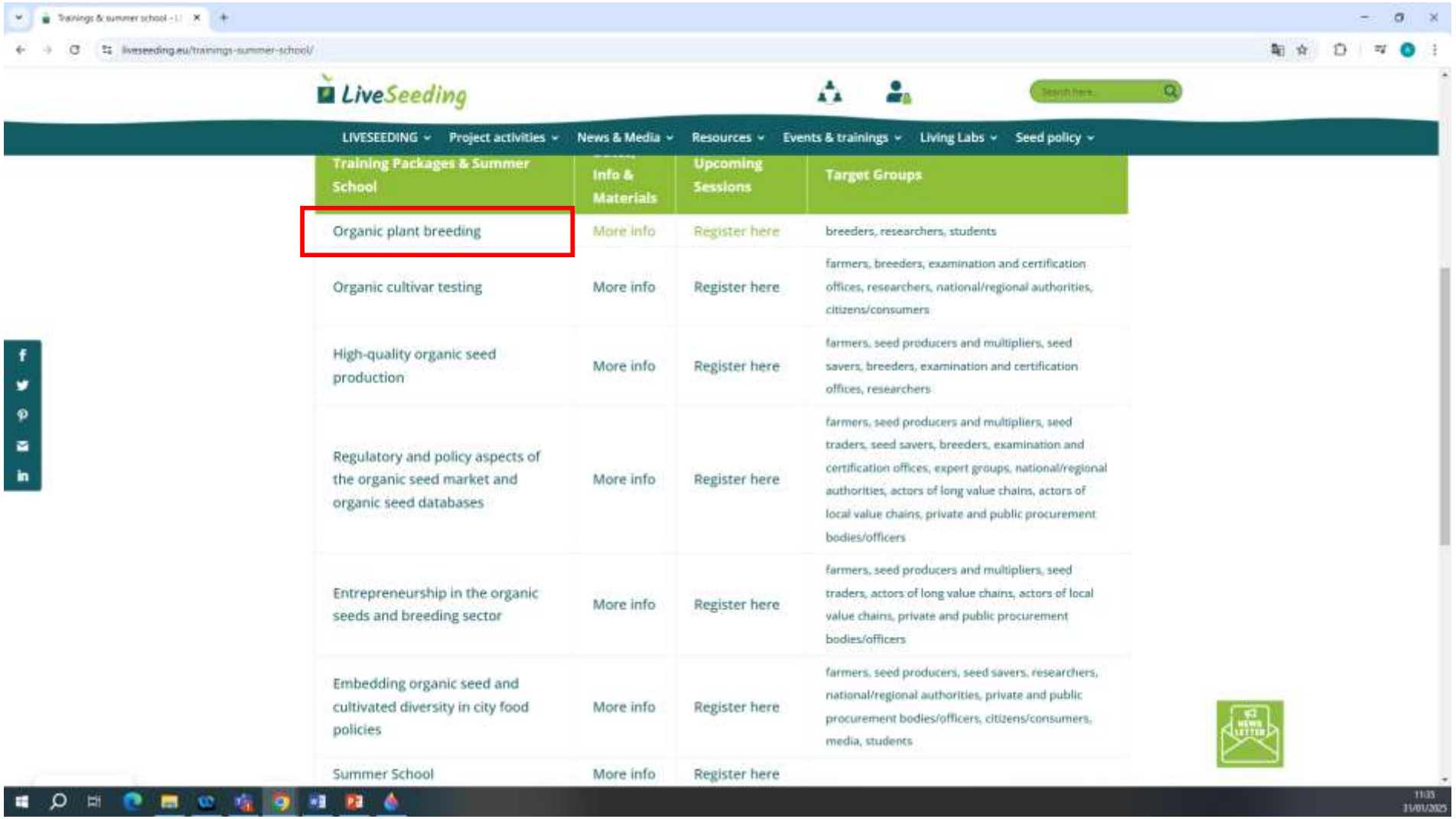


TRAINING IN ORGANIC BREEDING!

LiveSeeding

CONTEXT: Training in LIVESEEDING project

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



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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)

Unit 2.5: Methods for phenotyping and selection of added-value traits (e.g. taste and nutritional value)[2]

ITAB (Solenne Jourdren)

1 - An extra practical session to use the tool with own data is scheduled for FEB 10th (9-12h)
2 - Unit 2.5 planned for the end of March 2025. Registrants will be invited for this extra training lesson

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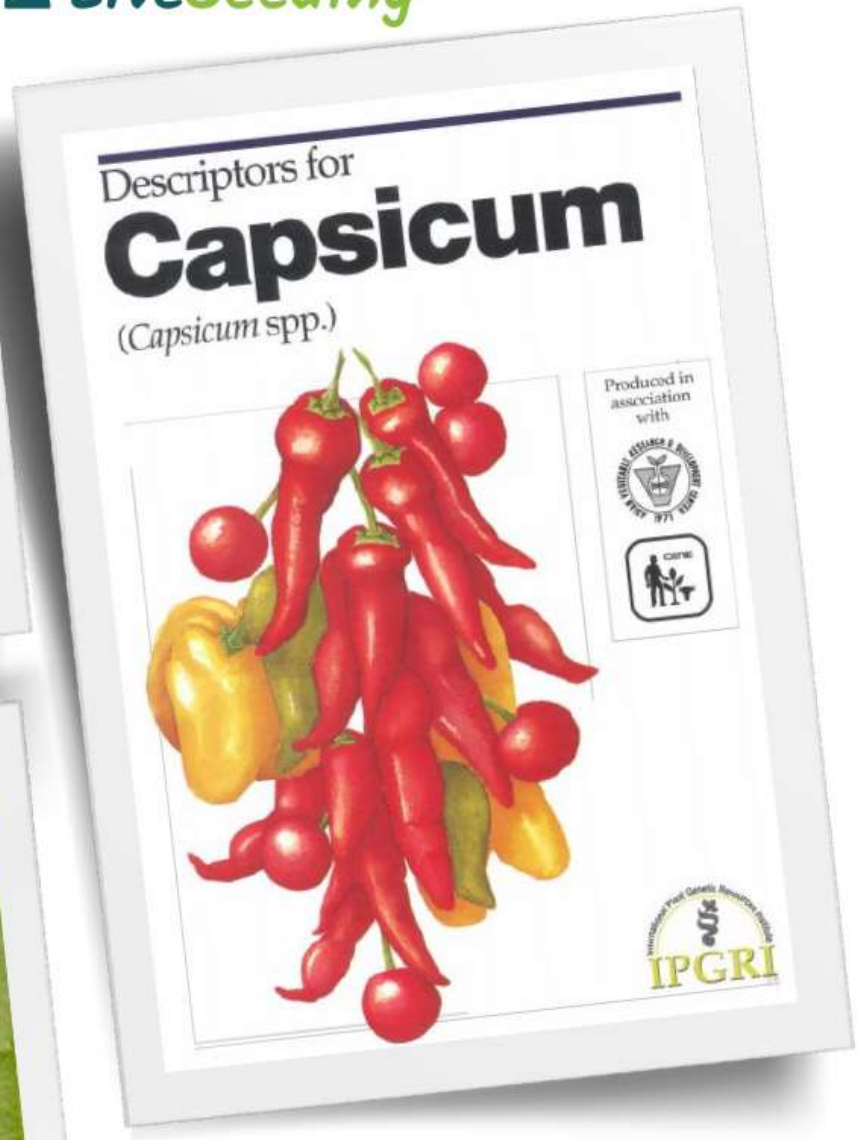

Training in organic breeding

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

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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/

- *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*

"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:

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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PUBLISHED 30 October 2024

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

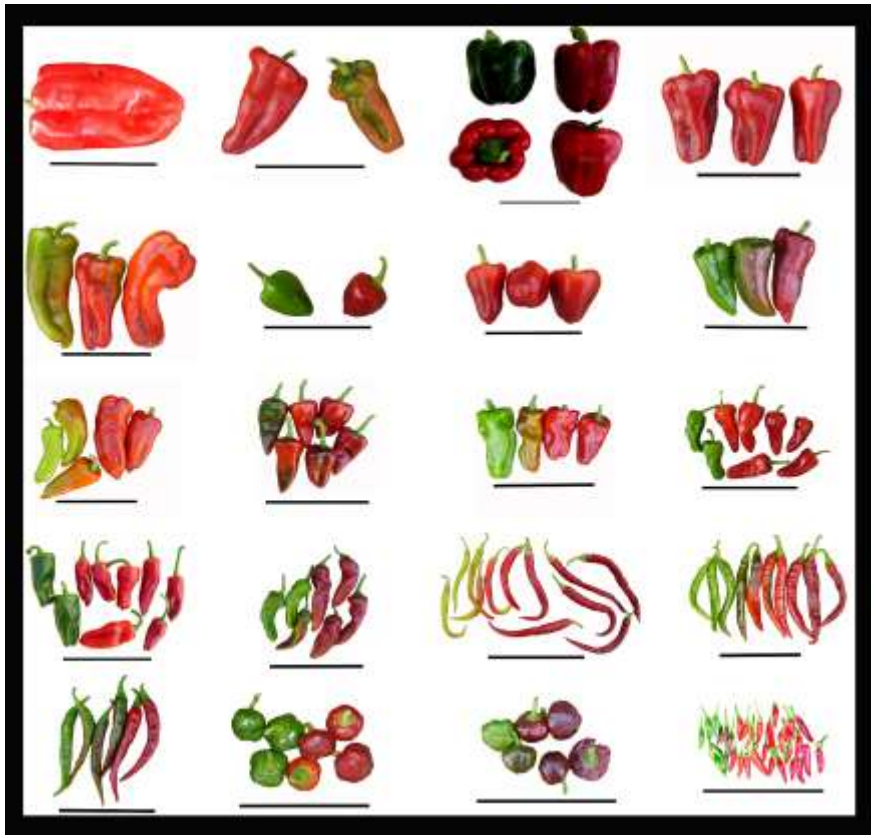
1. VISIT TO:

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/

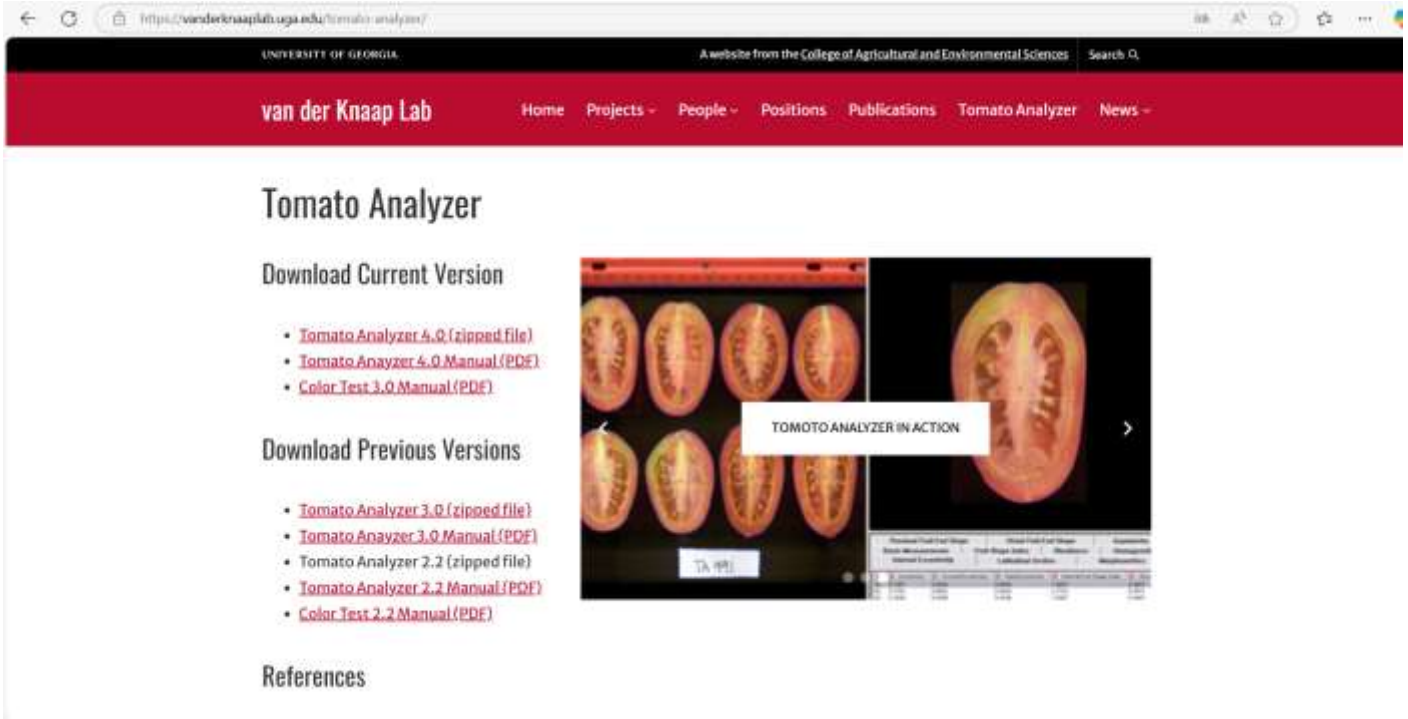
Developed in E. Van der Knapp lab

PLEASE.

STILL DO NOT ENTER!!!

BASED ON:

CUT FRUIT SCANNED PICTURES



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Module 2 – Unit 1 Phenomics: approaches and tools

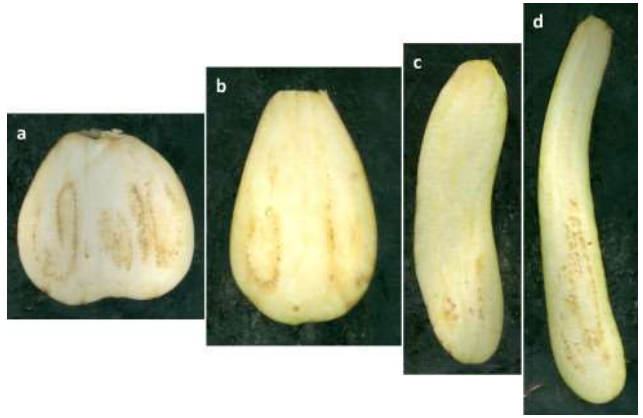
OTHER EXAMPLES OF Tomato Analyzer:

Scientia Horticulturae 164 (2013) 625–632

Contents lists available at ScienceDirect

Scientia Horticulturae

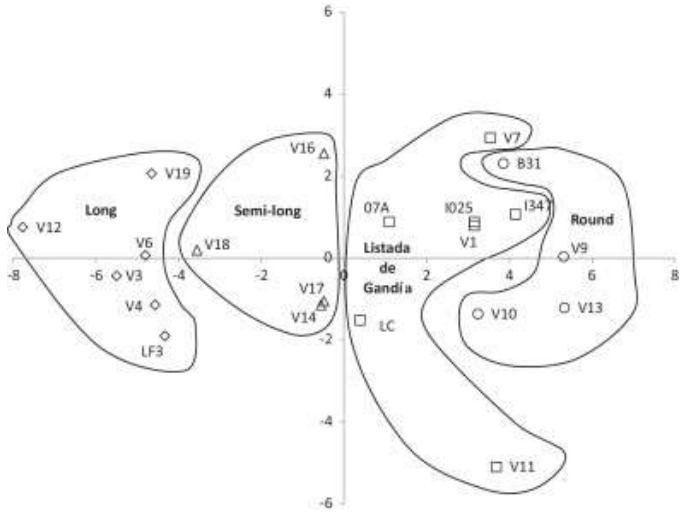
journal homepage: www.elsevier.com/locate/scihorti



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 *

Instituto de Conservación y Mejora de la Agrodiversidad Valenciana, Universitat Politècnica de València, Camino de Vera 14, 46022 Valencia, Spain



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Module 1 – Unit 1 Public/Institutional Seedbanks

3. SHORT VISIT TO:

https://seedlinked.com

PLEASE.

STILL DO NOT ENTER!!!

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Module 2 – Unit 1 Phenomics: approaches and tools

EXAMPLE OF UTILITY BY USING BOTH:

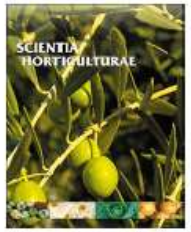
Descriptors & Tomato Analyzer (alone and together)

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]

[a] Instituto de Conservación y Mejora de la Agrodiversidad Valenciana, Universitat Politècnica de València, Camino de Vera s/n, 46022 Valencia, Spain
[b] Instituto Murciano de Investigación Agraria y Alimentaria, C/Mayor s/n, La Alberca-Murcia, 30150, Spain

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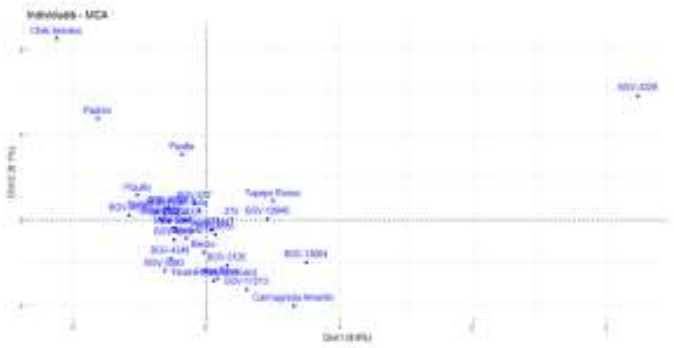
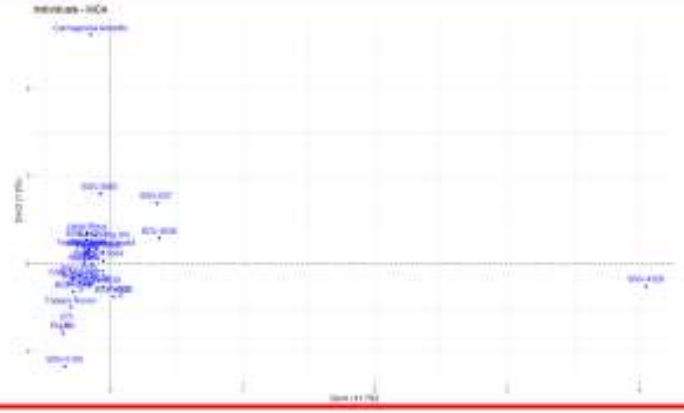
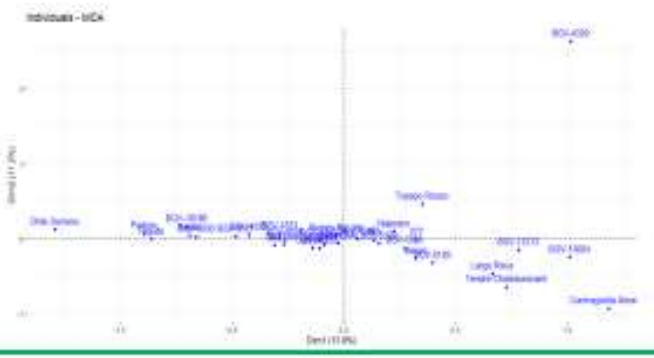
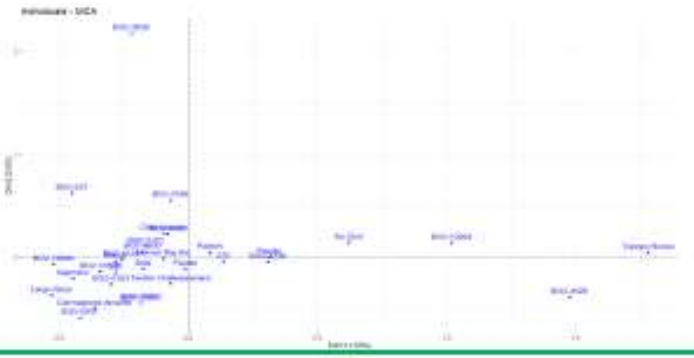
EXAMPLE OF UTILITY BY USING BOTH:

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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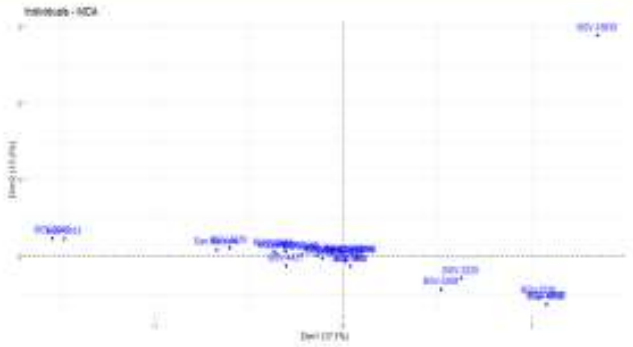
Module 2 – Unit 1 Phenomics: approaches and tools

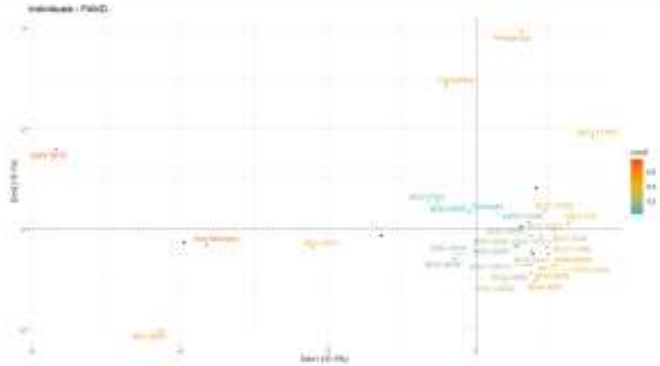
Tomatoes, 40 varieties

Location 1 - Meliana

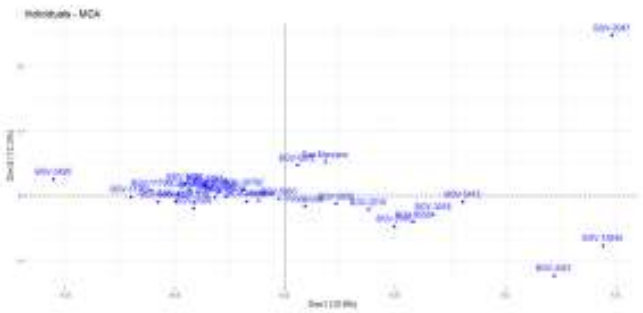
Location 2 - Picassent

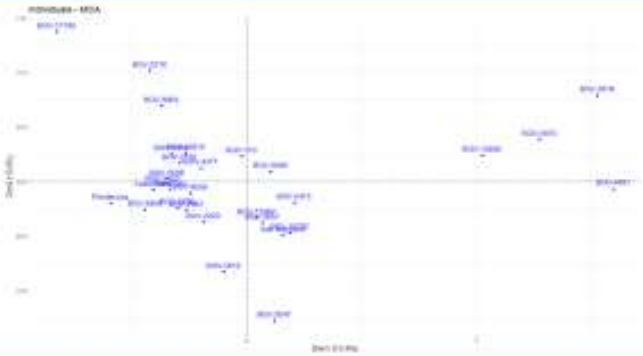
Conventional descriptors





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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UK Research and Innovation


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