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International Union for the Protection of New Varieties of Plants

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KORA: DIGITAL MANAGEMENT OF VARIETY COLLECTION

Document prepared by an expert from Italy

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The annex to this document contains a presentation “Kora: digital management of variety collection”, to be made by an expert from Italy, at the fourth session of the TWM.

[Annex follows]

Kora: digital management of variety collections

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1. Motivation
2. The Software
3. Design philosphy and development

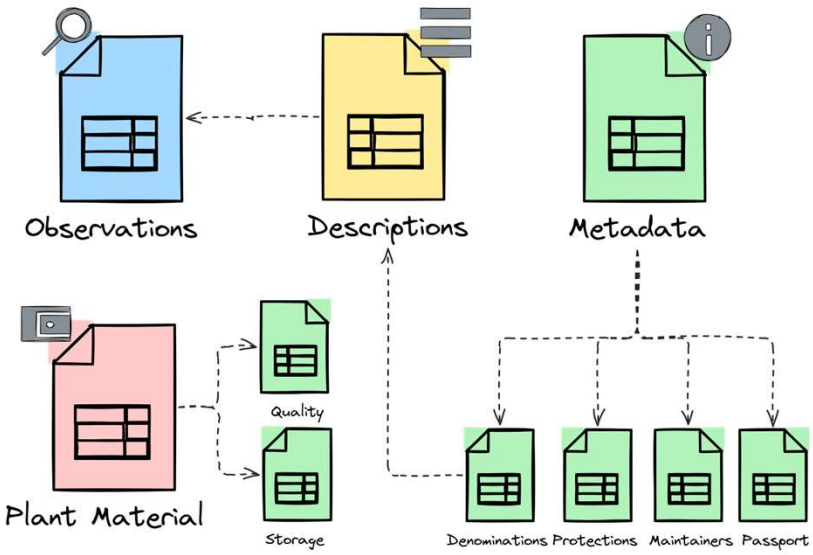
Variety collections combine heterogeneous data

Variety collections typically include:

- Descriptions produced *in-house* or by a third party
- Living plant material (inventory, storage, health status)
- Metadata (protection, denominations, evaluation data)
- Pictorial information

Managing a variety collection

It usually means a *lot* of spreadsheets



Spreadsheet systems do not scale well with large collections

As data volume and complexity increase, routine tasks become harder to perform

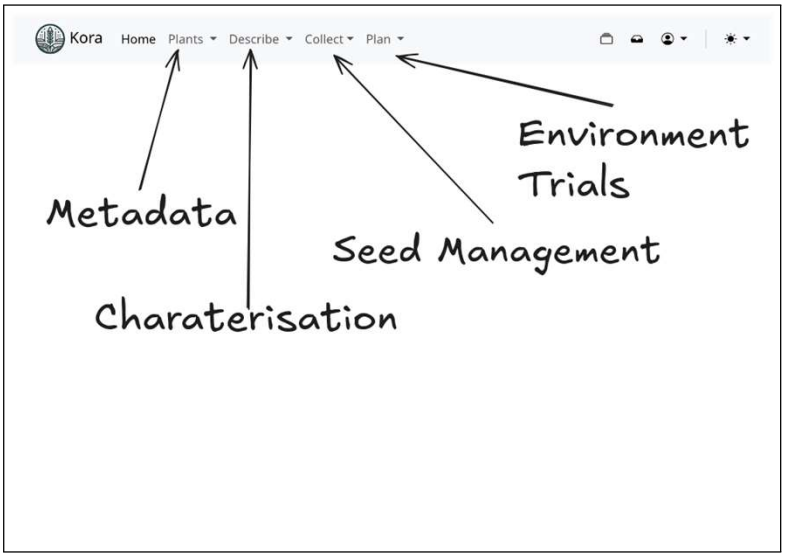
- Filtering across many characteristics becomes cumbersome
- Updates to guidelines complicate comparing earlier descriptions
- Maintaining metadata is difficult!
- Data validation and collaboration are limited
- Strongly cross-referenced data is not well handled in flat files

Introducing Kora

What is Kora?

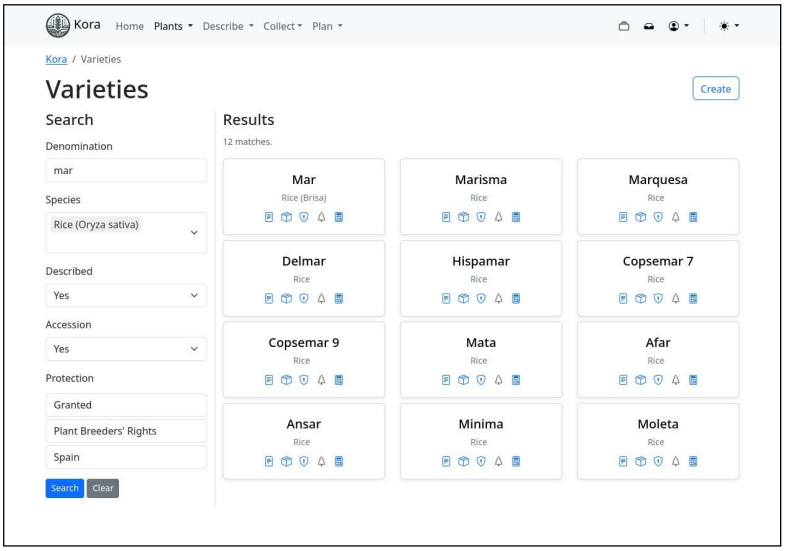
- Software designed for plant variety data management
- Integrates multiple types of data while preserving relationships
- Efficient filtering and data aggregation capabilities
- Easy integration with other tools and programs

Application Layout



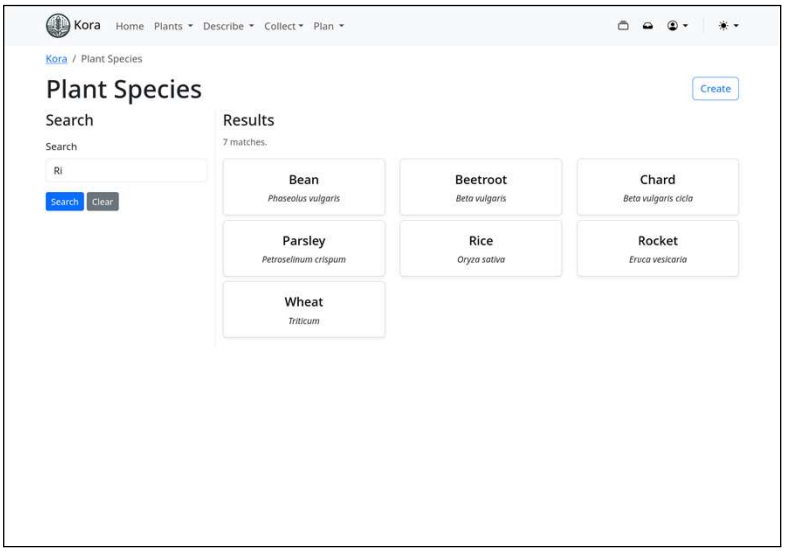
Varieties

The application is built around the concept of *variety*



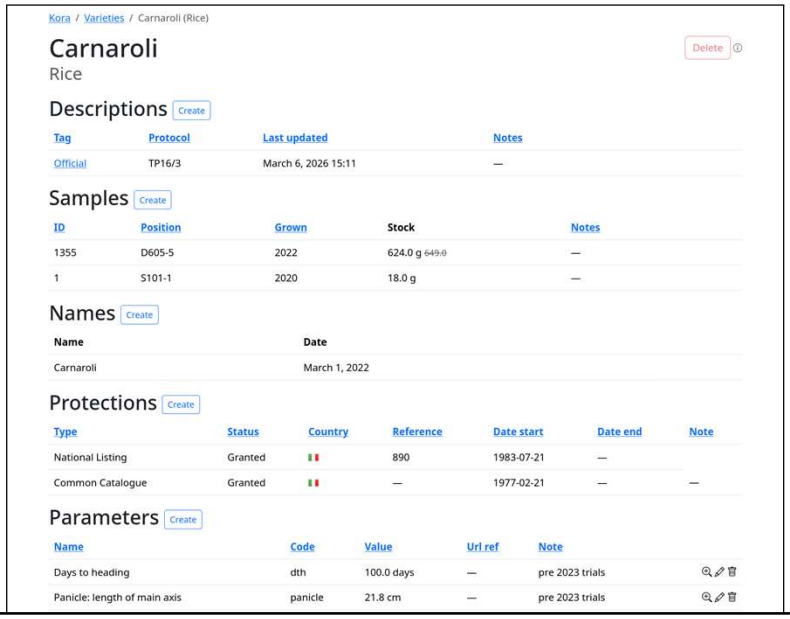
Species

It can manage variety collections across multiple species



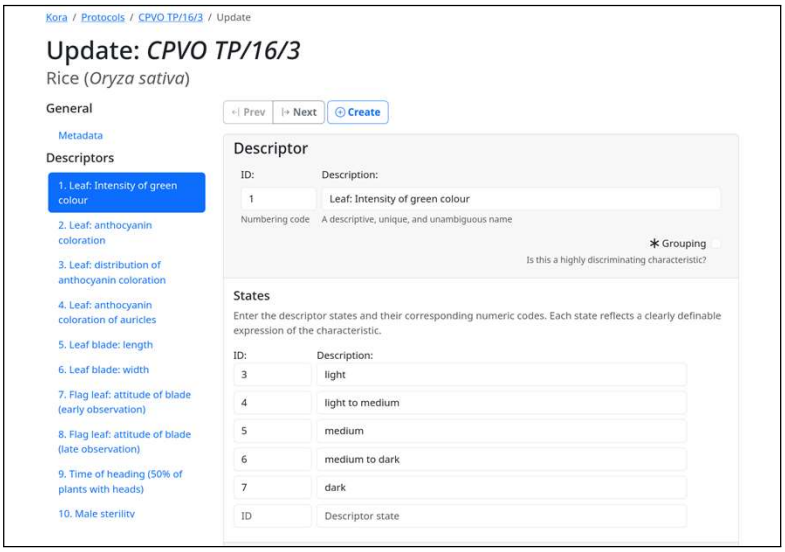
Variety Detail

The detail page of a variety contains all its information



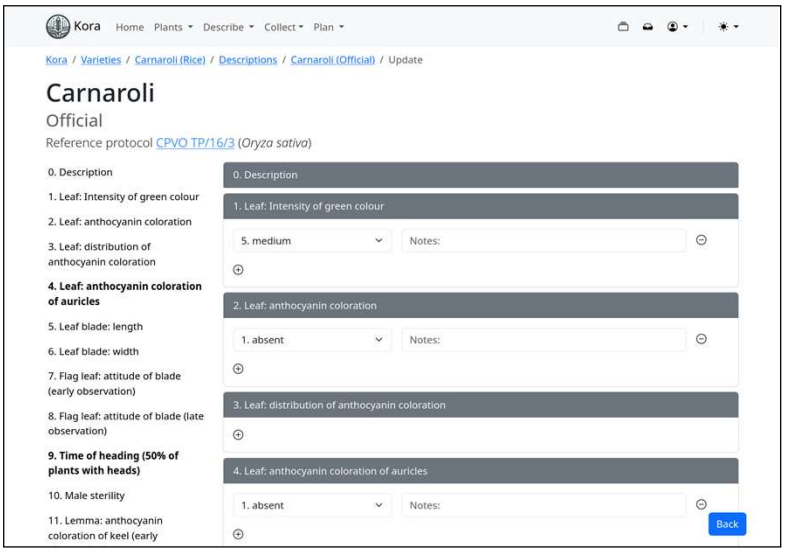
Protocols

Create protocols mirroring existing guidelines or custom



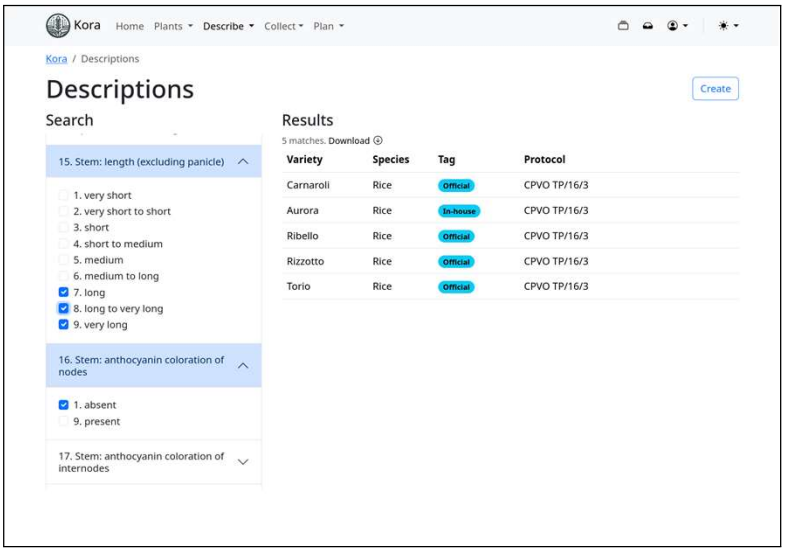
Descriptions

Create and store descriptions according to protocols



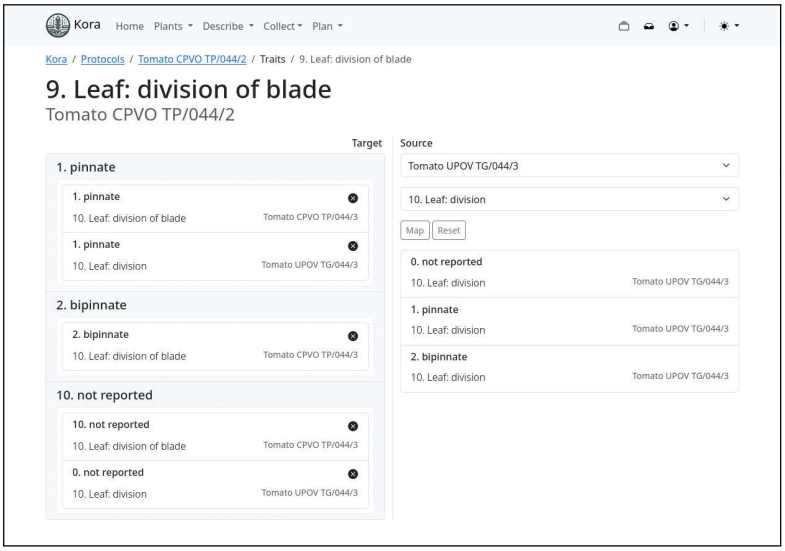
Descriptions

Filter descriptions by characteristics



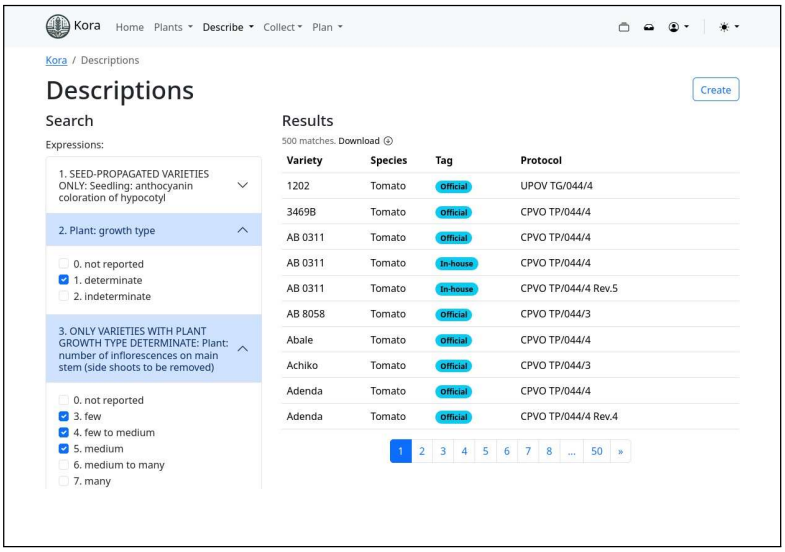
Protocols

Map state of expressions across different protocols...



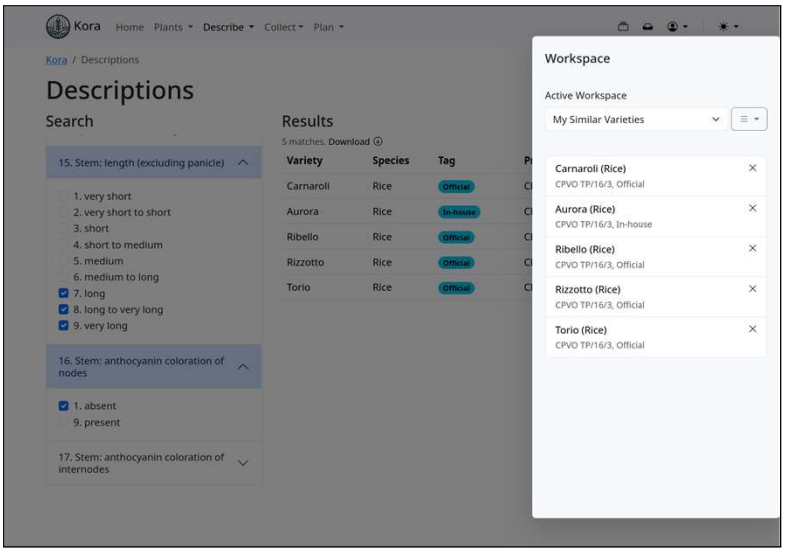
Descriptions

...then filter descriptions by characteristics, maintaining compatibility across protocols



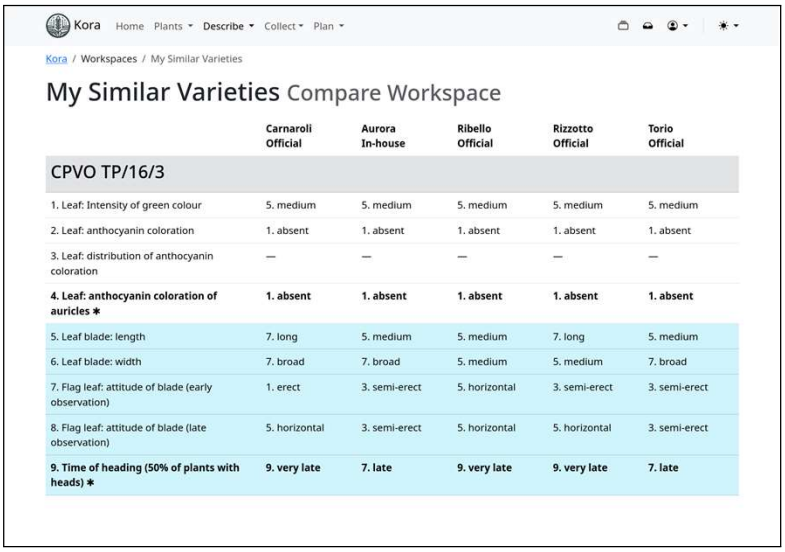
Workspaces

Users can create and add descriptions to workspaces to compare or export data



Compare Descriptions

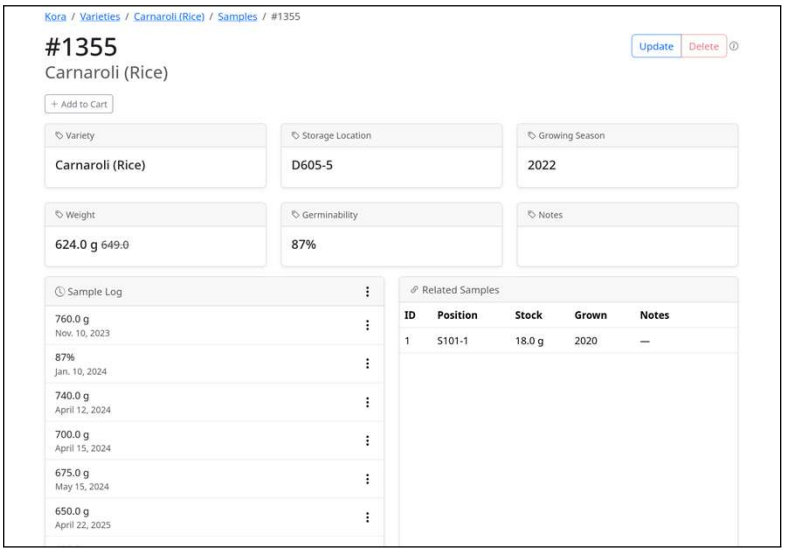
Compare descriptions side by side across multiple protocols



	Carnaroli Official	Aurora In-house	Ribello Official	Rizzotto Official	Torio Official
CPVO TP/16/3					
1. Leaf: Intensity of green colour	5. medium	5. medium	5. medium	5. medium	5. medium
2. Leaf: anthocyanin coloration	1. absent	1. absent	1. absent	1. absent	1. absent
3. Leaf: distribution of anthocyanin coloration	—	—	—	—	—
4. Leaf: anthocyanin coloration of auricles ✱	**1. absent**	**1. absent**	**1. absent**	**1. absent**	**1. absent**
5. Leaf blade: length	7. long	5. medium	5. medium	7. long	5. medium
6. Leaf blade: width	7. broad	7. broad	5. medium	5. medium	7. broad
7. Flag leaf: attitude of blade (early observation)	1. erect	3. semi-erect	5. horizontal	3. semi-erect	3. semi-erect
8. Flag leaf: attitude of blade (late observation)	5. horizontal	3. semi-erect	5. horizontal	5. horizontal	3. semi-erect
9. Time of heading (50% of plants with heads) ✱	**9. very late**	**7. late**	**9. very late**	**9. very late**	**7. late**

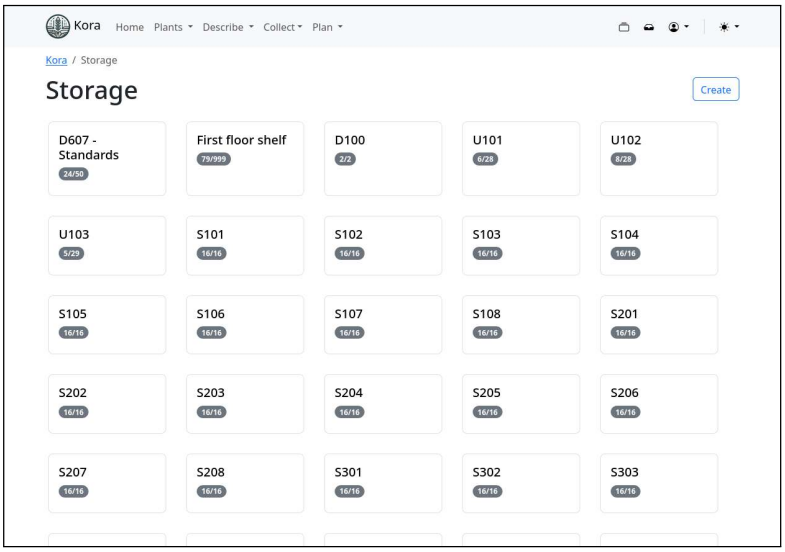
Samples

Manage seed inventories for multiple species. . .



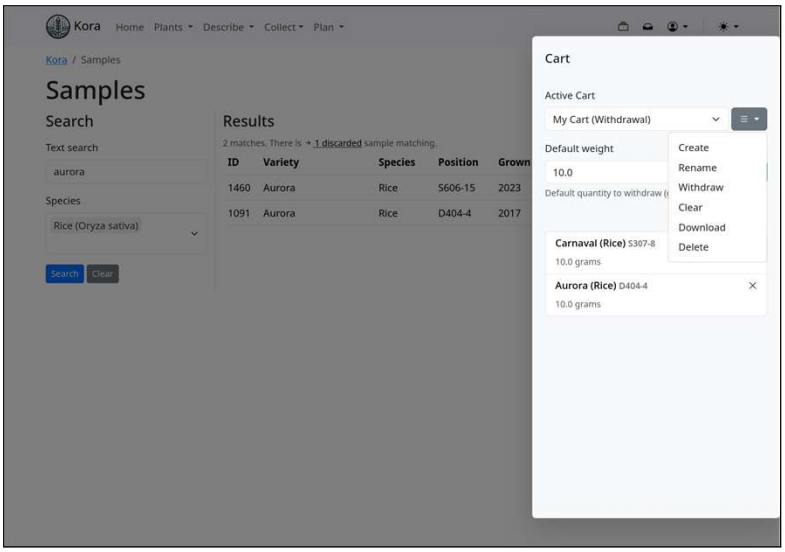
Storage

. . . and configure storage layout for automating space management



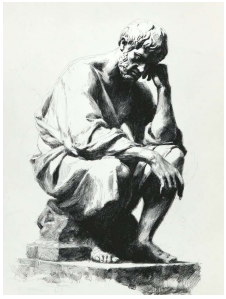
Carts

Carts can be used for efficient seed inventory management



Design philosophy

- Free and Open Source Software (FOSS)
- As simple and generic as possible, adaptable to multiple workflows
- Portable across operating systems, requires minimal resources
- Can be used locally, over a network, or over the internet



Integration with external tools

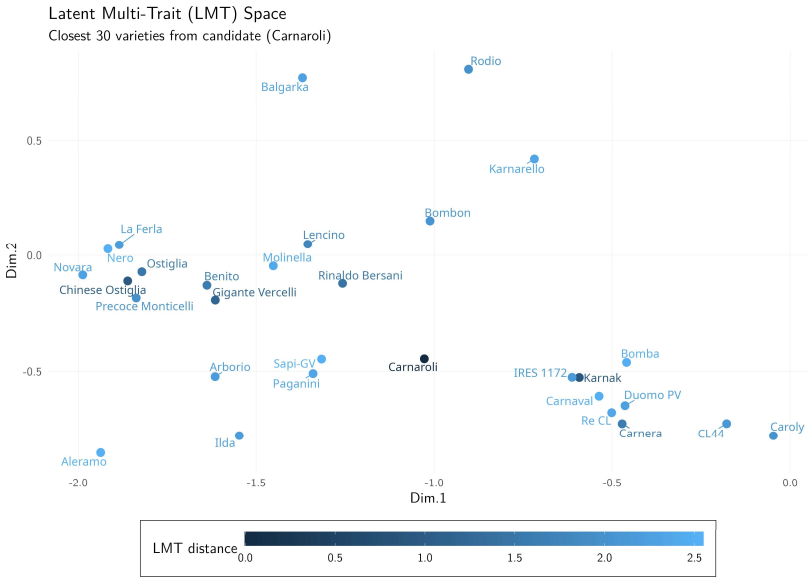
The API allows for full integration with external tools for more specific workflows

Examples:

- Import pre-existing data with scripts (R, Python, . . .)
- Use natural language to interrogate the database via Large Language Models
- Advanced data analysis with external tools

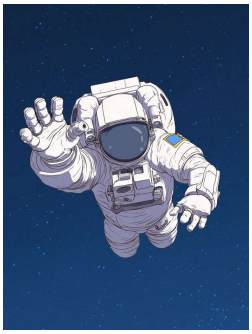
Example: find similar varieties

Calculate Latent Multi-Trait distance using stored data



Current status and release plans

- Kora is quite mature and under testing
- Currently being used by multiple offices across different crops
- It will be officially released to public by late 2026 (hopefully!)



Summary

- Kora streamlines digital management of variety collections
- It will be released as Free and Open Source Software available for anyone to use or modify under its license
- It can be easily extended or integrated with other tools for more specific workflows

- Outlook
  - Development is still on going with many new features coming
  - Under testing: custom passport data, pictures, field books, basic crop modelling capabilities

Thank you!

[End of Annex and of document]