

**Technical Working Party for Agricultural Crops****TWA/55/6****Fifty-Fifth Session  
Seoul, Republic of Korea, June 15 to 18, 2026****Original: English  
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**DIGITAL MANAGEMENT OF THE VARIETY COLLECTION WITH KORA***Document prepared by an expert from Italy**Disclaimer: this document does not represent UPOV policies or guidance*

1. DUS testing entails comparing candidate varieties against varieties of common knowledge represented in the variety collection. As the collection grows, managing it becomes increasingly difficult: identifying relevant varieties requires comparing many descriptions; test guidelines updates complicate the use of prior data; metadata must be kept current across multiple sources; and collaboration depends on proven workflows and disciplined maintenance.
2. Kora addresses these limitations. It is a free and open source software for plant variety data management and exploration. It supports metadata, characterization data, reproductive material management, and field and environmental data. It provides structured filtering, aggregation, and integration with third party software.
3. The software is currently in the final stage of testing for public release. Current development includes custom passport descriptors, image support, field books, and basic crop modelling capabilities. This ongoing work reinforces Kora as a structured, scalable, and extensible framework for the management of variety collections.
4. The annex to this document contains a presentation “Digital management of the variety collection with Kora”, to be made by an expert from Italy, at the fifty-fifth session of the TWA.

[Annex follows]

## Digital management of the variety collection with Kora

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① Motivation

② The Software

③ Demo

The variety collection lies at the core of DUS testing

#### DUS testing, in practice

Candidate varieties are compared against existing varieties of common knowledge represented in the **variety collection**.



Variety collections are heterogeneous by nature

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

## Variety collections become harder to manage as they grow

The challenge is not only storing information, but keeping it usable for comparison

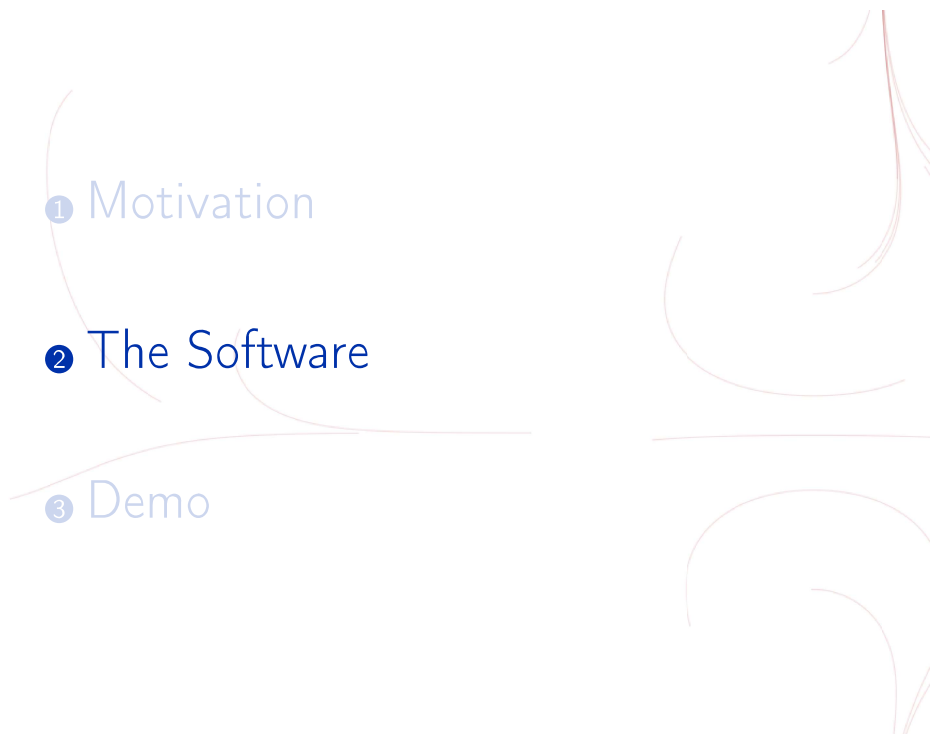
### With large variety collections...

- Finding relevant varieties requires comparing **many descriptions**
- **Test guidelines updates** complicate comparing earlier descriptions
- **Metadata** must be kept up to date across different sources
- **Collaboration** requires a shared and reliable variety
- **Errors and inconsistencies** become harder to detect

① Motivation

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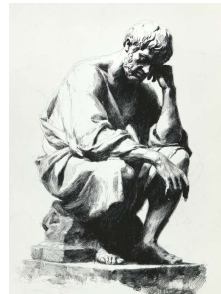
## Introducing Kora

### 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

## Design philosophy

- **Free** and Open Source Software (FOSS)
- As **simple and generic** as possible, adaptable to multiple workflows
- Can run on **most modern computers**, locally or over a network
- Data and software remain under the **user's control**

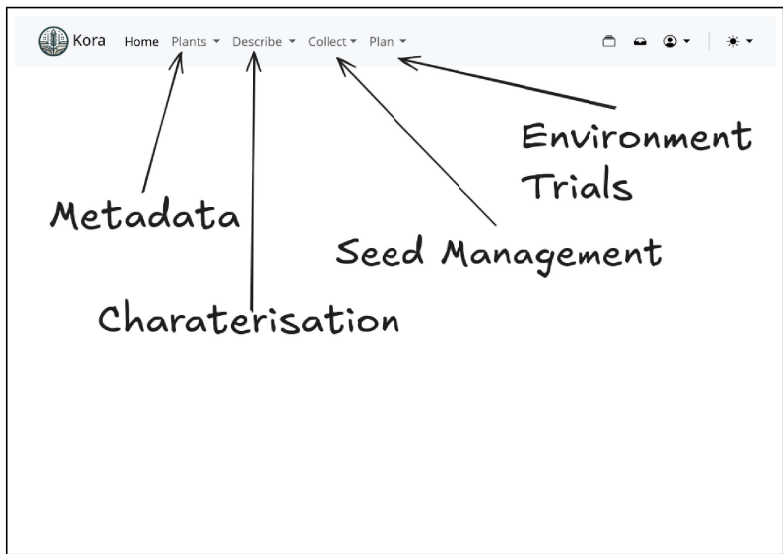


① Motivation

② The Software

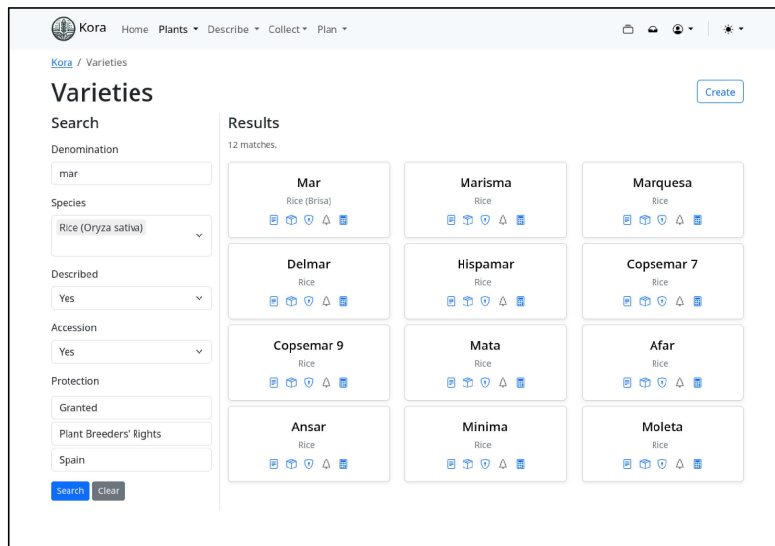
③ Demo

### Application Layout



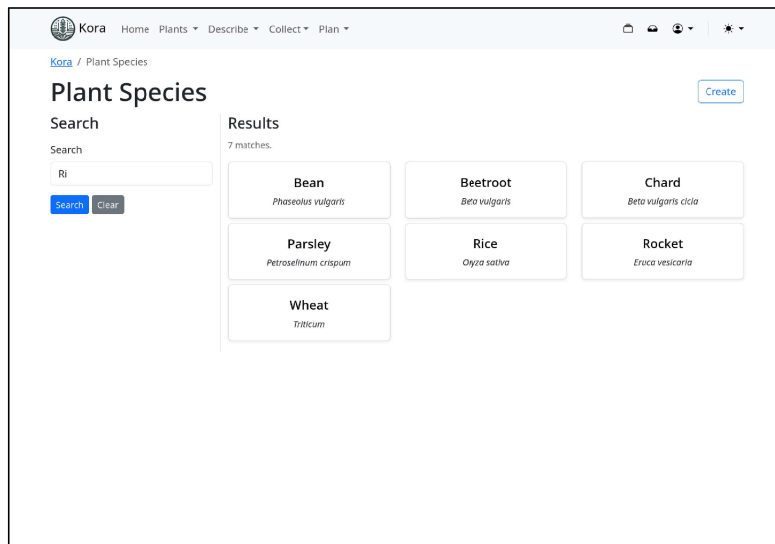
## Varieties

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

Kora / Varieties / Carnaroli (Rice)

### Carnaroli

Rice Delete

#### Descriptions Create

Tag	Protocol	Last updated	Notes
Official	TP16/3	March 6, 2026 15:11	—

#### Samples Create

ID	Position	Grown	Stock	Notes
1355	D605-5	2022	624.0 g <sup>644.0</sup>	—
1	S101-1	2020	18.0 g	—

#### Names Create

Name	Date
Carnaroli	March 1, 2022

#### Protections Create

Type	Status	Country	Reference	Date start	Date end	Note
National Listing	Granted		890	1983-07-21	—	—
Common Catalogue	Granted		—	1977-02-21	—	—

#### Parameters Create

Name	Code	Value	Url ref	Note
Days to heading	dth	100.0 days	—	pre 2023 trials
Panicle: length of main axis	panicle	21.8 cm	—	pre 2023 trials

## Protocols

Create protocols mirroring existing test guidelines or custom

Kora / Protocols / CPVO TP/16/3 / Update

### Update: CPVO TP/16/3

Rice (*Oryza sativa*)

General Prev Next Create

Metadata

#### Descriptors

- Leaf: Intensity of green colour
- Leaf: anthocyanin coloration
- Leaf: distribution of anthocyanin coloration
- Leaf: anthocyanin coloration of auricles
- Leaf blade: length
- Leaf blade: width
- Flag leaf: attitude of blade (early observation)
- Flag leaf: attitude of blade (late observation)
- Time of heading (50% of plants with heads)
- Male sterility

#### Descriptor

ID:  Description:

Numbering code:  A descriptive, unique, and unambiguous name

\* Grouping  
Is this a highly discriminating characteristic?

#### States

Enter the descriptor states and their corresponding numeric codes. Each state reflects a clearly definable expression of the characteristic.

ID	Description
<input type="text"/>	<input type="text"/>
3	light
<input type="text"/>	<input type="text"/>
4	light to medium
<input type="text"/>	<input type="text"/>
5	medium
<input type="text"/>	<input type="text"/>
6	medium to dark
<input type="text"/>	<input type="text"/>
7	dark
<input type="text"/>	<input type="text"/>
ID	Descriptor state

## Descriptions

Create and store descriptions according to protocols

Kora Home Plants Describe Collect Plan

Kora / Varieties / Carnaroli (Rice) / Descriptions / Carnaroli (Official) / Update

### Carnaroli

Official

Reference protocol [CPVO TP/16/3 \(Oryza sativa\)](#)

0. Description

1. Leaf: Intensity of green colour

2. Leaf: anthocyanin coloration

3. Leaf: distribution of anthocyanin coloration

4. Leaf: anthocyanin coloration of auricles

5. Leaf blade: length

6. Leaf blade: width

7. Flag leaf: attitude of blade (early observation)

8. Flag leaf: attitude of blade (late observation)

9. Time of heading (50% of plants with heads)

10. Male sterility

11. Lemma: anthocyanin coloration of keel (early)

0. Description

1. Leaf: Intensity of green colour

5. medium Notes: [ ]

2. Leaf: anthocyanin coloration

1. absent Notes: [ ]

3. Leaf: distribution of anthocyanin coloration

4. Leaf: anthocyanin coloration of auricles

1. absent Notes: [ ]

Back

## Descriptions

Filter descriptions by characteristics

Kora Home Plants Describe Collect Plan

Kora / Descriptions

### Descriptions

Search

15. Stem: length (excluding panicle)

1. very short

2. very short to short

3. short

4. short to medium

5. medium

6. medium to long

7. long

8. long to very long

9. very long

16. Stems: anthocyanin coloration of nodes

1. absent

9. present

17. Stems: anthocyanin coloration of internodes

Results

5 matches. Download

Variety	Species	Tag	Protocol
Carnaroli	Rice	Official	CPVO TP/16/3
Aurora	Rice	In-house	CPVO TP/16/3
Ribello	Rice	Official	CPVO TP/16/3
Rizzotto	Rice	Official	CPVO TP/16/3
Torio	Rice	Official	CPVO TP/16/3

Create

## Protocols

Map state of expressions across different protocols. . .

The screenshot shows the Kora interface for mapping the trait "9. Leaf: division of blade" (Tomato CPVO TP/044/2). The interface is divided into "Target" and "Source" sections.

**Target Section:**

- 1. pinnate:**
  - 1. pinnate (Tomato CPVO TP/044/3)
  - 10. Leaf: division of blade (Tomato CPVO TP/044/3)
  - 1. pinnate (Tomato UPOV TG/044/3)
  - 10. Leaf: division (Tomato UPOV TG/044/3)
- 2. bipinnate:**
  - 2. bipinnate (Tomato CPVO TP/044/3)
  - 10. Leaf: division of blade (Tomato CPVO TP/044/3)
- 10. not reported:**
  - 10. not reported (Tomato CPVO TP/044/3)
  - 10. Leaf: division of blade (Tomato CPVO TP/044/3)
  - 0. not reported (Tomato UPOV TG/044/3)
  - 10. Leaf: division (Tomato UPOV TG/044/3)

**Source Section:**

- Tomato UFOV TG/044/3 (selected)
- 10. Leaf: division (selected)
- 0. not reported (Tomato UPOV TG/044/3)
- 1. pinnate (Tomato UPOV TG/044/3)
- 10. Leaf: division (Tomato UPOV TG/044/3)
- 2. bipinnate (Tomato UPOV TG/044/3)
- 10. Leaf: division (Tomato UPOV TG/044/3)

Buttons for "Map" and "Reset" are visible between the sections.

## Descriptions

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

The screenshot shows the Kora interface for searching and filtering descriptions. The "Search" section on the left allows filtering by expressions and characteristics.

**Search Expressions:**

- 1. SEED-PROPAGATED VARIETIES ONLY: Seedling anthocyanin coloration of hypocotyl
- 2. Plant: growth type
  - 0. not reported
  - 1. determinate
  - 2. indeterminate
- 3. ONLY VARIETIES WITH PLANT GROWTH TYPE DETERMINATE: Plant: number of inflorescences on main stem (side shoots to be removed)
  - 0. not reported
  - 3. few
  - 4. few to medium
  - 5. medium
  - 6. medium to many
  - 7. many

**Results Section:**

500 matches. Download

Variety	Species	Tag	Protocol
1202	Tomato	Official	UPOV TG/044/4
3469B	Tomato	Official	CPVO TP/044/4
AB 0311	Tomato	Official	CPVO TP/044/4
AB 0311	Tomato	In-house	CPVO TP/044/4
AB 0311	Tomato	In-house	CPVO TP/044/4 Rev.5
AB 8058	Tomato	Official	CPVO TP/044/3
Abale	Tomato	Official	CPVO TP/044/4
Achiko	Tomato	Official	CPVO TP/044/3
Adenda	Tomato	Official	CPVO TP/044/4
Adenda	Tomato	Official	CPVO TP/044/4 Rev.4

Navigation: 1 2 3 4 5 6 7 8 ... 50

## Workspaces

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

The screenshot shows the Kora application interface. On the left, there are search filters for '15. Stem: length (excluding panicle)' and '16. Stem: anthocyanin coloration of nodes'. The main area displays search results for rice varieties: Carnaroli, Aurora, Ribello, Rizzotto, and Torio, each with a tag like 'Official' or 'In-house'. On the right, a 'Workspace' panel is open, showing a list of 'My Similar Varieties' with checkboxes for each variety.

## Compare Descriptions

Compare descriptions side by side across multiple protocols

The screenshot shows the 'My Similar Varieties Compare Workspace' in the Kora application. It displays a table comparing five rice varieties: Carnaroli Official, Aurora In-house, Ribello Official, Rizzotto Official, and Torio Official. The table lists various morphological and phenological traits and their values for each variety.

	Carnaroli Official	Aurora In-house	Ribello Official	Rizzotto Official	Torio Official
<b>CPVO TP/16/3</b>					
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	—	—	—	—	—
<b>4. Leaf: anthocyanin coloration of auricles *</b>	<b>1. absent</b>	<b>1. absent</b>	<b>1. absent</b>	<b>1. absent</b>	<b>1. absent</b>
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
<b>9. Time of heading (50% of plants with heads) *</b>	<b>9. very late</b>	<b>7. late</b>	<b>9. very late</b>	<b>9. very late</b>	<b>7. late</b>

## Samples

Manage seed inventories for multiple species...

Kora / Varieties / Carnaroli (Rice) / Samples / #1355

**#1355** Update Delete

Carnaroli (Rice)

+ Add to Cart

Variety	Storage Location	Growing Season
Carnaroli (Rice)	D605-5	2022
Weight	Germinability	Notes
624.0 g 649.0	87%	

Sample Log		Related Samples				
ID	Position	Stock	Grown	Notes		
760.0 g Nov. 10, 2023						
87% Jan. 10, 2024						
740.0 g April 12, 2024						
700.0 g April 15, 2024						
675.0 g May 15, 2024						
650.0 g April 22, 2025						
1	S101-I	18.0 g	2020	—		

## Storage

... and configure storage layout for automating space management

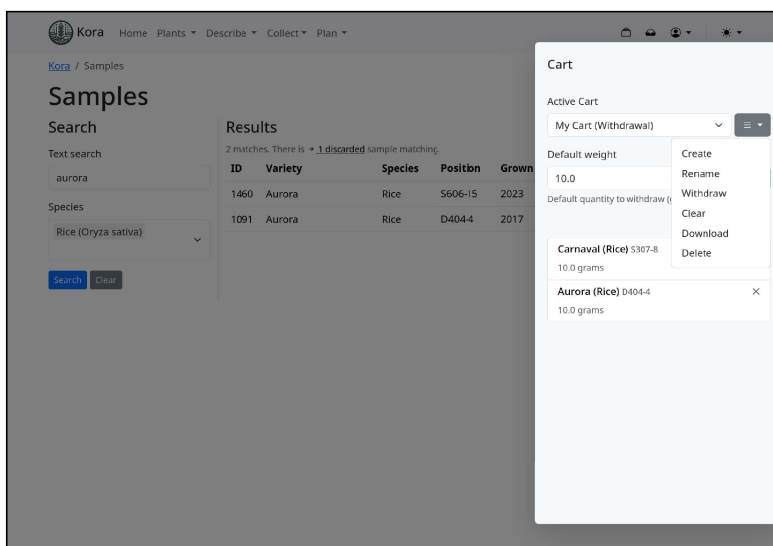
Kora Home Plants Describe Collect Plan

Kora / Storage Create

D607 - Standards 24/99	First floor shelf 79/999	D100 2/2	U101 6/28	U102 8/28
U103 5/29	S101 16/16	S102 16/16	S103 16/16	S104 16/16
S105 16/16	S106 16/16	S107 16/16	S108 16/16	S201 16/16
S202 16/16	S203 16/16	S204 16/16	S205 16/16	S206 16/16
S207 16/16	S208 16/16	S301 16/16	S302 16/16	S303 16/16

## Carts

Carts can be used for efficient seed inventory management



## Integration with external tools

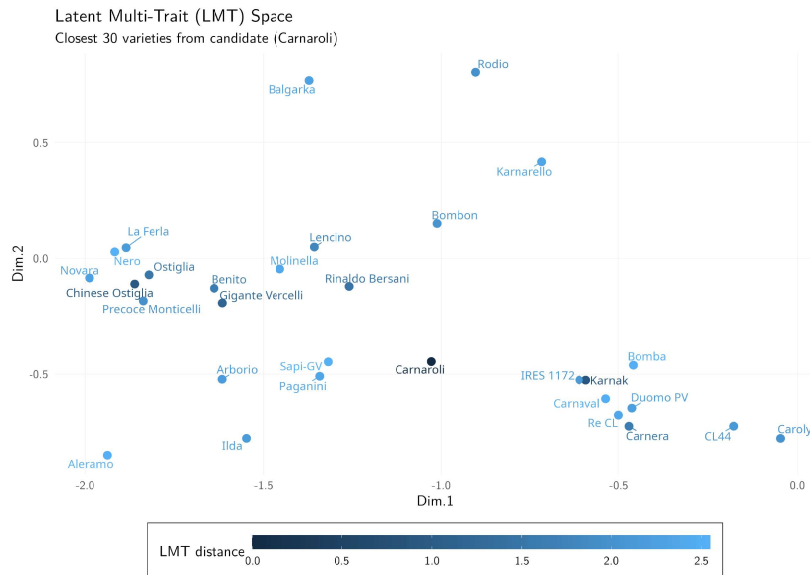
The API allows for full integration with external tools for more specific workflows

### 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

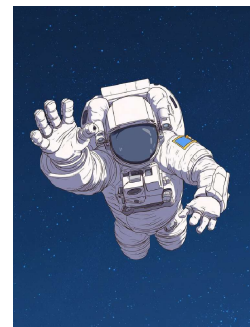
## Example: find similar varieties

Calculate latent multi-trait distance using stored data



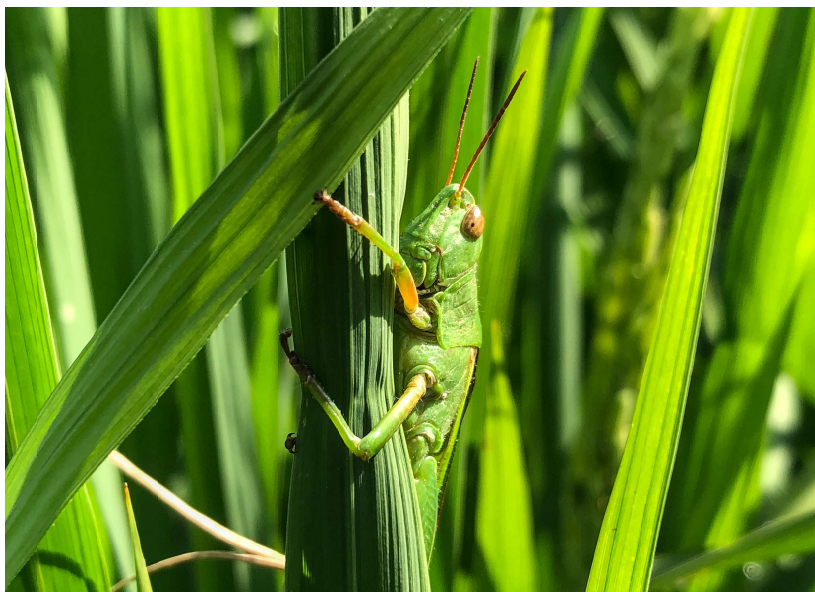
## Current status and release plans

- 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** 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!