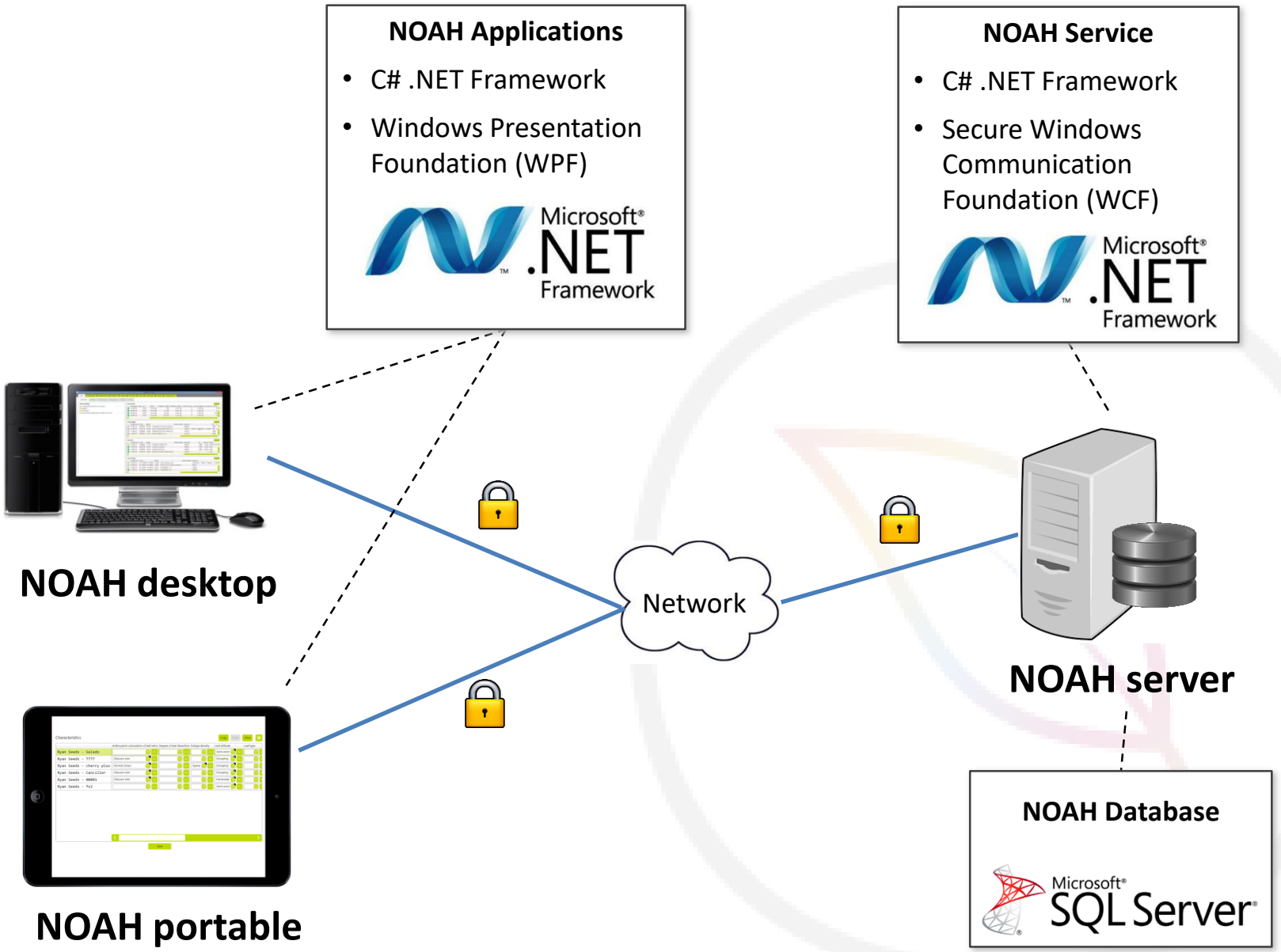
NOAH

plant germplasm ERP

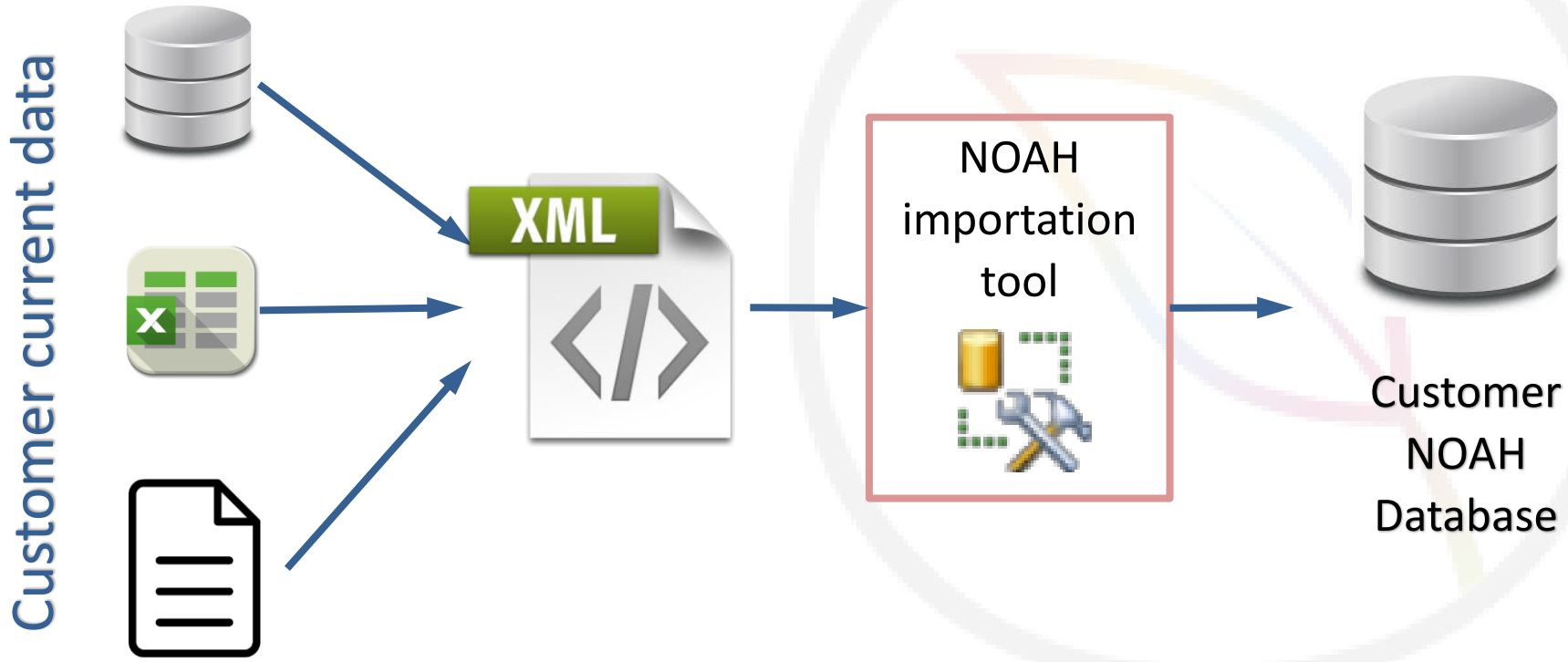
www.bullsoftsolutions.com


NOAH Applications
C# .NET Framework
Windows Presentation Foundation (WPF)
Microsoft .NET Framework
NOAH Service
C# .NET Framework
Secure Windows Communication Foundation (WCF)
Microsoft .NET Framework
NOAH desktop
Network
NOAH server
NOAH portable
NOAH Database
Microsoft SQL Server

Bullsoft Solutions will never access, under any circumstance, to customer current data or customer NOAH database.

Customer IT department

- Protocol to import current data
- Apply NOAH updates

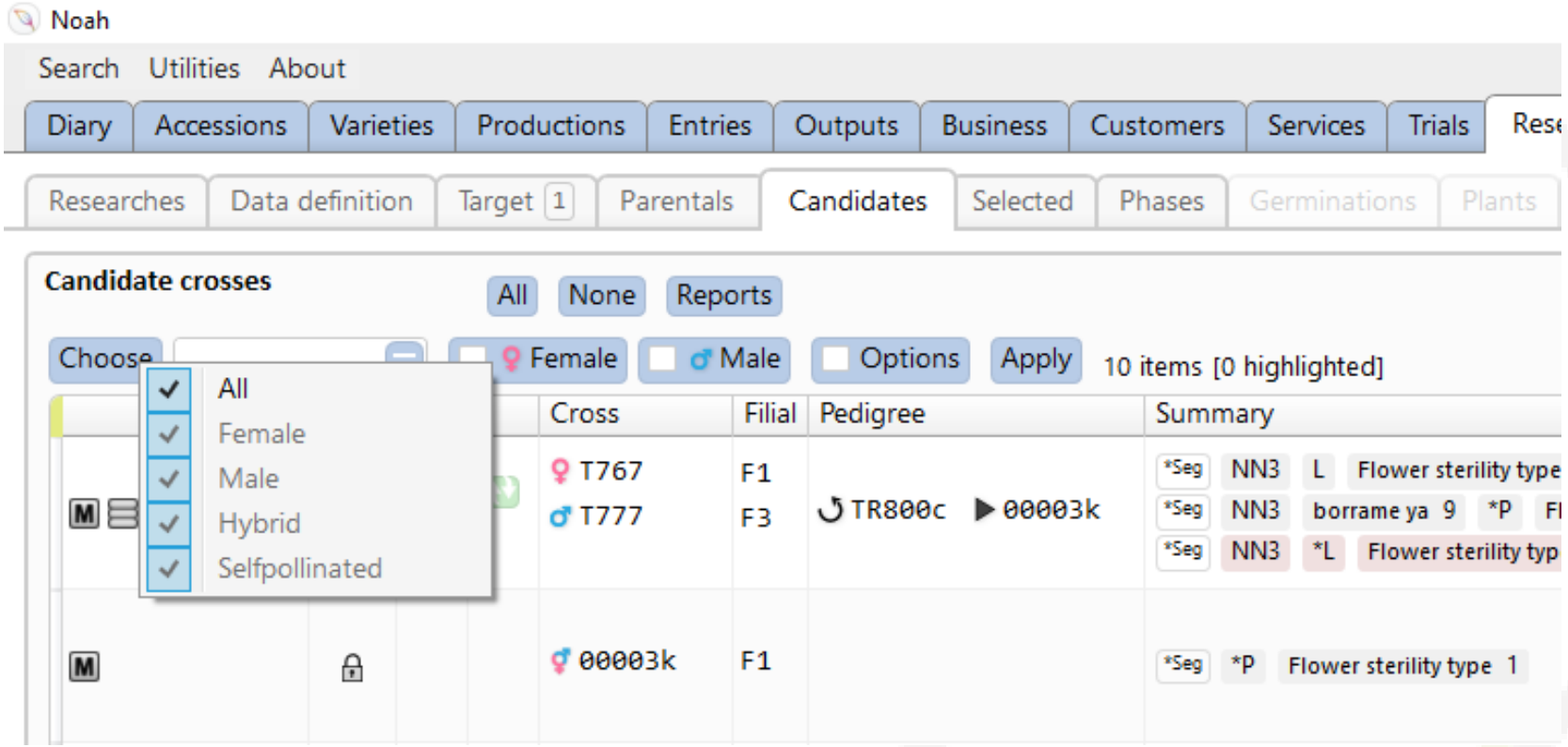


NOAH Plant Germplasm ERP is a new software solution for resource planning of plant germplasm, and provides full functionality for:

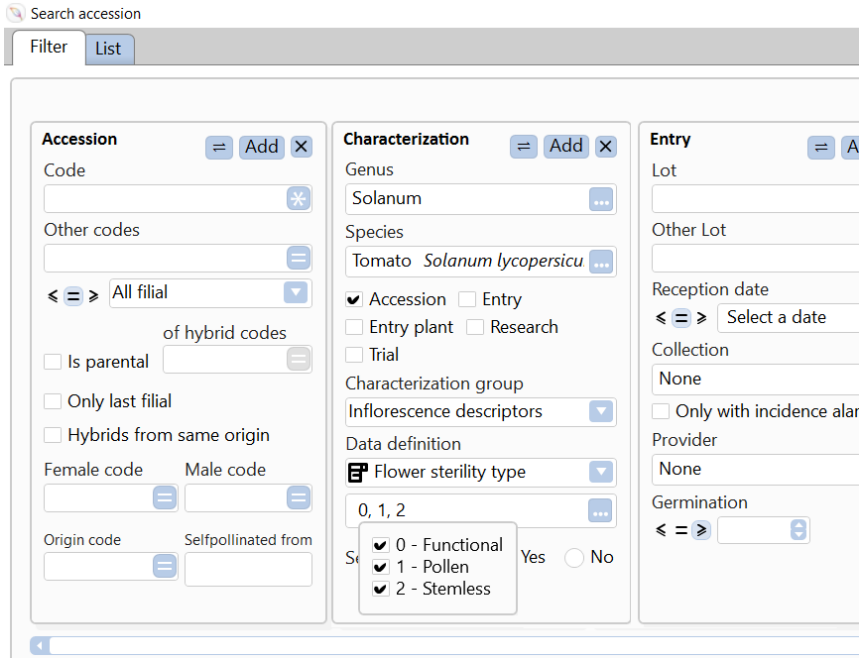
- Plant breeding.
- Variety trials.
- Product development.
- Research, development and commecial inventory.
- Germplasm bank, treatments, samples, sales.

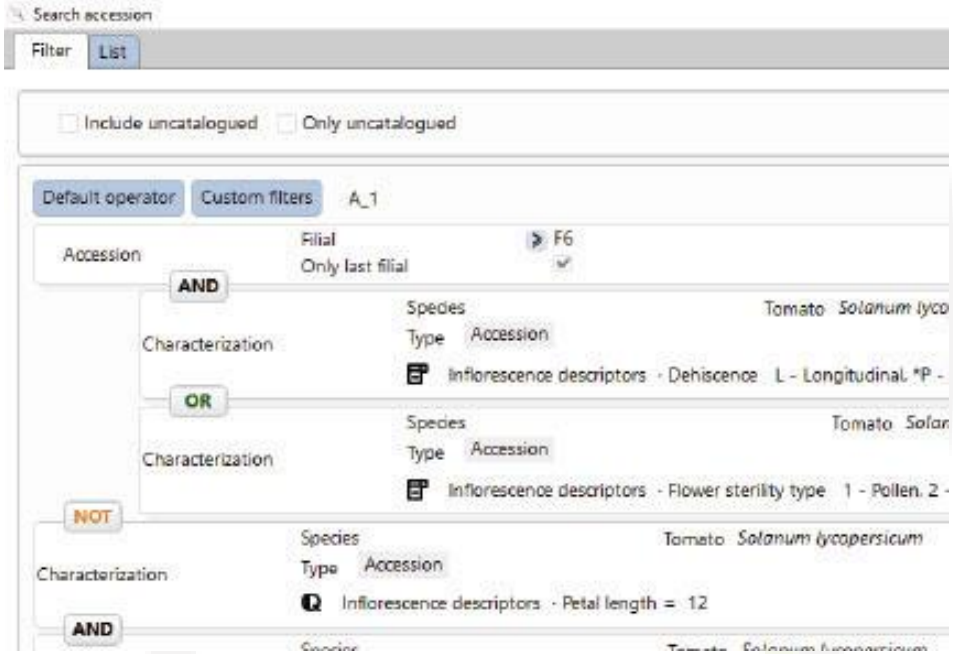
- Noah is powerful, flexible and easy-to-implement.
- Noah manages the integrity, security and robustness of the information.
- Includes the functionality for configuring the automatic importation of molecular markers lab reports.
- Provides tools for the automatic importation of existing data.

Noah provides a modern, high performance and easy learning user interface design.

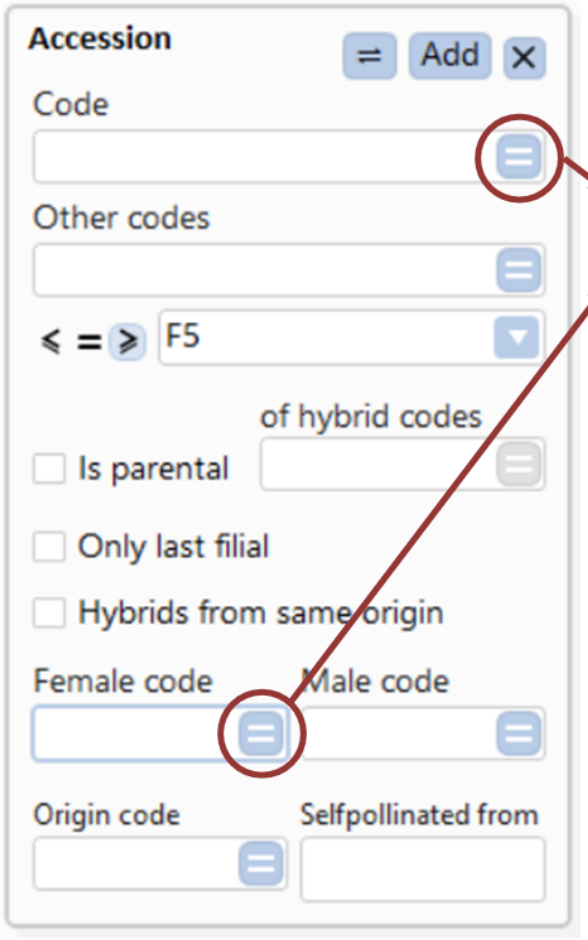


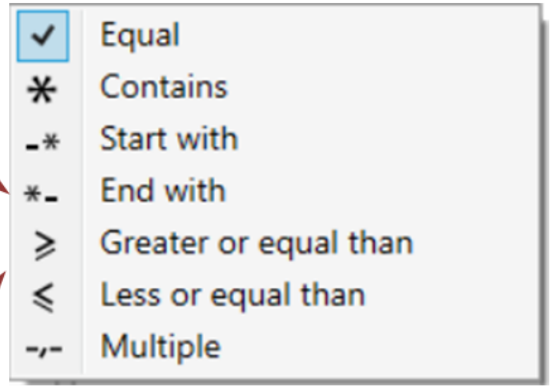
Noah provides a flexible and powerful search system by filters and operators, for accurate support for any decision making and generation of complex reports.





- Searching accessions according to their pedigree and filial information. Noah is optimized to perform searches throughout ancestors and descendants.

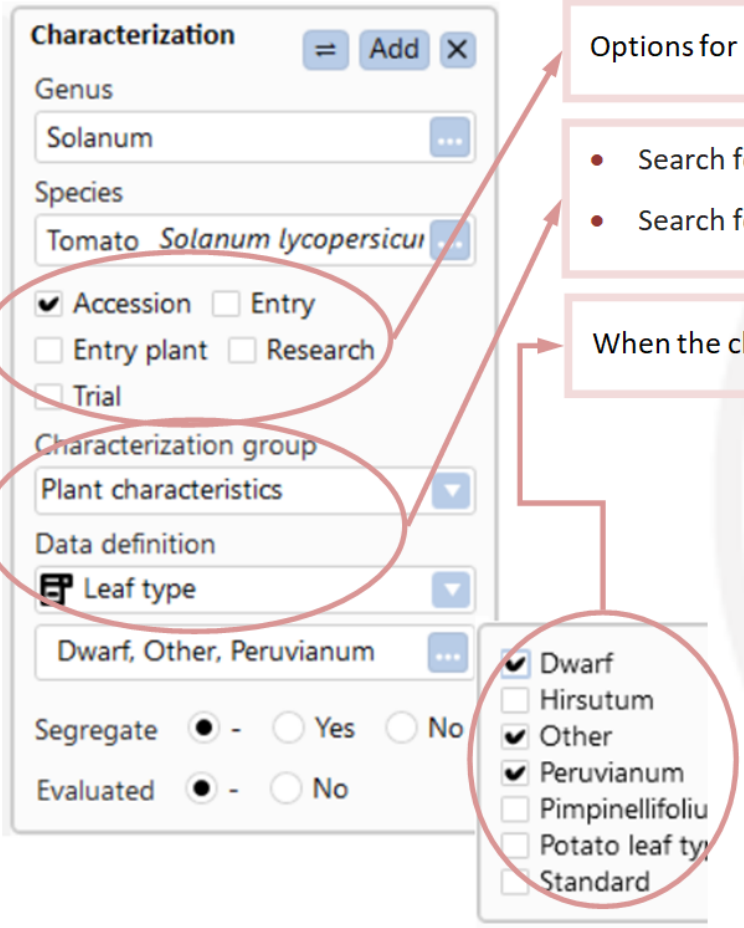




Options for searching accessions that are equal to that code, or contains that code, or start with, end with, are greater or less than.

Multiple: allows to enter a list of codes.

- Search accessions that are parental of any hybrid.
- Search accessions by filial or those that are last filial.
- Search accessions according to:
  - Origin code
  - Male code
  - Female code
- Search accessions that are selfpollinated from a particular ancestor.
- Search hybrids from same origin.

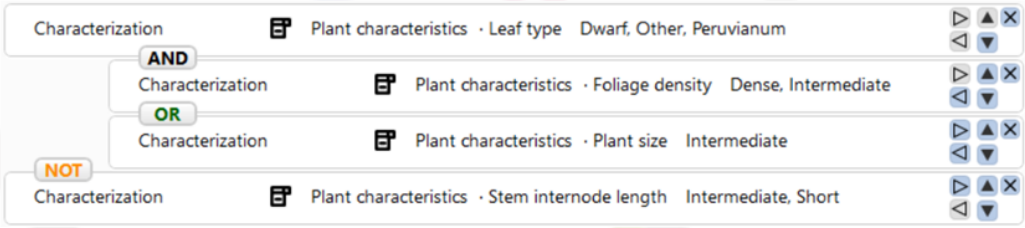


Options for establish the type of characteristic according to the source of the data.

- Search for accessions that **segregate** for a group of characteristics or for a specific one.
- Search for accessions **evaluated or not** for a group of characteristics or for a specific one.

When the characteristic is qualitative, several values can be chosen.

- Add many filters with operators AND, OR, NOT and group them.
- Tabulate filters to perform the operation with the desired groupings.

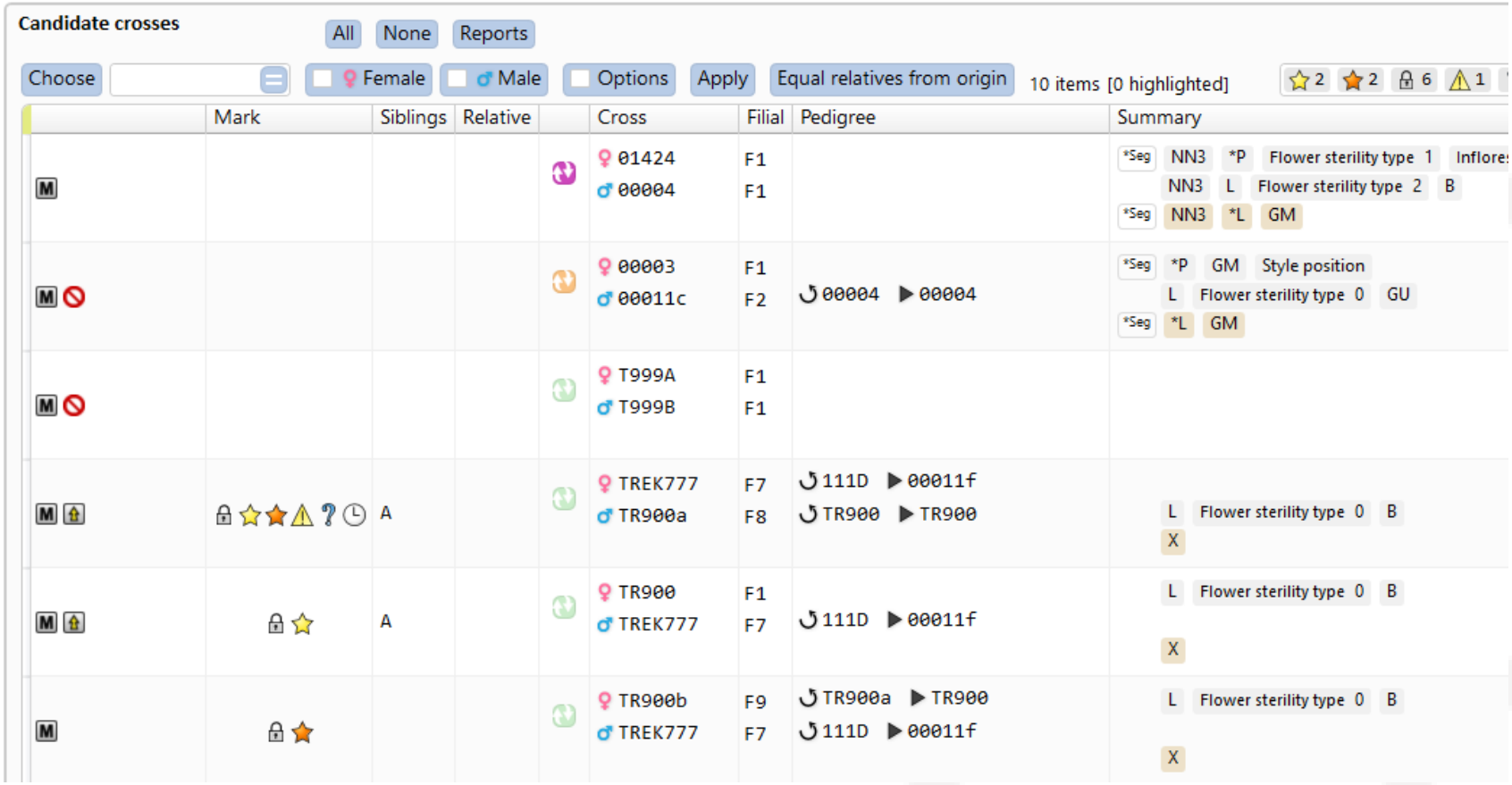


Speed test performed on a production database with real data (750,000 tomato accessions) in one of the companies in which Noah has already been implemented.

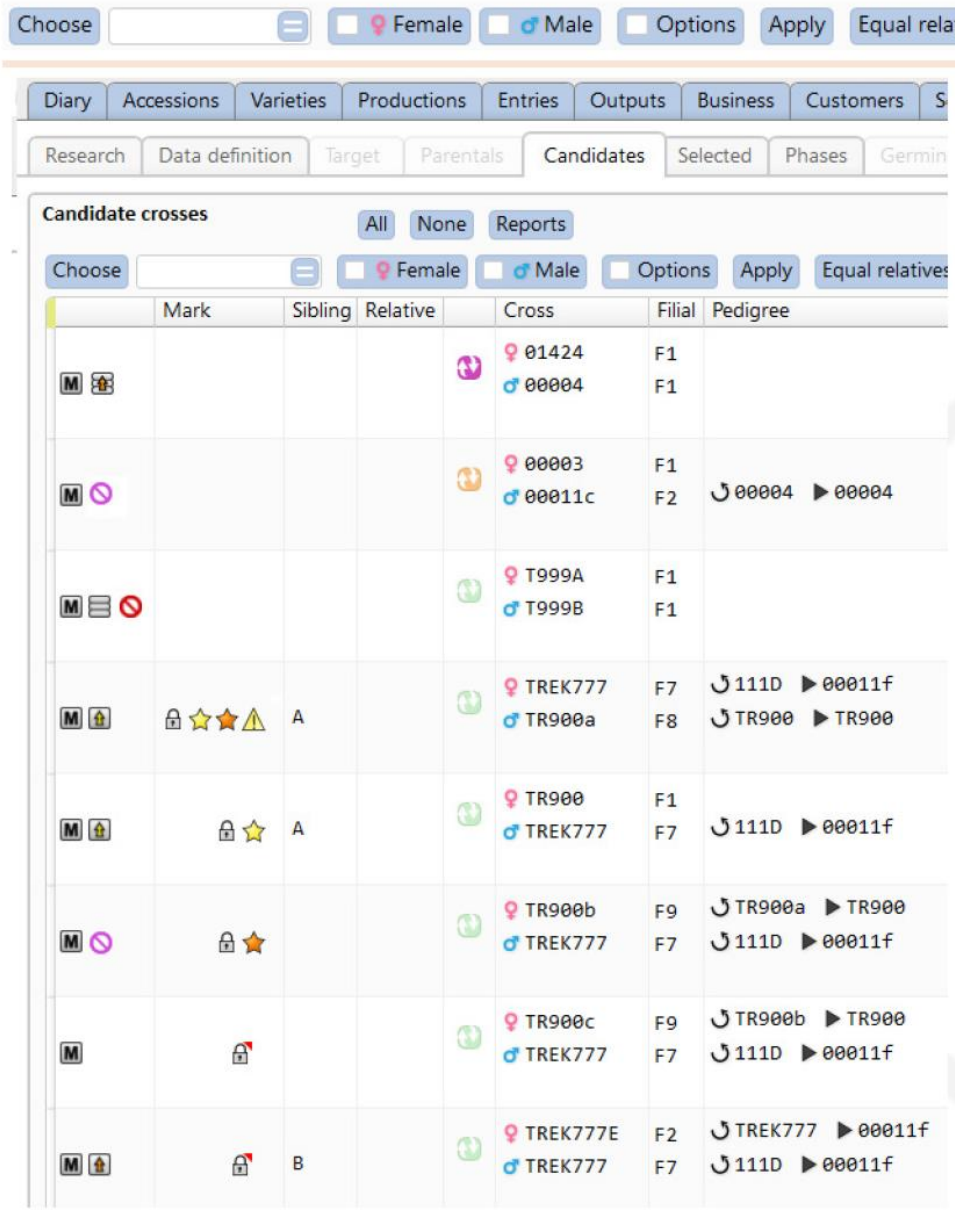
Operation: look for accessions according to their characteristics and molecular markers using a complex query with subsets of operators AND, OR and NOT.

Server	Database size	Number of characteristics consulted	Number of values consulted per characteristic	Number of molecular markers consulted	Number of subsets with operators AND, OR and NOT	Response time
Dell PowerEdge Intel Xeon E7-4830 Memory 64 GB	750,000 tomato accessions	3	1	3	3	7 seconds
		5	1	5	5	12 seconds
		12	3	8	17	15 seconds

Noah provides full functionality for plant breeding with tools for managing new hybrids with accurate design of parental characteristics.



- Prediction of the characteristics of new hybrids.
- Rules for setting forbidden crosses.
- Rules for setting crosses that must be swapped.
- Automatic detection of equal siblings or relatives.
- Automatic detection of already existing hybrids.
- Tools for filtering candidate crosses.
- Automatic detection of backcrossing.
- Information of the segregation of each accession.
- Visual warnings and icons with custom annotations.
- Nursery management.
- Tablet application for field working.



Button tools for filtering candidate crosses

The cross is forbidden according to the characteristics of mother and male

The cross must be obligatory swapped according to the characteristics of mother and male

The cross has been swapped by the user

The cross has been swapped by the system according to forbidden rule

The cross already exists in the database

Equal relative crosses already exist in the database

Equal relative crosses already exist in the list

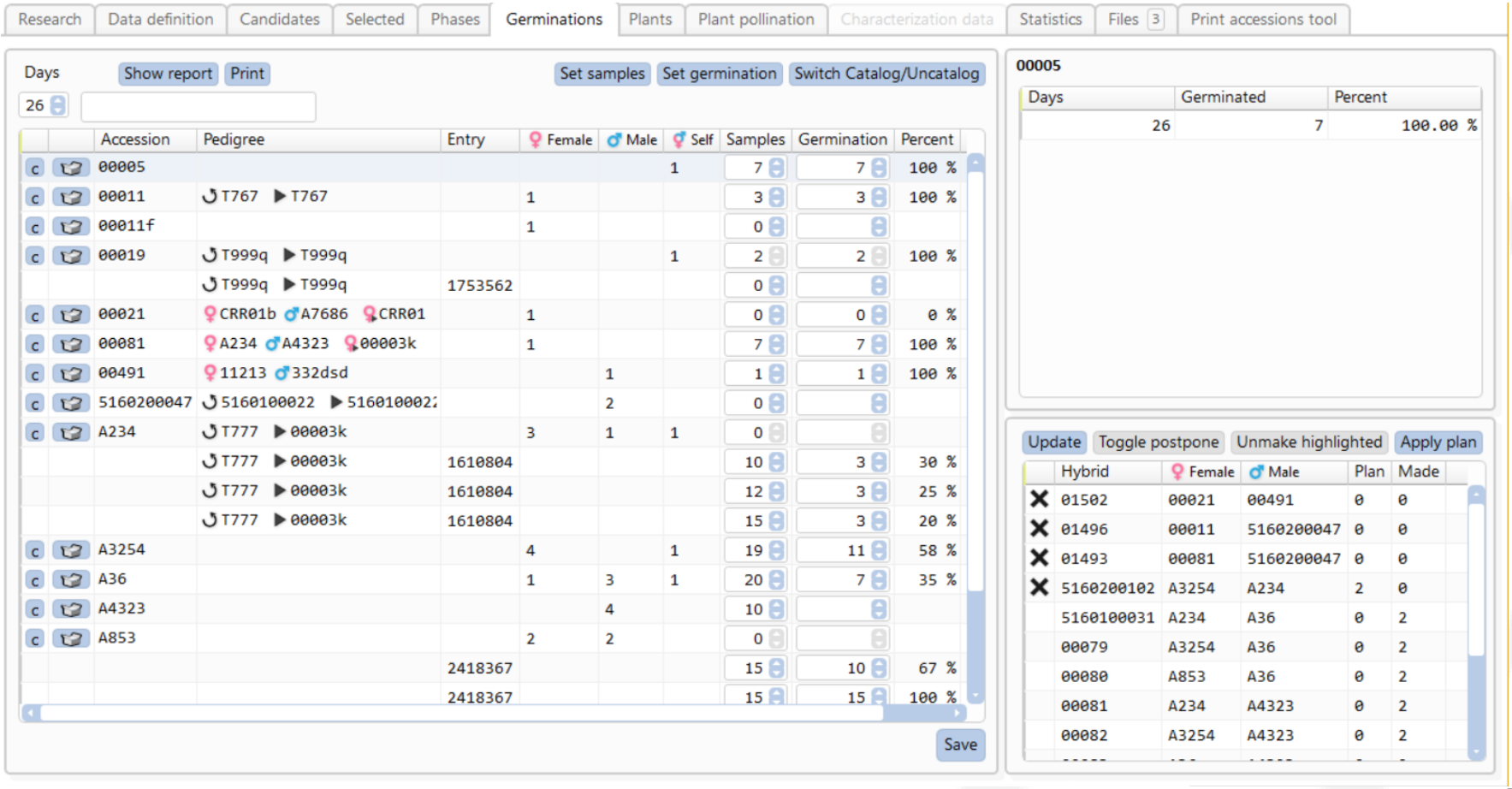
Yellow all equality-characteristics evaluated

Orange some equality-characteristics evaluated

Equal relative crosses have the same label in columns *Sibling* or *Relative*

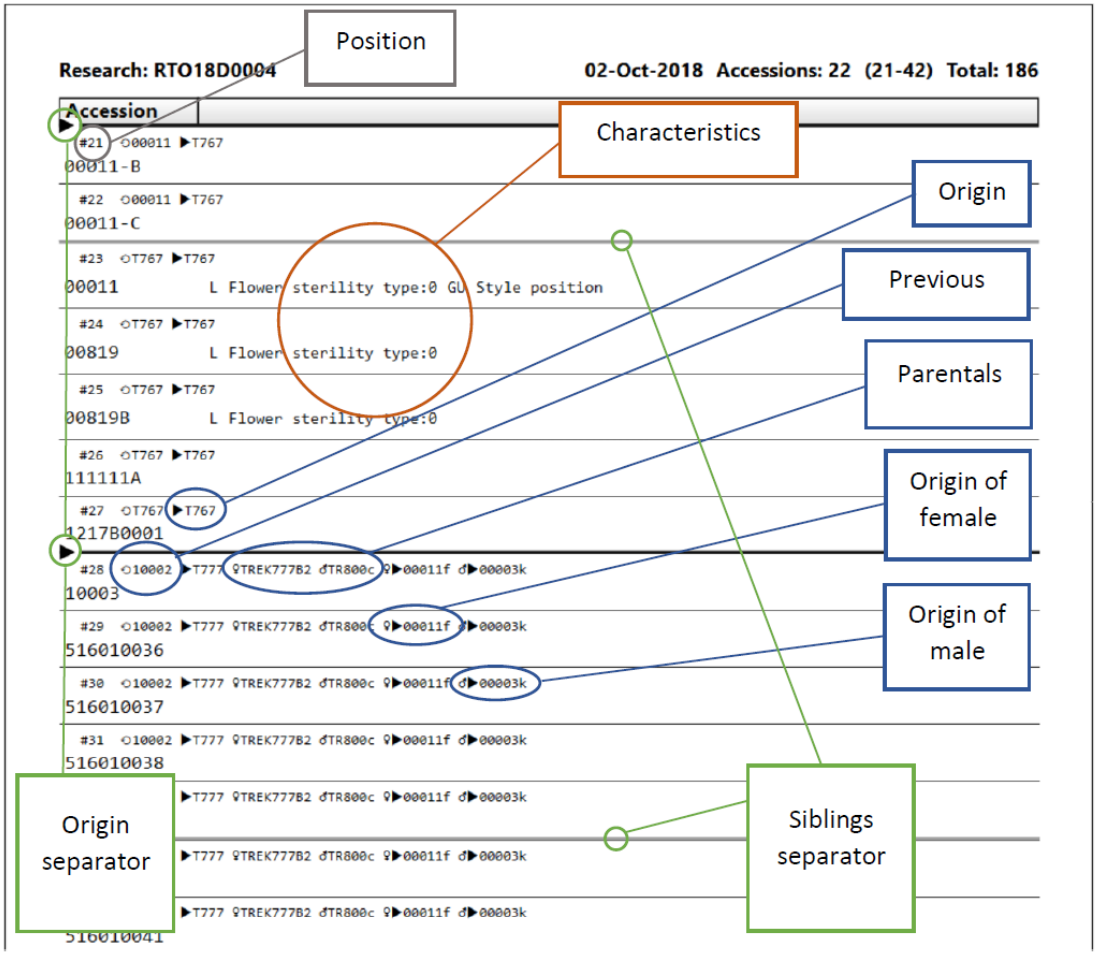
Visual icons for marking crosses
Each icon may include a text note

- Printing of reports for manage the seed inventory and planting process.
- Planning of the hybrids to be carried out according to available plants and the established proportion of females pollinated per male.

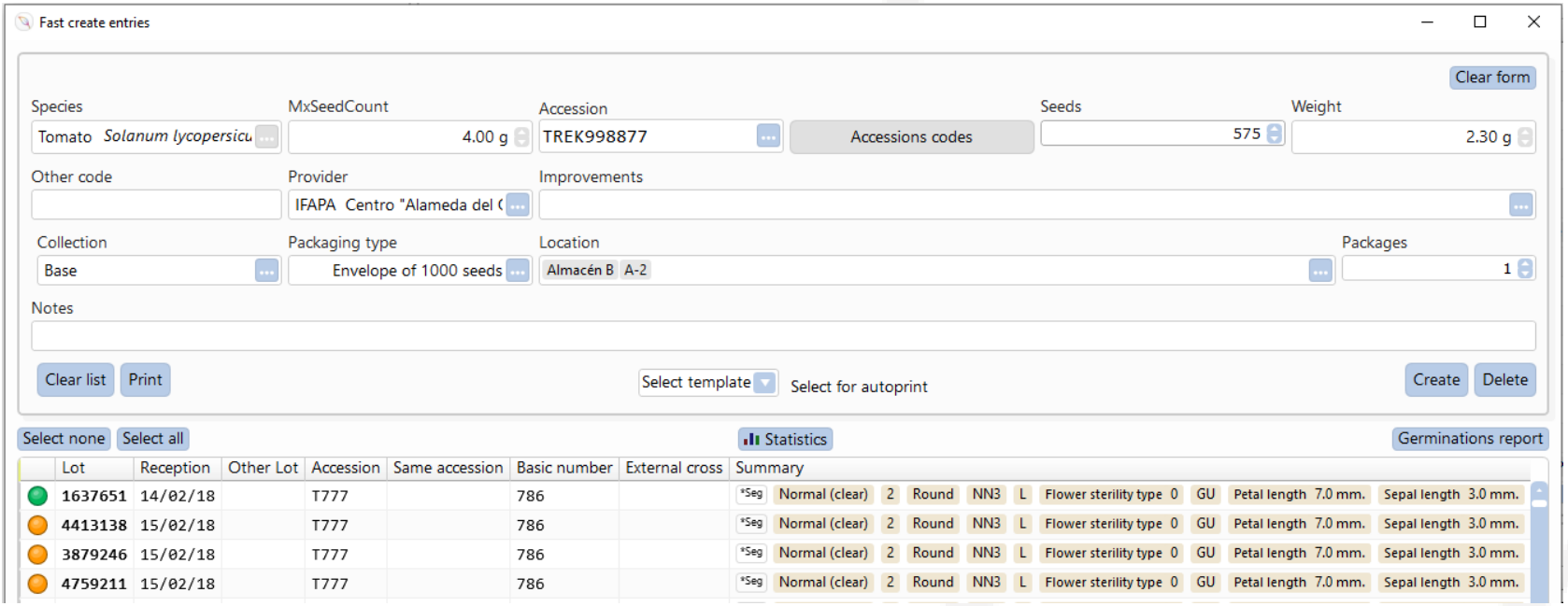


Printing of the labels according to the germination data.

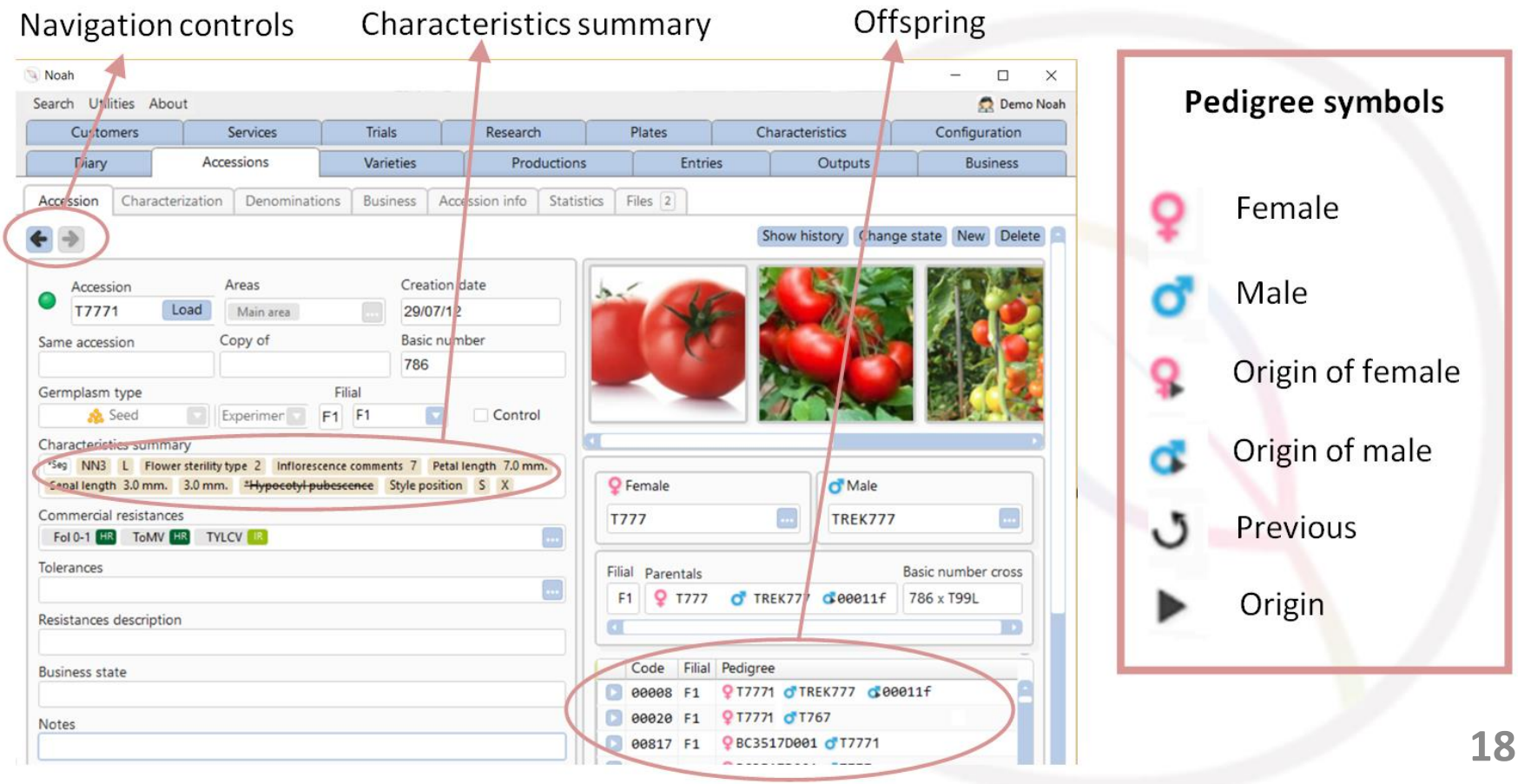
Option for planting ordering materials according to their origin. In this way the selection work is facilitated, and printing of labels and reports will follow this order.



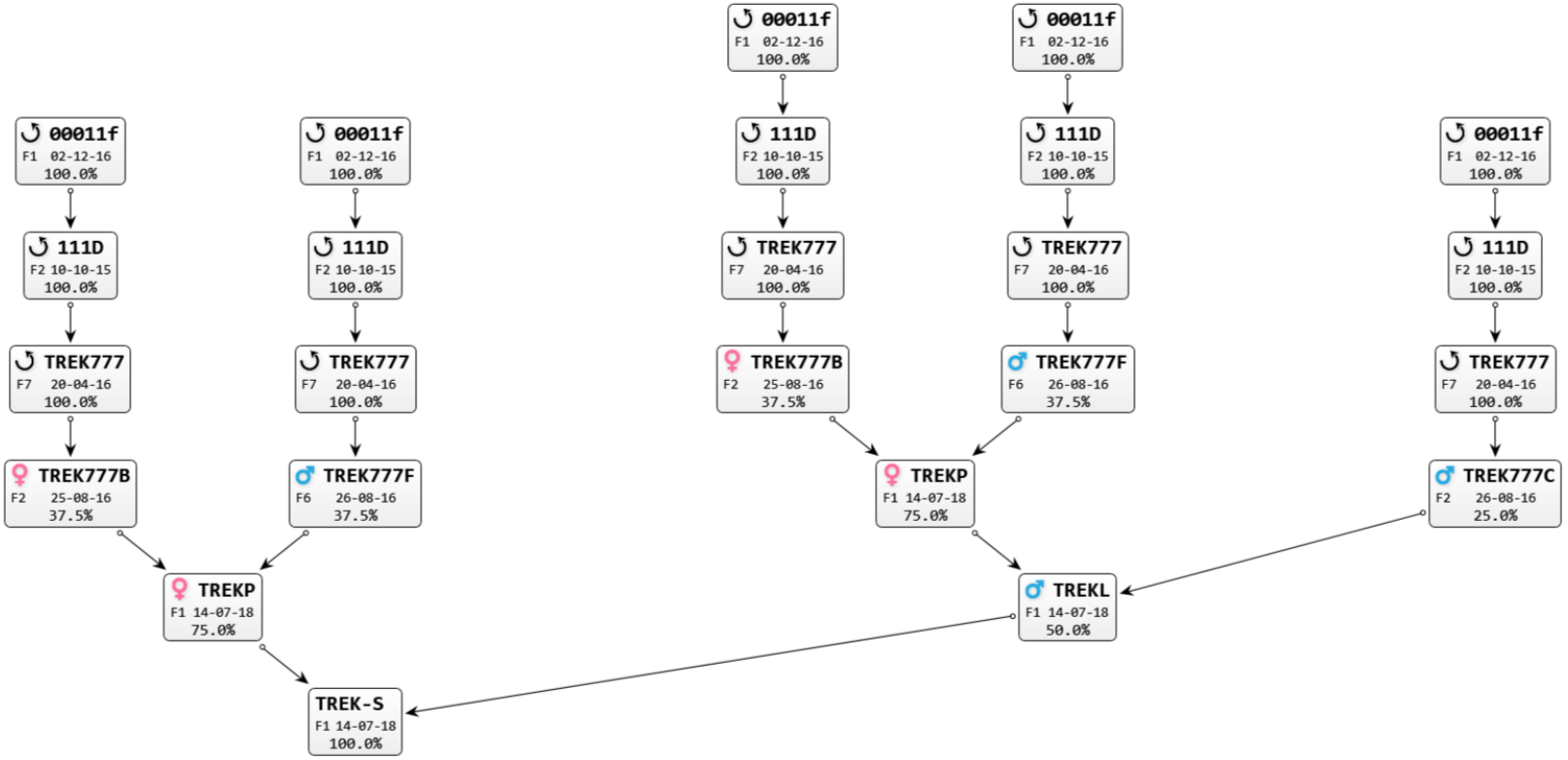
Noah incorporates specific sections to increase users performance and reduce the time to manage repetitive information. An example is the simplified form for fast registration of research accessions: experimental hybrids, and advances of lines, backcrossing, genetic crosses, etc.



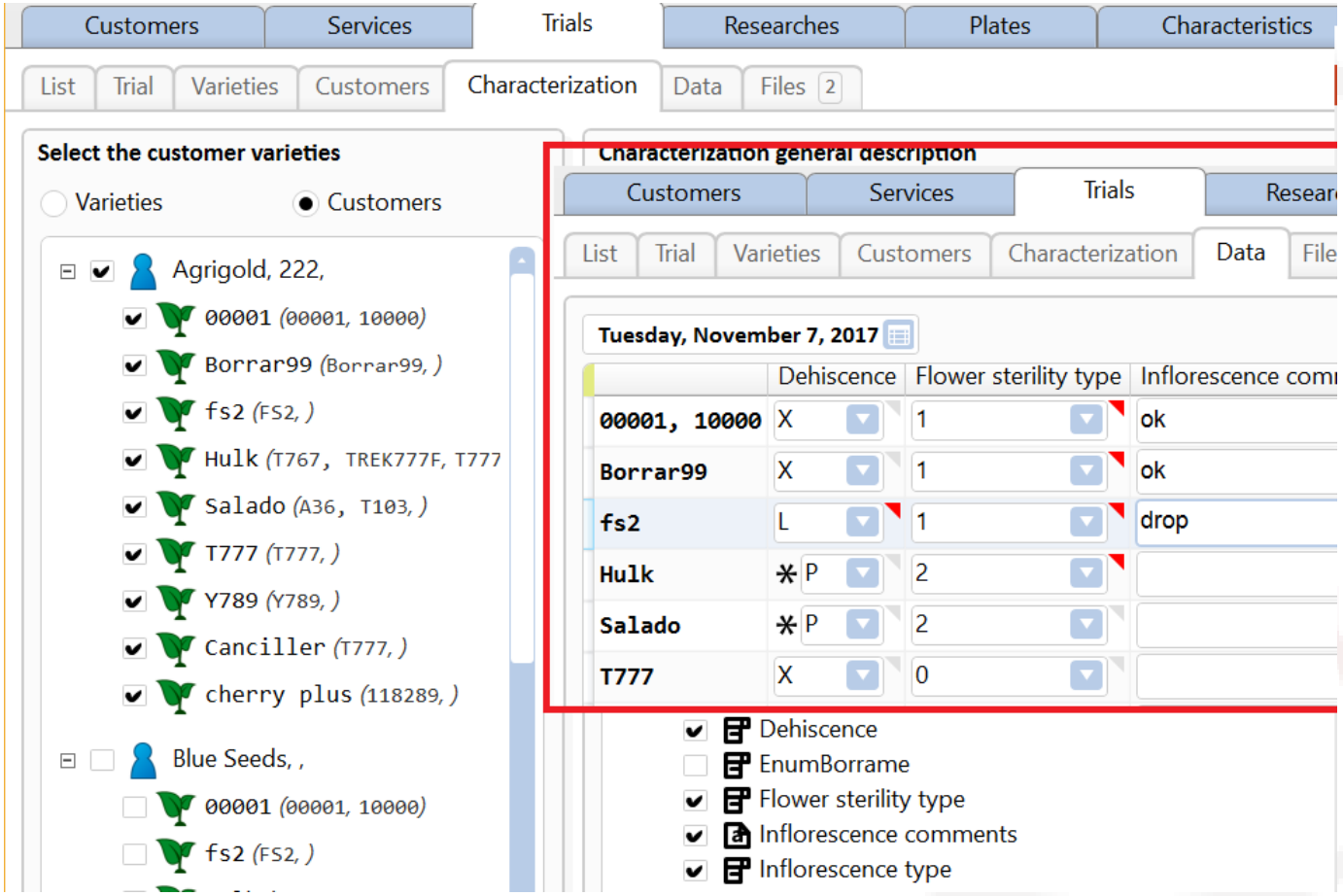
The user can click on each pedigree or offspring accession and load it. With the navigation controls the user can go through the displayed accessions from front to back and vice versa, inspecting their characteristics.



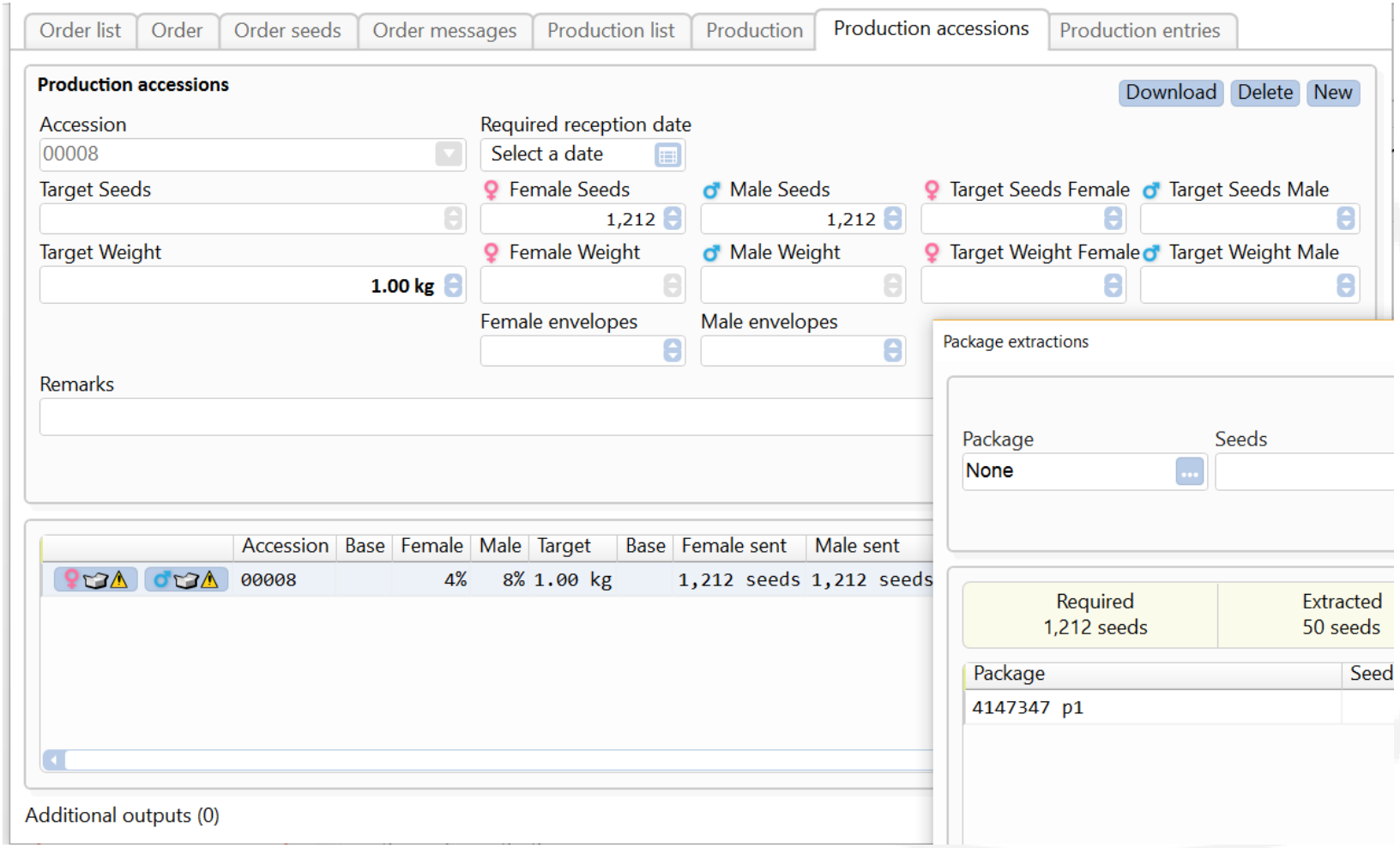
Graphic representation of the pedigree showing selfpollination, crosses, and the % of genetic contribution of each material.



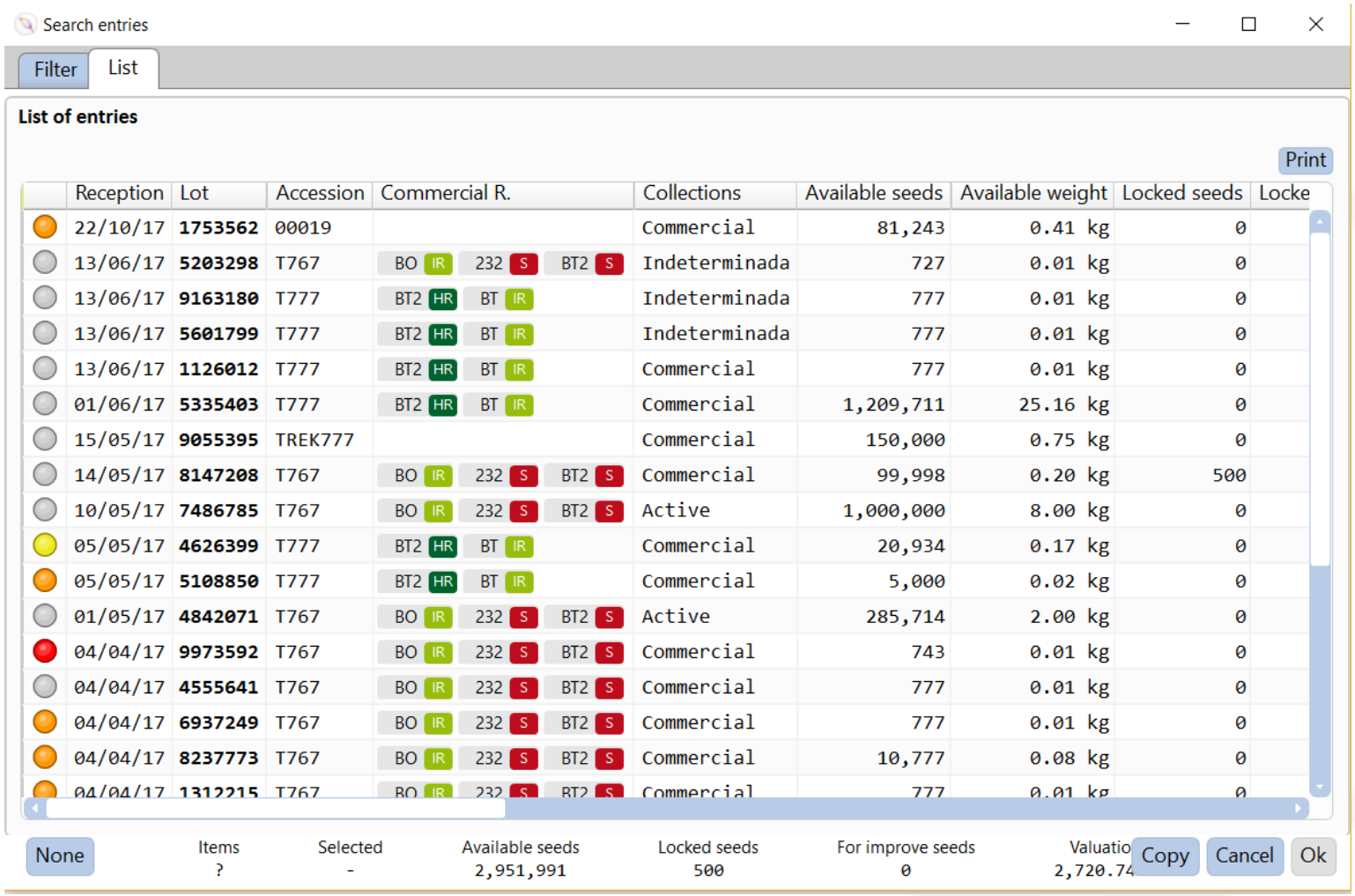
Noah provides the trials section for variety testing. Each characteristic can store the annotated observations over time.



Noah provides a section for the management of planting of experimental hybrids.

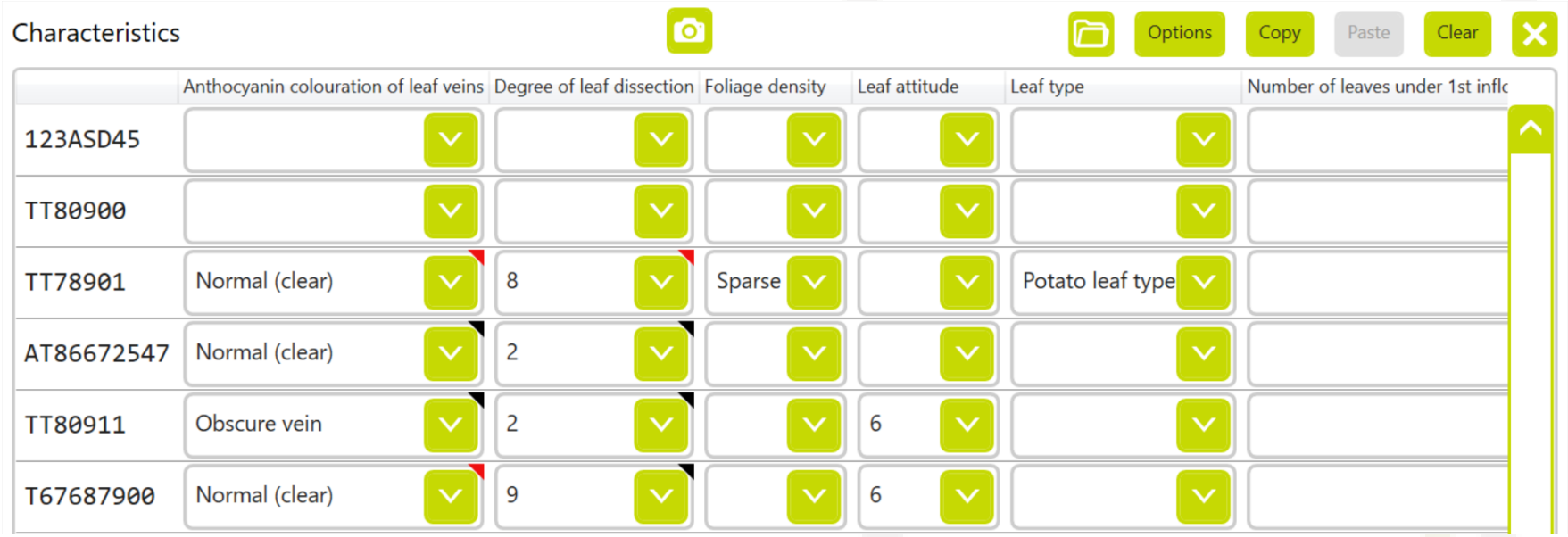


Noah provides functionality for inventory, seed tracking, seed treatment, sales and samples.

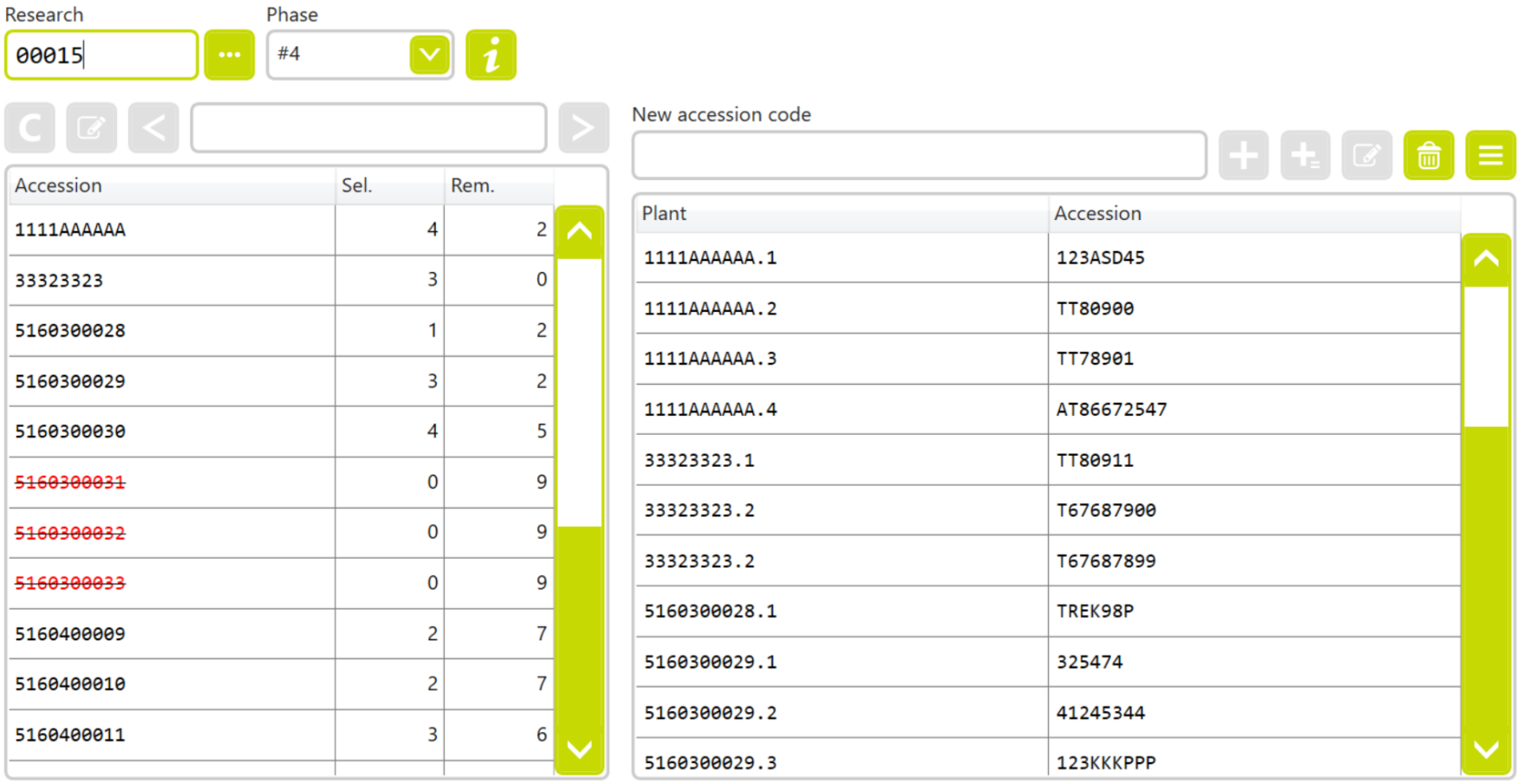


Noah Portable, specially designed for tablets, provides field work functionality.

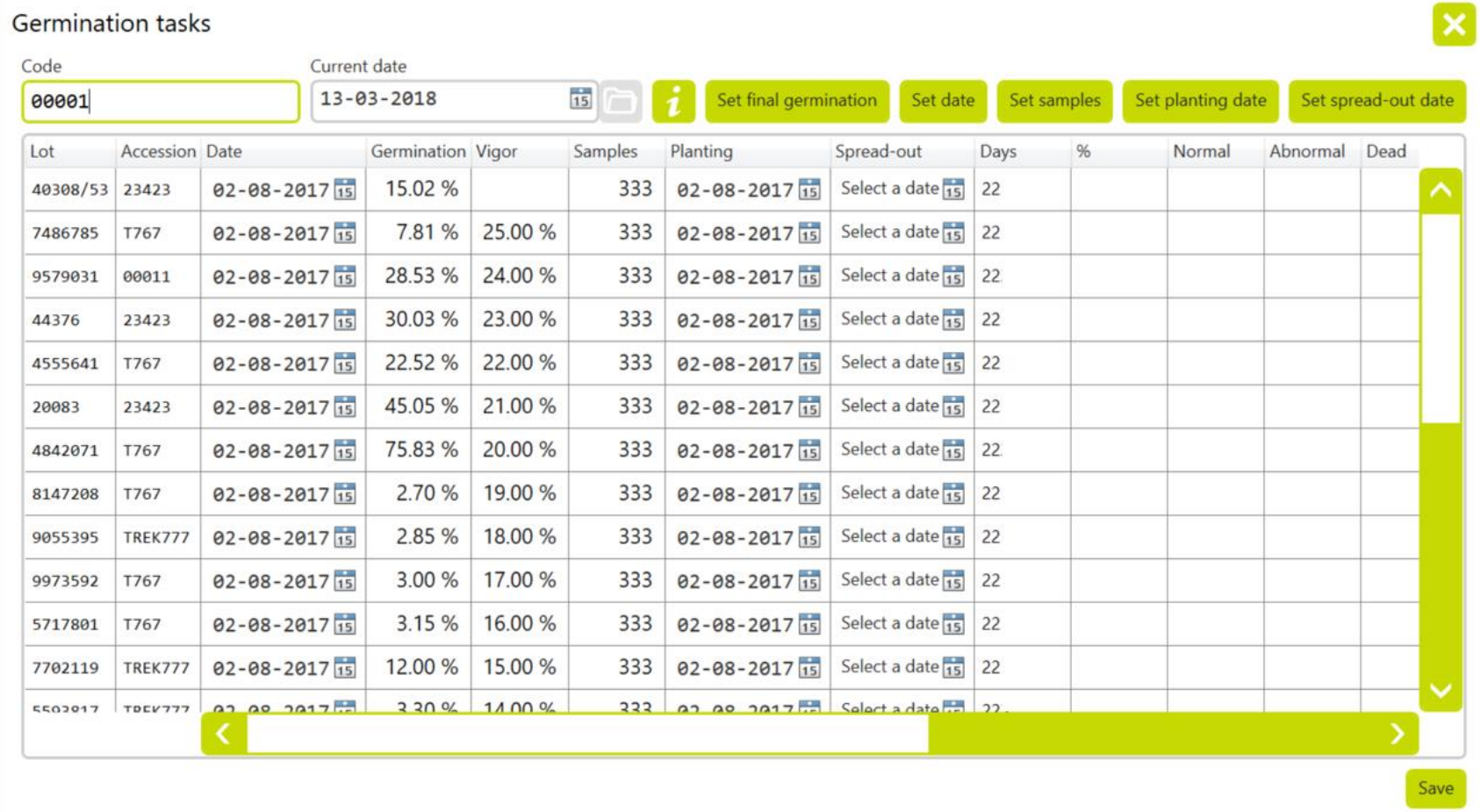
Noah Portable works in real time with Internet connection. For an offline operating mode Noah generate spreadsheets configured by the user.



Noah Portable facilitates the managing of advancing lines at field, adding new selections and uncataloguing accessions. It allows registering the observed characteristics in the system and uploading photos.

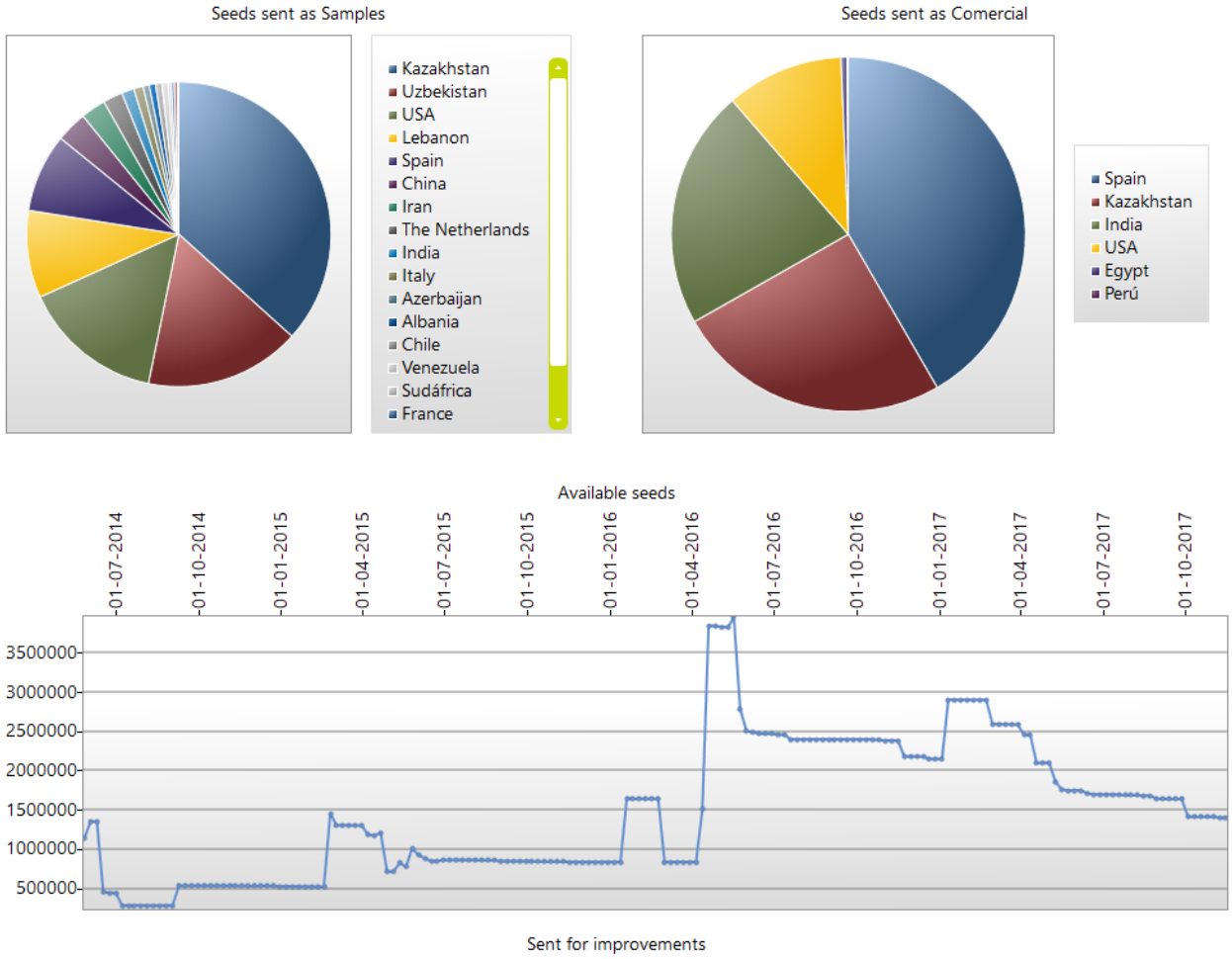


Noah Portable provides a section of germination tasks for registering the germination of seed lots. Includes the upload of photos of the tray of plants to the information of each lot.

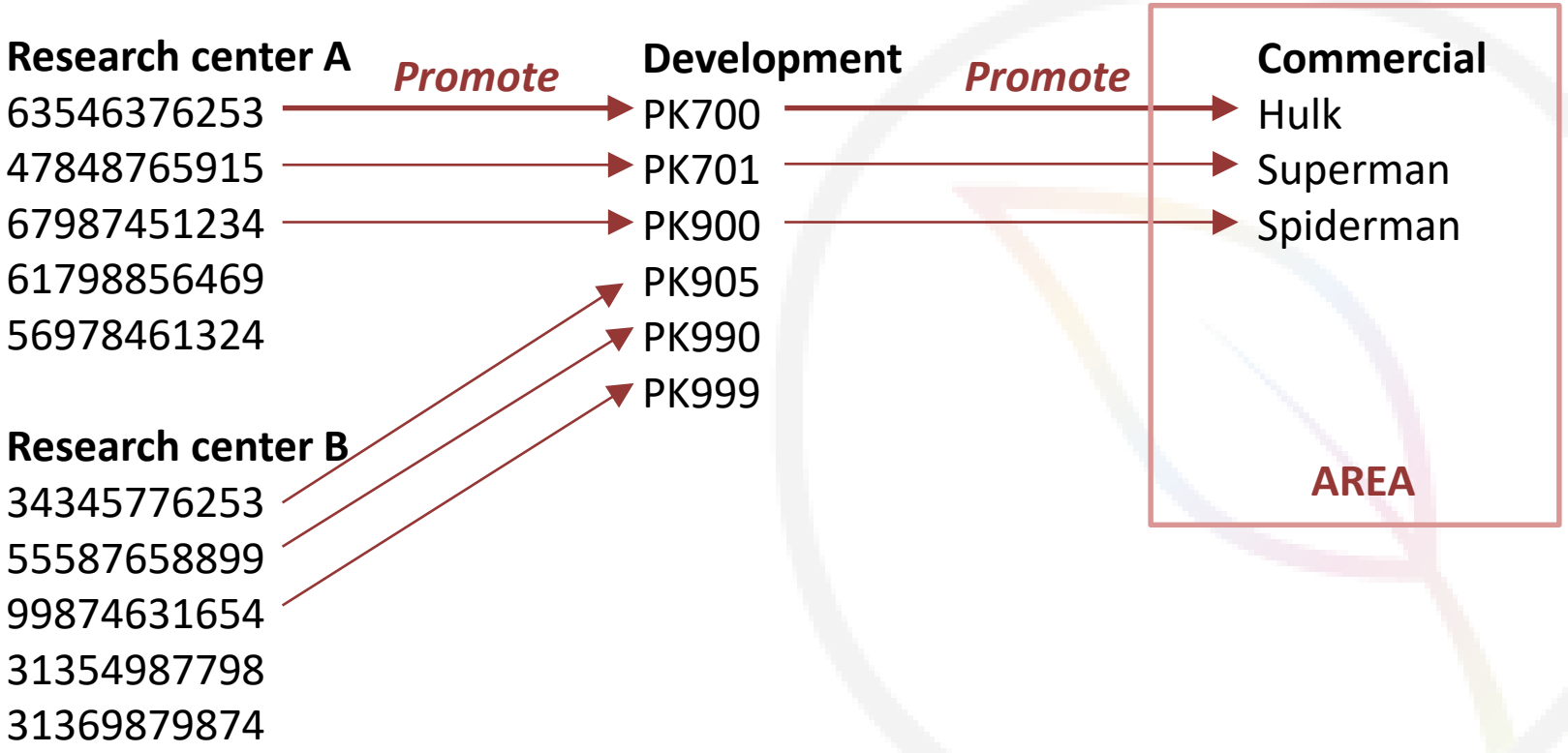


Lot	Accession	Date	Germination	Vigor	Samples	Planting	Spread-out	Days	%	Normal	Abnormal	Dead
40308/53	23423	02-08-2017	15.02 %		333	02-08-2017	Select a date	22				
7486785	T767	02-08-2017	7.81 %	25.00 %	333	02-08-2017	Select a date	22				
9579031	00011	02-08-2017	28.53 %	24.00 %	333	02-08-2017	Select a date	22				
44376	23423	02-08-2017	30.03 %	23.00 %	333	02-08-2017	Select a date	22				
4555641	T767	02-08-2017	22.52 %	22.00 %	333	02-08-2017	Select a date	22				
20083	23423	02-08-2017	45.05 %	21.00 %	333	02-08-2017	Select a date	22				
4842071	T767	02-08-2017	75.83 %	20.00 %	333	02-08-2017	Select a date	22				
8147208	T767	02-08-2017	2.70 %	19.00 %	333	02-08-2017	Select a date	22				
9055395	TREK777	02-08-2017	2.85 %	18.00 %	333	02-08-2017	Select a date	22				
9973592	T767	02-08-2017	3.00 %	17.00 %	333	02-08-2017	Select a date	22				
5717801	T767	02-08-2017	3.15 %	16.00 %	333	02-08-2017	Select a date	22				
7702119	TREK777	02-08-2017	12.00 %	15.00 %	333	02-08-2017	Select a date	22				
5593817	TREK777	02-08-2017	3.30 %	14.00 %	333	02-08-2017	Select a date	22				

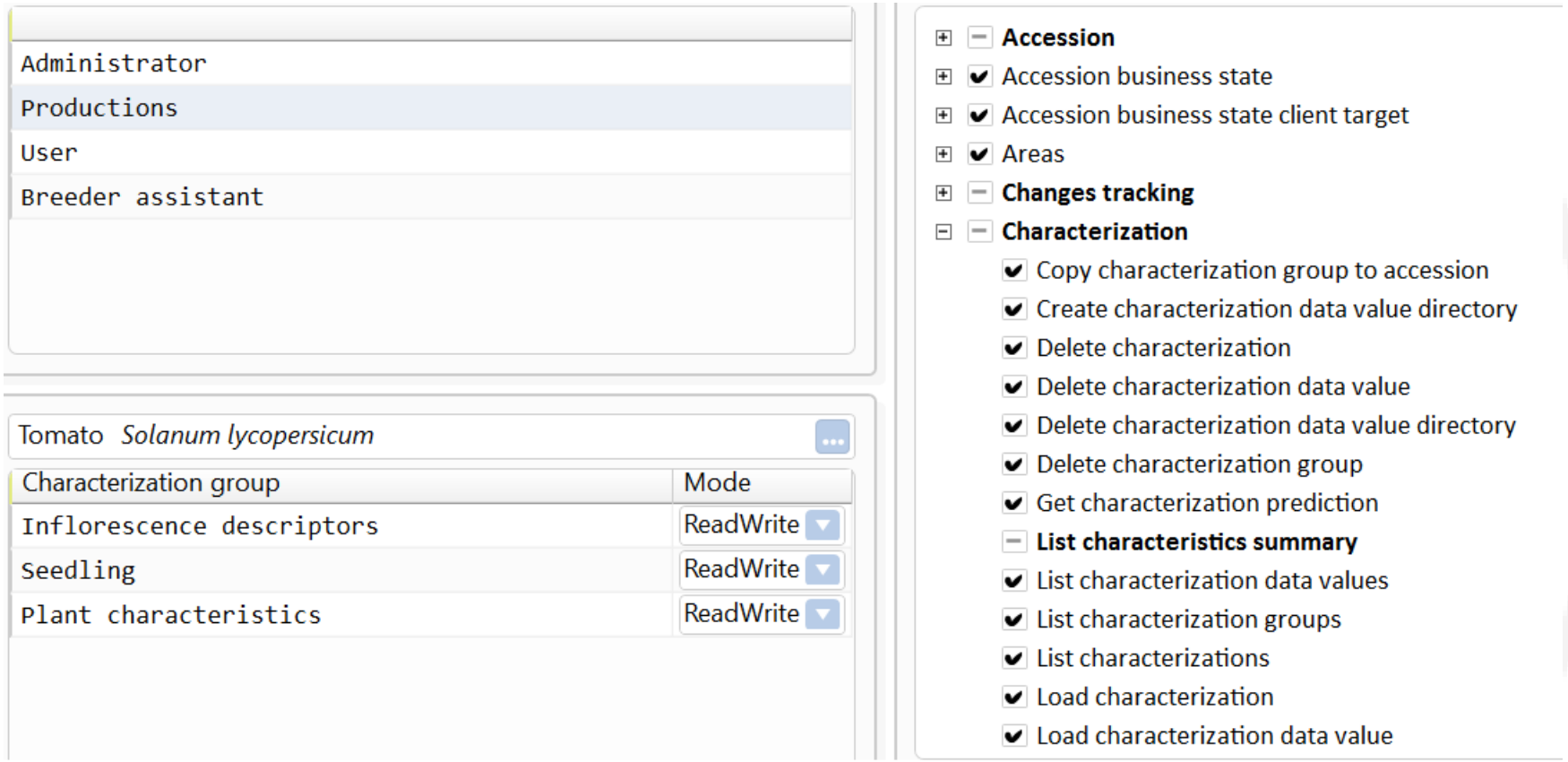
Noah provides a tool for showing statistics. Customers may require Bullsoft to add complex statistics or export Noah data to specific statistical analysis software.

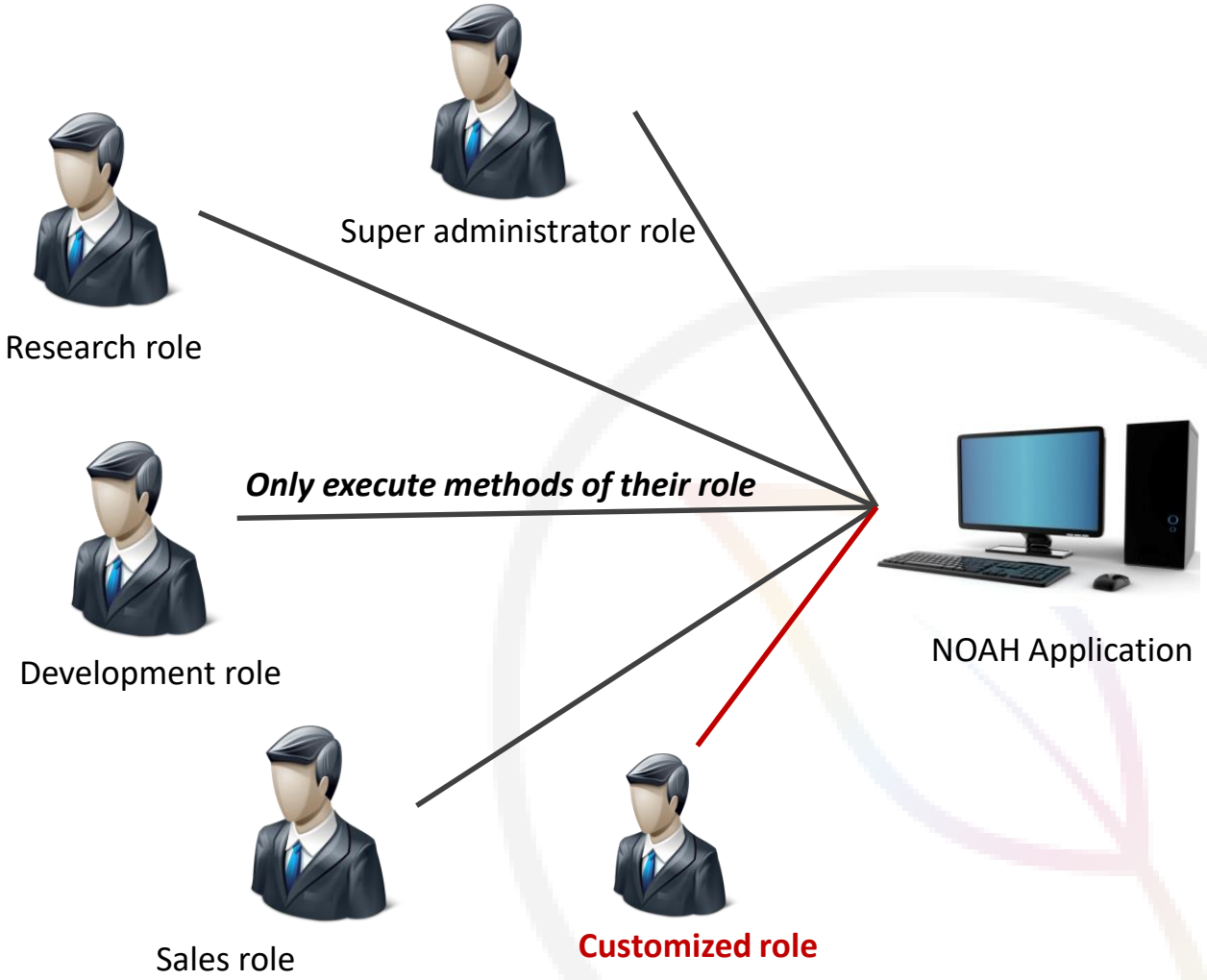


Noah allows to classify the accessions in Areas. Each user can only see information related to the materials that belong to their Areas.



The configuration of the user roles allows to have a total control of the actions that each user can perform.




Super administrator role
Research role
Only execute methods of their role
NOAH Application
Development role
Sales role
Customized role

Noah allows you to configure the code pattern of the objects (accessions, trials, lots, packages, etc) with a secure and flexible XML format.

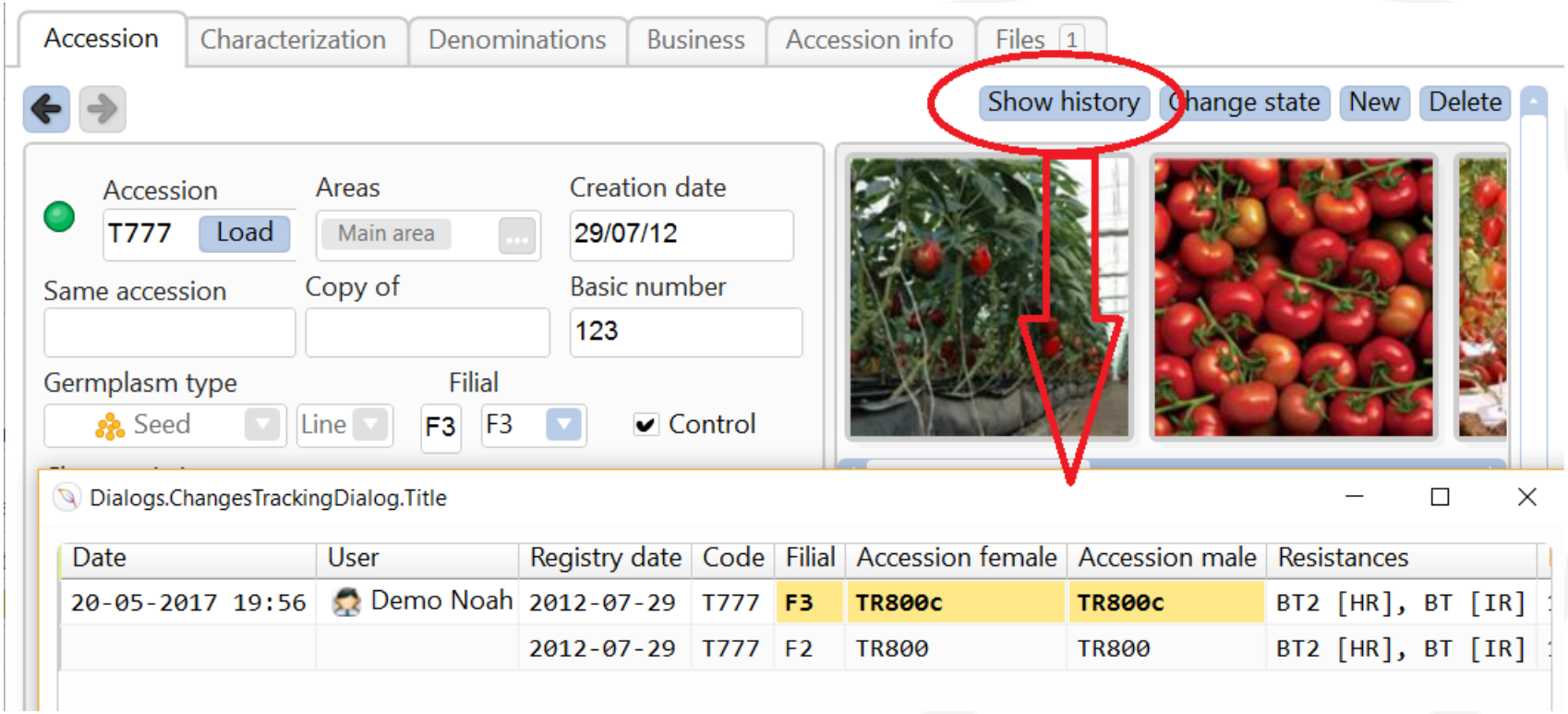
```
<pattern>
	<conditionalPattern>
		<condition param="PedigreeType" value="Haploid" />
		<param>SpeciesCodeB</param>
		<literal>S</literal>
		<param>CurrentYear</param>
		<param>AreaCode</param>
		<code defaultType="number" initialValue="0" fillLength="10-position" fillChar="0">
			<literal>Haploid</literal>
```

Name	Last code	Help
Accession	01521	Pattern for the code of accessions
Basic number of accessic	6015	Pattern for the code of the basic number of the accessions
Autodenomination for cus	OL-24561-0012	Pattern for the code of denominations automatically generate
Entry	4640496	Pattern for the code of entries
Entry plant	00011	Pattern for the code of entry plants
Germination task	00005	Pattern for the code of germination tasks
Invoice	?/002	Pattern for the code of invoice

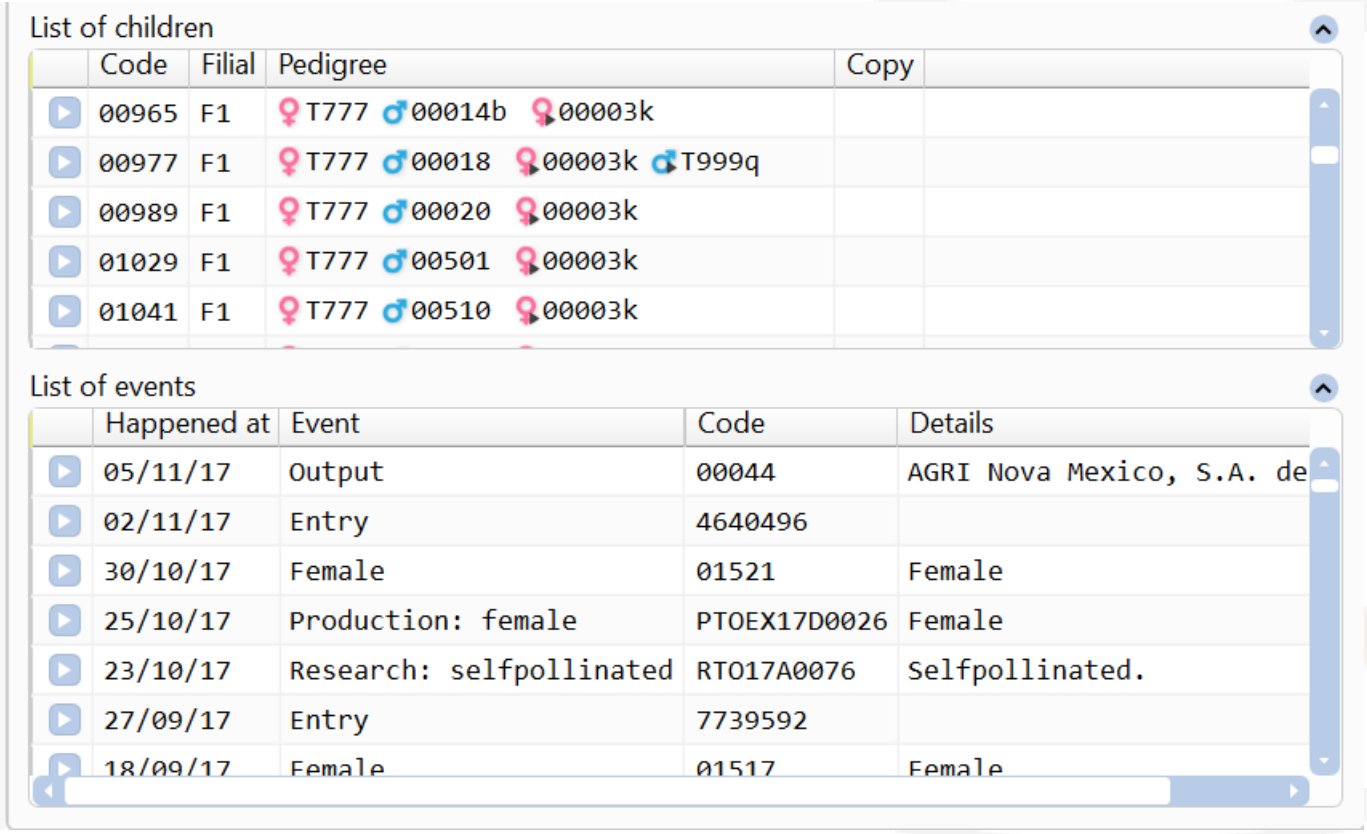
Noah includes a set of visual warnings that increases the performance of users and the reliability of operations.

Mark	Created at	Output	Customer		Species	Extracted	State
	22/10/17	00051	21382	Agrigold Esto son las notas del client		--	Rectification
	18/05/17	00049	19260	Agence Agdir Lot 157 Badra	Tomato	0% ⚠	Budget
	11/05/17	00048	85410	ADEL SHOUSHA	Tomato	0% ⚠	Budget
⚠	12/04/17	00045	72554	(AGRICA) CTS LTD.	Tomato	0% ⚠	Budget
	13/02/17	00044	90123	AGRI Nova Mexico, S.A. de C.V.		--	Internal
⚠ ?	31/12/16	00042	93852	AGRIGENSOL		--	Budget
	31/12/16	00043	21382	Agrigold Esto son las notas del client		--	Rectification
	31/12/16	00039	21382	Agrigold Esto son las notas del client		--	Budget
	12/11/16	00029				--	Budget
	06/11/16	00028	21382	Agrigold Esto son las notas del client	Tomato	0% ⚠	Budget
	16/10/16	00014	24561	Blue Seeds		--	Rectification
	27/08/16	1234	21382	Agrigold Esto son las notas del client	Olivo	0% ⚠	Confirmed
	04/08/16	1620402	24561	Blue Seeds	Tomato,	18% ⚠	Budget
	06/07/16	1668543				--	Budget

Noah includes the history of object changes where the user can see how an object has been modified since it was created.



The accessions have a list of events and a list of children, so that the user can easily see the activity of each material.



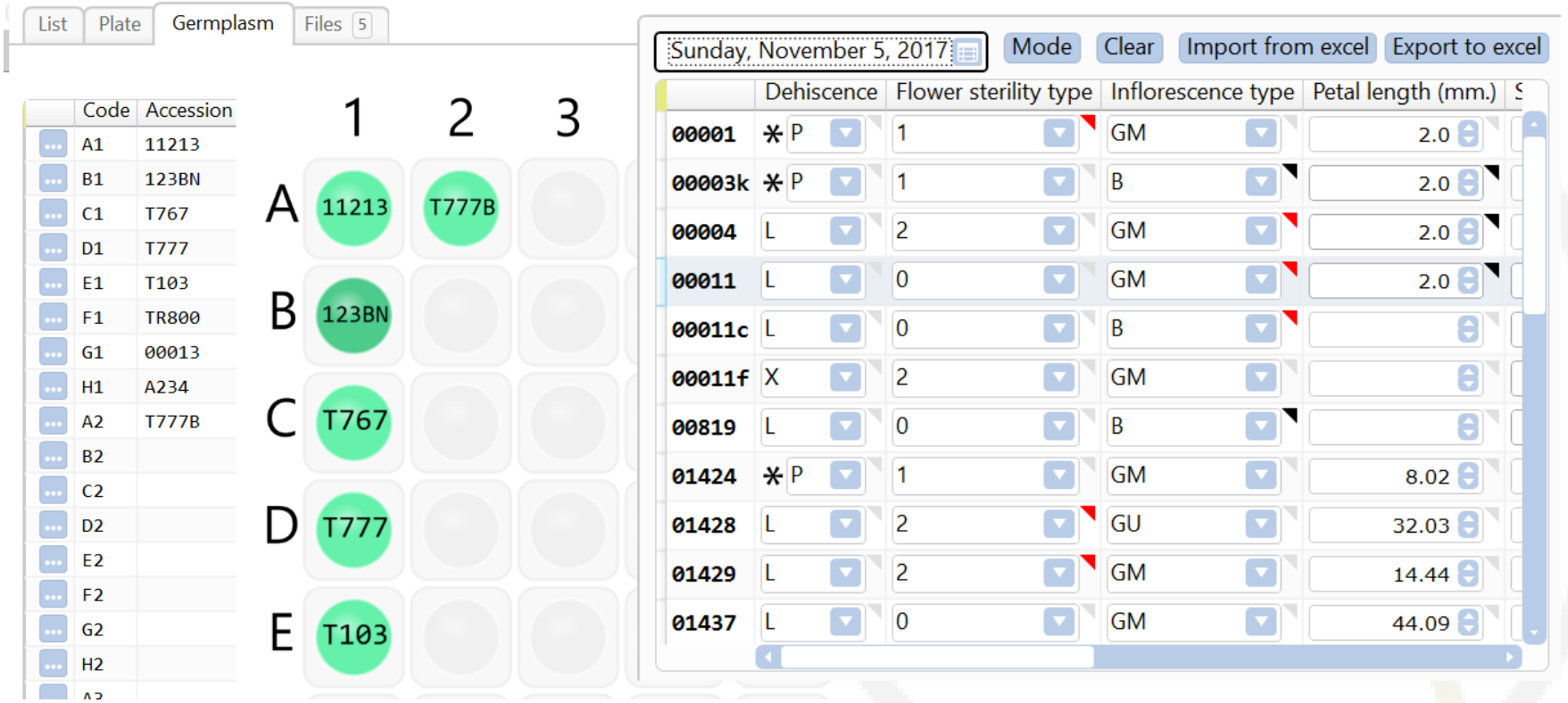
List of children

Code	Filial	Pedigree	Copy
00965	F1	♀T777 ♂00014b ♀00003k	
00977	F1	♀T777 ♂00018 ♀00003k ♂T999q	
00989	F1	♀T777 ♂00020 ♀00003k	
01029	F1	♀T777 ♂00501 ♀00003k	
01041	F1	♀T777 ♂00510 ♀00003k	

List of events

Happened at	Event	Code	Details
05/11/17	Output	00044	AGRI Nova Mexico, S.A. de
02/11/17	Entry	4640496	
30/10/17	Female	01521	Female
25/10/17	Production: female	PTOEX17D0026	Female
23/10/17	Research: selfpollinated	RTO17A0076	Selfpollinated.
27/09/17	Entry	7739592	
18/09/17	Female	01517	Female

The tool for automatically importing laboratory tests for molecular markers saves time and provides reliability.



Noah provides a flexible reporting tool that describes in detail the information requested by the user.

List accessions **05-Nov-2017 Accessions: 19 (1-19) Total: 122**

(

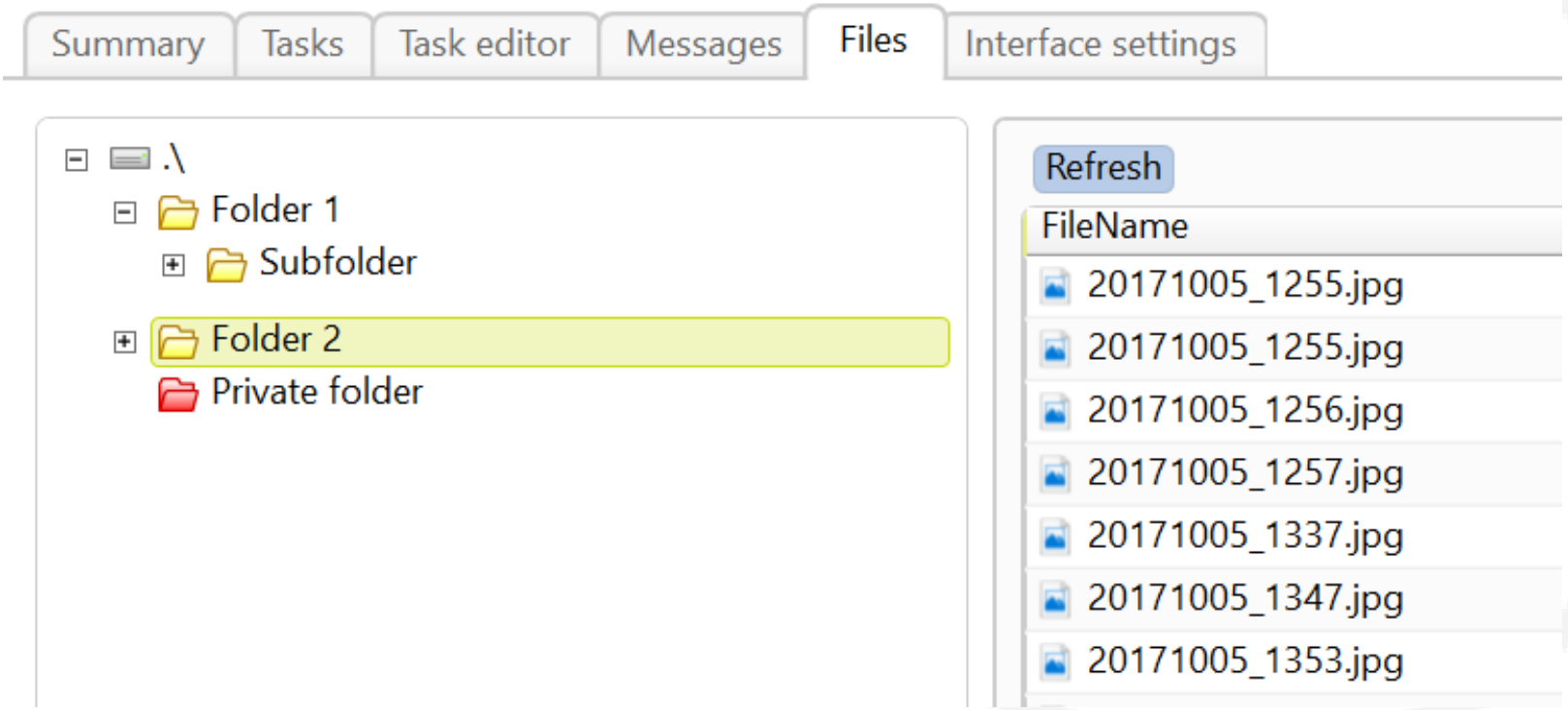
From characterization: Dehiscence is "Longitudinal|Poricidal|Medium"
OR
From characterization: Flower sterility type is "Functional|Pollen|Stemless"

)

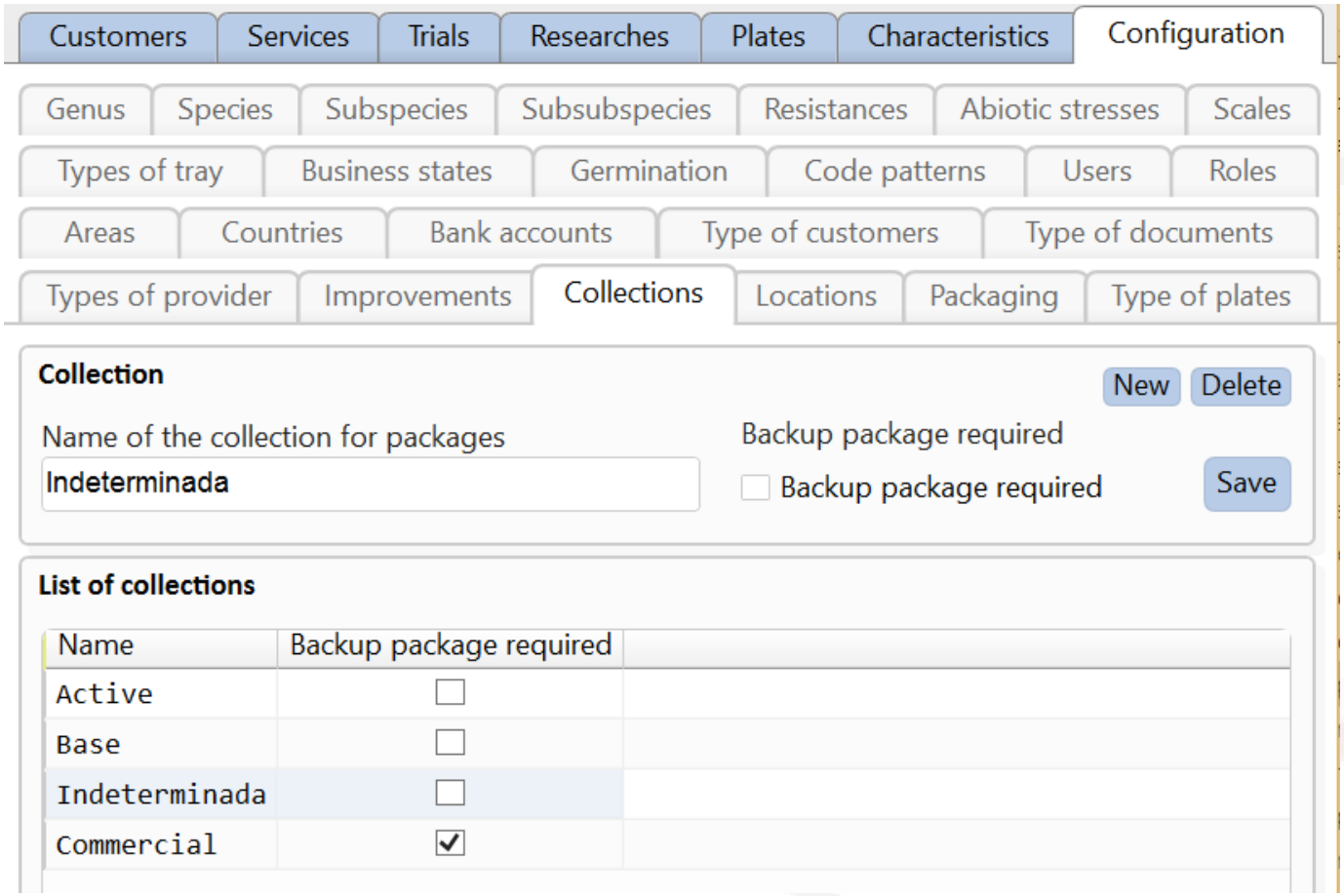
Accession	
00001	*P Flower sterility type:2 Inflorescence comments:Mola!! GM Petal length:2.0 mm. Sepal length:2.0 mm. ~~Hypocotyl pubescence~~ Style position S O
00003	*P GM Style position
00003k	*P Flower sterility type:1
00004	NN3 L Flower sterility type:2 B
00006	Flower sterility type:2
♀T777 ♂TREK777 ♀▶00003k ♂▶00011f 00008	Flower sterility type:0
↻T767 ▶T767 00011	L Flower sterility type:0 GU Style position

Noah includes a file repository. The files that belong to an object, are saved together with the object.

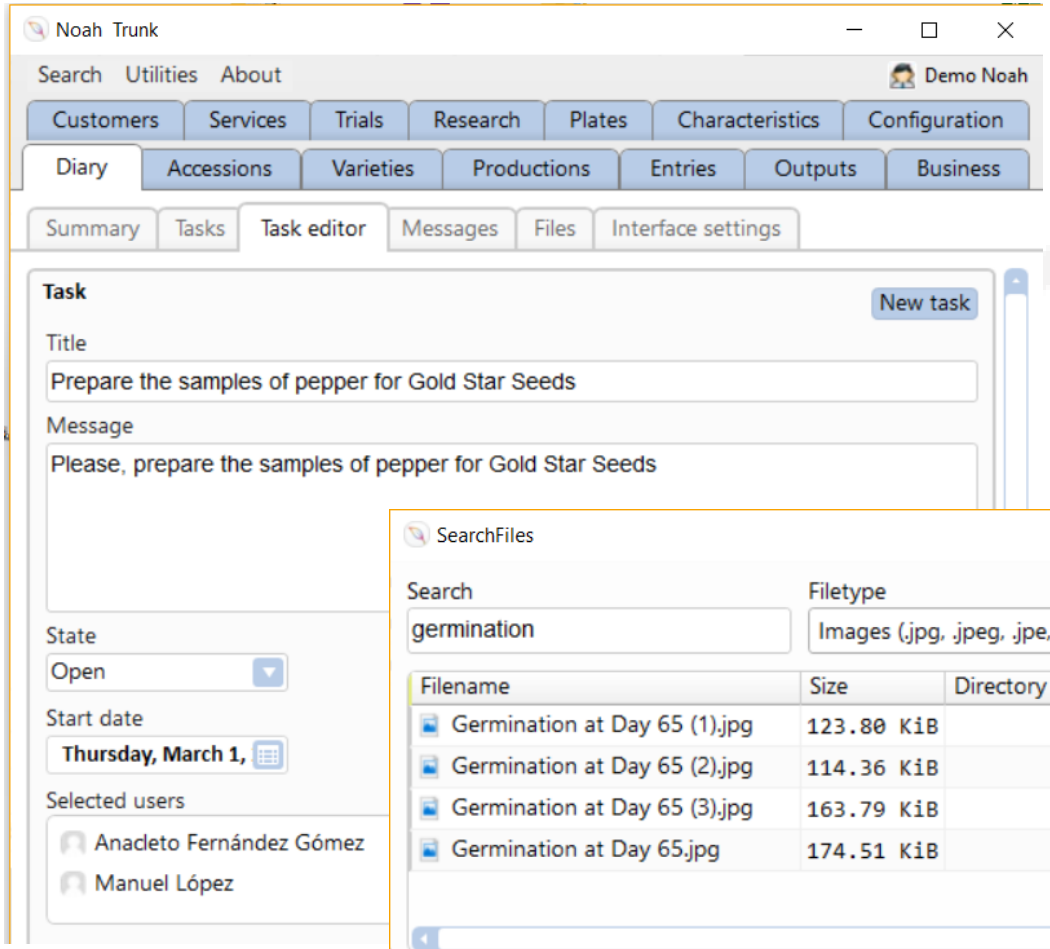
- File Version Control.
- Access to folders can be restricted by user.

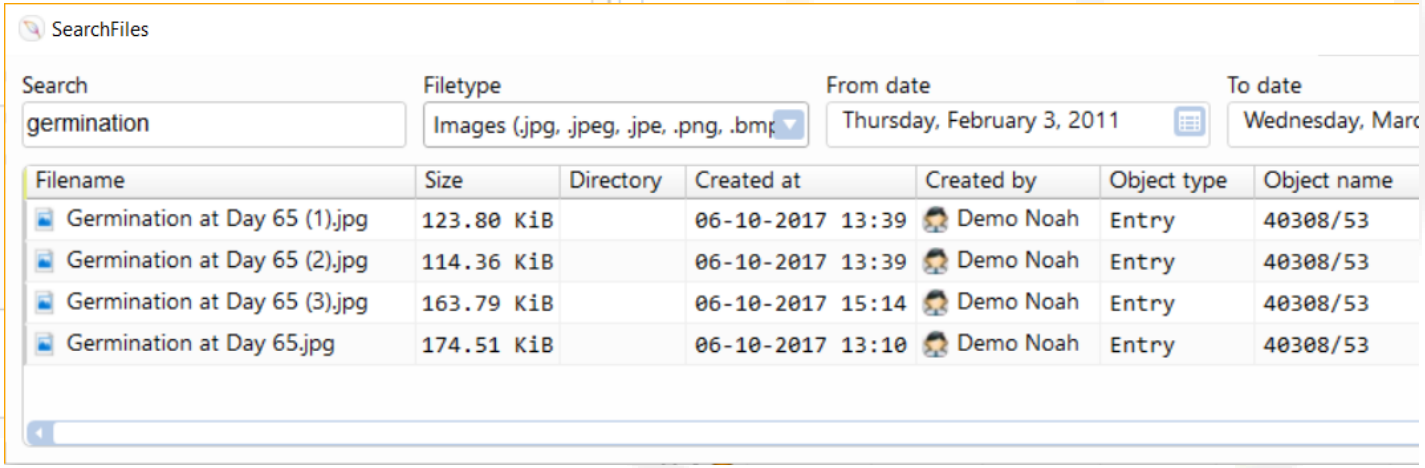


All the types of objects are fully customizable:



Noah includes a section for task management and a tool for searching files saved in the database of the system.





Noah saves in a Log-database all the operations carried out throughout the day. In a way that allows a complete historical audit of the activity of each user with the system.

	Id	CreatedAt	Company	CallId	Session	Type	Log
4152	4152	2018-03-07 11:45:35.687Z	SYS	1368	demo	Data	Response: <LoadDenominationResponse xmlns="http://www.Bullsoft.com/noah/"><LoadDenominationResul...
4153	4153	2018-03-07 11:45:35.687Z	SYS	1368	demo	Data	Elepased time: 10 ms
4154	4154	2018-03-07 11:45:35.687Z	SYS	1369	demo	Data	Call: <LoadAccession xmlns="http://www.Bullsoft.com/noah/"><id>140e8f41-24bf-43d5-a11d-ec2b639dc05c<
4155	4155	2018-03-07 11:45:35.691Z	SYS	1362	demo	Data	Response: <GetAccessionEventsResponse xmlns="http://www.Bullsoft.com/noah/"><GetAccessionEventsResul
4156	4156	2018-03-07 11:45:35.691Z	SYS	1362	demo	Data	Elepased time: 27 ms
4157	4157	2018-03-07 11:45:35.693Z	SYS	1369	demo	Data	Response: <LoadAccessionResponse xmlns="http://www.Bullsoft.com/noah/"><LoadAccessionResult xmlns:i=
4158	4158	2018-03-07 11:45:35.693Z	SYS	1369	demo	Data	Elepased time: 5 ms
4159	4159	2018-03-07 11:45:35.696Z	SYS	1370	demo	Data	Call: <LoadAccession xmlns="http://www.Bullsoft.com/noah/"><id>a8080cc0-5fa1-4e6d-9b49-7a35b9d97cd9<
4160	4160	2018-03-07 11:45:35.703Z	SYS	1371	demo	Data	Call: <LoadAccession xmlns="http://www.Bullsoft.com/noah/"><id>6c0605e2-e916-4b0a-8528-48df16d49bfd<
4161	4161	2018-03-07 11:45:35.709Z	SYS	1364	demo	Data	Response: <LoadAccessionResponse xmlns="http://www.Bullsoft.com/noah/"><LoadAccessionResult xmlns:i=
4162	4162	2018-03-07 11:45:35.709Z	SYS	1364	demo	Data	Elepased time: 43 ms
4163	4163	2018-03-07 11:45:35.709Z	SYS	1365	demo	Data	Response: <LoadAccessionResponse xmlns="http://www.Bullsoft.com/noah/"><LoadAccessionResult xmlns:i=
4164	4164	2018-03-07 11:45:35.709Z	SYS	1365	demo	Data	Elepased time: 40 ms
4165	4165	2018-03-07 11:45:35.710Z	SYS	1370	demo	Data	Response: <LoadAccessionResponse xmlns="http://www.Bullsoft.com/noah/"><LoadAccessionResult xmlns:i=
4166	4166	2018-03-07 11:45:35.710Z	SYS	1370	demo	Data	Elepased time: 14 ms
4167	4167	2018-03-07 11:45:35.711Z	SYS	1372	demo	Data	Call: <LoadAccession xmlns="http://www.Bullsoft.com/noah/"><id>d15c94d8-3e25-401b-ae7a-715c22eda7c1<
4168	4168	2018-03-07 11:45:35.712Z	SYS	1373	demo	Data	Call: <LoadAccession xmlns="http://www.Bullsoft.com/noah/"><id>ee0ed86e-f143-464d-b67f-c92cf9324d6b<
4169	4169	2018-03-07 11:45:35.725Z	SYS	1373	demo	Data	Response: <LoadAccessionResponse xmlns="http://www.Bullsoft.com/noah/"><LoadAccessionResult xmlns:i=
4170	4170	2018-03-07 11:45:35.725Z	SYS	1373	demo	Data	Elepased time: 13 ms
4171	4171	2018-03-07 11:45:35.726Z	SYS	1372	demo	Data	Response: <LoadAccessionResponse xmlns="http://www.Bullsoft.com/noah/"><LoadAccessionResult xmlns:i=

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