

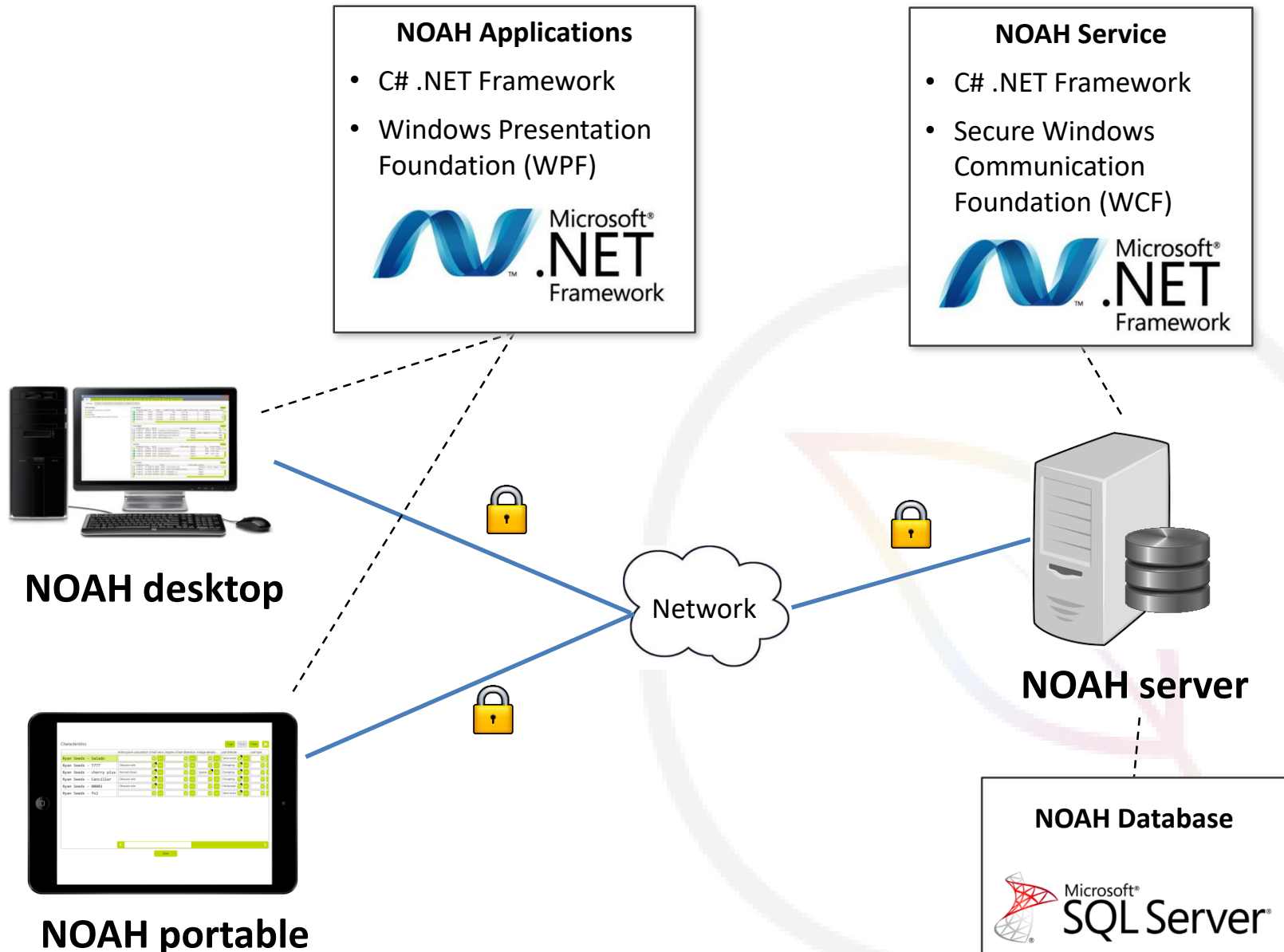
NOAH

plant germplasm ERP



BULLSOFT

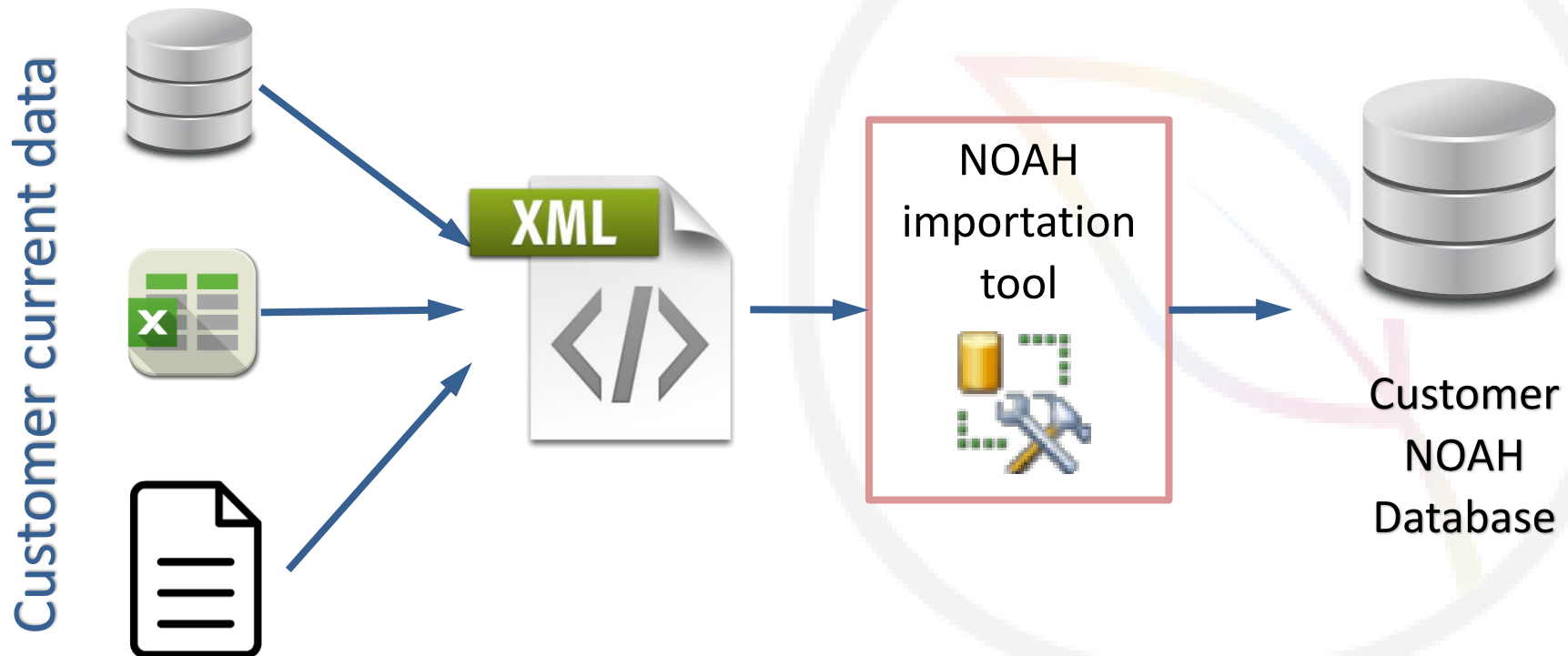
www.bullsoftsolutions.com



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 commercial 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

Search Utilities About

Diary Accessions Varieties Productions Entries Outputs Business Customers Services Trials Rese

Researches Data definition Target 1 Parentals Candidates Selected Phases Germinations Plants

Candidate crosses All None Reports

Choose ☐ Female ☐ Male ☐ Options Apply 10 items [0 highlighted]

	Cross	Filial	Pedigree	Summary
<input checked="" type="checkbox"/> All	♀ T767	F1	↻ TR800c ▶ 00003k	*Seg NN3 L Flower sterility type
<input checked="" type="checkbox"/> Female	♂ T777	F3		*Seg NN3 borrame ya 9 *P FI
<input checked="" type="checkbox"/> Male				*Seg NN3 *L Flower sterility typ
<input checked="" type="checkbox"/> Hybrid				
<input checked="" type="checkbox"/> Selfpollinated				
<input type="checkbox"/> Options				
<input type="checkbox"/> Apply				
10 items [0 highlighted]				
	♀ 00003k	F1		*Seg *P Flower sterility type 1

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

Search accession

Filter List

Accession = Add X

Code *

Other codes =

< = > All filial

of hybrid codes

☐ Is parental =

☐ Only last filial

☐ Hybrids from same origin

Female code = Male code =

Origin code = Selfpollinated from =

Characterization = Add X

Genus Solanum

Species Tomato Solanum lycopersicu

☒ Accession ☐ Entry ☐ Entry plant ☐ Research ☐ Trial

Characterization group Inflorescence descriptors

Data definition Flower sterility type

0, 1, 2

☒ 0 - Functional ☒ 1 - Pollen ☒ 2 - Stemless

Yes ☐ No ☐

Entry = A

Lot

Other Lot

Reception date < = > Select a date

Collection None

☐ Only with incidence alarm

Provider None

Germination < = >

Search accession

Filter List

☐ Include uncatalogued ☐ Only uncatalogued

Default operator Custom filters A_1

Accession Filial F6

Only last filial

AND

Characterization Species Tomato Solanum lycopersicum

Type Accession

OR

Characterization Inflorescence descriptors - Dehiscence L - Longitudinal *P -

NOT

Characterization Species Tomato Solanum lycopersicum

Type Accession

Inflorescence descriptors - Flower sterility type 1 - Pollen, 2 -

AND

Characterization Inflorescence descriptors - Petal length = 12

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

Accession

Code

Other codes

F5

of hybrid codes

☐ Is parental

☐ Only last filial

☐ Hybrids from same origin

Female code Male code

Origin code Selfpollinated from

<input checked="" type="checkbox"/>	Equal
<input type="checkbox"/>	Contains
<input type="checkbox"/>	Start with
<input type="checkbox"/>	End with
<input type="checkbox"/>	Greater or equal than
<input type="checkbox"/>	Less or equal than
<input type="checkbox"/>	Multiple

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.

Characterization = Add X

Genus
Solanum

Species
Tomato *Solanum lycopersicum*

☒ Accession ☐ Entry
☐ Entry plant ☐ Research
☐ Trial

Characterization group
Plant characteristics

Data definition
Leaf type

Dwarf, Other, Peruvianum

Segregate ☒ - ☐ Yes ☐ No
Evaluated ☒ - ☐ No

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.

Characterization ☒ Plant characteristics · Leaf type Dwarf, Other, Peruvianum

AND

Characterization ☒ Plant characteristics · Foliage density Dense, Intermediate

OR

Characterization ☒ Plant characteristics · Plant size Intermediate

NOT

Characterization ☒ Plant characteristics · Stem internode length Intermediate, Short













































- ☒ Dwarf
☐ Hirsutum
☒ Other
☒ Peruvianum
☐ Pimpinellifolium
☐ Potato leaf type
☐ Standard

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	750,000 tomato accessions	3	1	3	3	7 seconds
Intel Xeon E7-4830		5	1	5	5	12 seconds
Memory 64 GB		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.

Candidate crosses							
		All	None	Reports			
Choose		<input type="checkbox"/> Female	<input type="checkbox"/> Male	<input type="checkbox"/> Options	Apply	Equal relatives from origin	10 items [0 highlighted]
Mark	Siblings	Relative	Cross	Filial	Pedigree	Summary	
			 01424  00004	F1 F1		*Seg NN3 *P Flower sterility type 1 Inflore: NN3 L Flower sterility type 2 B *Seg NN3 *L GM	
 			 00003  00011c	F1 F2	 00004  00004	*Seg *P GM Style position L Flower sterility type 0 GU *Seg *L GM	
 			 T999A  T999B	F1 F1			
 	      A		 TREK777  TR900a	F7 F8	 111D  00011f  TR900  TR900	L Flower sterility type 0 B X	
 	  A		 TR900  TREK777	F1 F7	 111D  00011f	L Flower sterility type 0 B X	
	 		 TR900b  TREK777	F9 F7	 TR900a  TR900  111D  00011f	L Flower sterility type 0 B X	

- 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.

Choose = ☐ Female ☐ Male ☐ Options Apply Equal relatives from origin → Button tools for filtering candidate crosses

Diary	Accessions	Varieties	Productions	Entries	Outputs	Business	Customers	S
Research	Data definition	Target	Parentals	Candidates	Selected	Phases	Germin	
Candidate crosses								
Choose	<input type="text"/>	=	<input type="checkbox"/> Female	<input type="checkbox"/> Male	<input type="checkbox"/> Options	Apply	Equal relatives	
Mark	Sibling	Relative	Cross	Filial	Pedigree			
 			♀ 01424 ♂ 00004	F1 F1				
 			♀ 00003 ♂ 00011c	F1 F2	↪ 00004 ▶ 00004			
  			♀ T999A ♂ T999B	F1 F1				
     		A	♀ TREK777 ♂ TR900a	F7 F8	↪ 111D ▶ 00011f ↪ TR900 ▶ TR900			
   		A	♀ TR900 ♂ TREK777	F1 F7	↪ 111D ▶ 00011f			
   			♀ TR900b ♂ TREK777	F9 F7	↪ TR900a ▶ TR900 ↪ 111D ▶ 00011f			
 			♀ TR900c ♂ TREK777	F9 F7	↪ TR900b ▶ TR900 ↪ 111D ▶ 00011f			
  	B		♀ TREK777E ♂ TREK777	F2 F7	↪ TREK777 ▶ 00011f ↪ 111D ▶ 00011f			



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.

Research Data definition Candidates Selected Phases Germinations Plants Plant pollination Characterization data Statistics Files 3 Print accessions tool

Days [Show report](#) [Print](#) [Set samples](#) [Set germination](#) [Switch Catalog/Uncatalog](#)

	Accession	Pedigree	Entry	♀ Female	♂ Male	Self	Samples	Germination	Percent
	00005					1	7	7	100 %
	00011	↪ T767 ▶ T767		1			3	3	100 %
	00011f			1			0		
	00019	↪ T999q ▶ T999q				1	2	2	100 %
		↪ T999q ▶ T999q	1753562				0		
	00021	♀ CRR01b ♂ A7686 ♀ CRR01		1			0	0	0 %
	00081	♀ A234 ♂ A4323 ♀ 00003k		1			7	7	100 %
	00491	♀ 11213 ♂ 332dsd			1		1	1	100 %
	5160200047	↪ 5160100022 ▶ 5160100022			2		0		
	A234	↪ T777 ▶ 00003k		3	1	1	0		
		↪ T777 ▶ 00003k	1610804				10	3	30 %
		↪ T777 ▶ 00003k	1610804				12	3	25 %
		↪ T777 ▶ 00003k	1610804				15	3	20 %
	A3254			4		1	19	11	58 %
	A36			1	3	1	20	7	35 %
	A4323				4		10		
	A853			2	2		0		
			2418367				15	10	67 %
			2418367				15	15	100 %

[Save](#)

00005

Days	Germinated	Percent
26	7	100.00 %

[Update](#) [Toggle postpone](#) [Unmake highlighted](#) [Apply plan](#)

Hybrid	♀ Female	♂ Male	Plan	Made
✗ 01502	00021	00491	0	0
✗ 01496	00011	5160200047	0	0
✗ 01493	00081	5160200047	0	0
✗ 5160200102	A3254	A234	2	0
	5160100031	A234	0	2
	00079	A3254	0	2
	00080	A853	0	2
	00081	A234	0	2
	00082	A3254	0	2

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.

Research: RTO18D0004 Position 02-Oct-2018 Accessions: 22 (21-42) Total: 186

Accession	Characteristics	Origin	Previous	Parentals	Origin of female	Origin of male	Origin separator	Siblings separator
#21 00011 ▶T767								
00011-B								
#22 00011 ▶T767								
00011-C								
#23 0T767 ▶T767								
00011 L Flower sterility type:0 GU Style position								
#24 0T767 ▶T767								
00819 L Flower sterility type:0								
#25 0T767 ▶T767								
00819B L Flower sterility type:0								
#26 0T767 ▶T767								
111111A								
#27 0T767 ▶T767								
1217B0001								
#28 010002 ▶T777 QTREK777B2 dTR800c 0▶00011f d▶00003k								
10003								
#29 010002 ▶T777 QTREK777B2 dTR800c 0▶00011f d▶00003k								
516010036								
#30 010002 ▶T777 QTREK777B2 dTR800c 0▶00011f d▶00003k								
516010037								
#31 010002 ▶T777 QTREK777B2 dTR800c 0▶00011f d▶00003k								
516010038								
▶T777 QTREK777B2 dTR800c 0▶00011f d▶00003k								
▶T777 QTREK777B2 dTR800c 0▶00011f d▶00003k								
▶T777 QTREK777B2 dTR800c 0▶00011f d▶00003k								
516010041								

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.

Fast create entries

Species

Tomato *Solanum lycopersicu*

MxSeedCount

4.00 g

Accession

TREK998877

Seeds

575

Weight

2.30 g

Other code

Provider

IFAPA Centro "Alameda del C

Improvements

Collection

Base

Packaging type

Envelope of 1000 seeds

Location

Almacén B A-2

Packages

1

Notes

Clear list

Print

Select template

Select for autoprnt

Create

Delete

Select none

Select all

Statistics

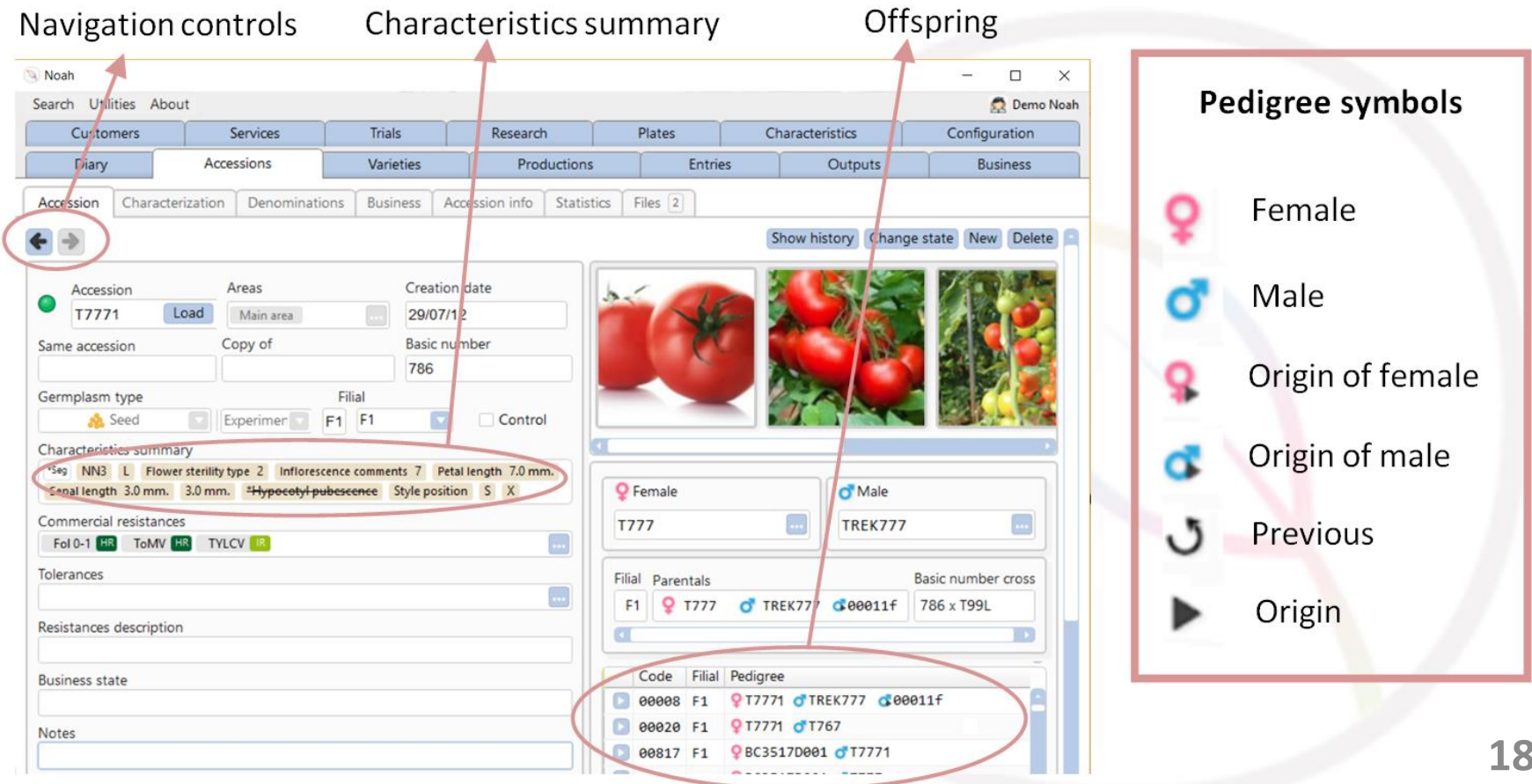
Germinations report

	Lot	Reception	Other Lot	Accession	Same accession	Basic number	External cross	Summary
	1637651	14/02/18		T777		786		*Seg Normal (clear) 2 Round NN3 L Flower sterility type 0 GU Petal length 7.0 mm. Sepal length 3.0 mm.
	4413138	15/02/18		T777		786		*Seg Normal (clear) 2 Round NN3 L Flower sterility type 0 GU Petal length 7.0 mm. Sepal length 3.0 mm.
	3879246	15/02/18		T777		786		*Seg Normal (clear) 2 Round NN3 L Flower sterility type 0 GU Petal length 7.0 mm. Sepal length 3.0 mm.
	4759211	15/02/18		T777		786		*Seg Normal (clear) 2 Round NN3 L Flower sterility type 0 GU Petal length 7.0 mm. Sepal length 3.0 mm.







17

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.

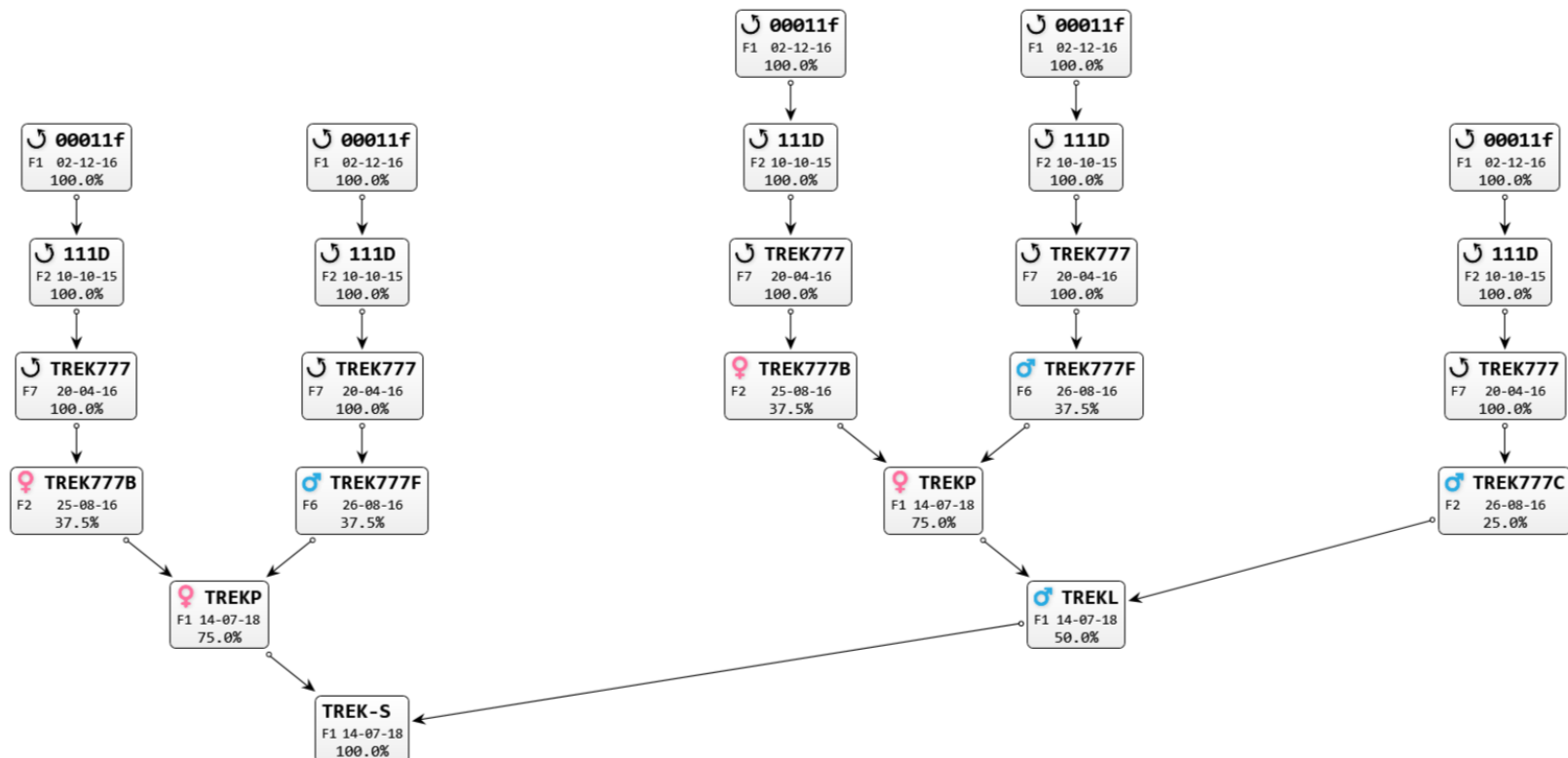
Navigation controls
Characteristics summary
Offspring



Pedigree symbols

-  Female
-  Male
-  Origin of female
-  Origin of male
-  Previous
-  Origin

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.

CustomersServicesTrialsResearchesPlatesCharacteristics

ListTrialVarietiesCustomersCharacterizationDataFiles2

Select the customer varieties

☐ Varieties
☒ Customers

☒ Agrigold, 222,

- ☒ 00001 (00001, 10000)
- ☒ Borrar99 (Borrar99,)
- ☒ fs2 (FS2,)
- ☒ Hulk (T767, TREK777F, T777
- ☒ Salado (A36, T103,)
- ☒ T777 (T777,)
- ☒ Y789 (Y789,)
- ☒ Canciller (T777,)
- ☒ cherry plus (118289,)

☐ Blue Seeds, ,

- ☐ 00001 (00001, 10000)
- ☐ fs2 (FS2,)

Characterization general description

CustomersServicesTrialsResearches

ListTrialVarietiesCustomersCharacterizationDataFile

Tuesday, November 7, 2017

	Dehiscence	Flower sterility type	Inflorescence com
00001, 10000	X	1	ok
Borrar99	X	1	ok
fs2	L	1	drop
Hulk	* P	2	
Salado	* P	2	
T777	X	0	

☒ Dehiscence
☐ EnumBorrane
☒ Flower sterility type
☒ Inflorescence comments
☒ Inflorescence type

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

Order list
Order
Order seeds
Order messages
Production list
Production
Production accessions
Production entries

Download
Delete
New

Production accessions

Accession
00008

Required reception date
Select a date

Target Seeds

Target Weight
1.00 kg

Female Seeds
1,212

Male Seeds
1,212

Target Seeds Female

Target Seeds Male

Female Weight

Male Weight





Target Weight Female

Target Weight Male

Female envelopes

Male envelopes

Remarks

	Accession	Base	Female	Male	Target	Base	Female sent	Male sent
   	00008		4%	8%	1.00 kg		1,212 seeds	1,212 seeds

Additional outputs (0)

Package extractions

Package
None

Seeds

Required 1,212 seeds	Extracted 50 seeds
-------------------------	-----------------------

Package	Seed
4147347 p1	

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

Search entries

Filter List

List of entries




Print

	Reception	Lot	Accession	Commercial R.	Collections	Available seeds	Available weight	Locked seeds	Locke
	22/10/17	1753562	00019		Commercial	81,243	0.41 kg	0	
	13/06/17	5203298	T767	BO IR 232 S BT2 S	Indeterminada	727	0.01 kg	0	
	13/06/17	9163180	T777	BT2 HR BT IR	Indeterminada	777	0.01 kg	0	
	13/06/17	5601799	T777	BT2 HR BT IR	Indeterminada	777	0.01 kg	0	
	13/06/17	1126012	T777	BT2 HR BT IR	Commercial	777	0.01 kg	0	
	01/06/17	5335403	T777	BT2 HR BT IR	Commercial	1,209,711	25.16 kg	0	
	15/05/17	9055395	TREK777		Commercial	150,000	0.75 kg	0	
	14/05/17	8147208	T767	BO IR 232 S BT2 S	Commercial	99,998	0.20 kg	500	
	10/05/17	7486785	T767	BO IR 232 S BT2 S	Active	1,000,000	8.00 kg	0	
	05/05/17	4626399	T777	BT2 HR BT IR	Commercial	20,934	0.17 kg	0	
	05/05/17	5108850	T777	BT2 HR BT IR	Commercial	5,000	0.02 kg	0	
	01/05/17	4842071	T767	BO IR 232 S BT2 S	Active	285,714	2.00 kg	0	
	04/04/17	9973592	T767	BO IR 232 S BT2 S	Commercial	743	0.01 kg	0	
	04/04/17	4555641	T767	BO IR 232 S BT2 S	Commercial	777	0.01 kg	0	
	04/04/17	6937249	T767	BO IR 232 S BT2 S	Commercial	777	0.01 kg	0	
	04/04/17	8237773	T767	BO IR 232 S BT2 S	Commercial	10,777	0.08 kg	0	
	04/04/17	1312215	T767	BO IR 232 S BT2 S	Commercial	777	0.01 kg	0	

None Items ? Selected - Available seeds 2,951,991 Locked seeds 500 For improve seeds 0 Valuation 2,720.74 Copy Cancel Ok

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.

Characteristics


Options
Copy
Paste
Clear


	Anthocyanin colouration of leaf veins	Degree of leaf dissection	Foliage density	Leaf attitude	Leaf type	Number of leaves under 1st infl
123ASD45	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
TT80900	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
TT78901	Normal (clear)	8	Sparse	<input type="text"/>	Potato leaf type	<input type="text"/>
AT86672547	Normal (clear)	2	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
TT80911	Obscure vein	2	<input type="text"/>	6	<input type="text"/>	<input type="text"/>
T67687900	Normal (clear)	9	<input type="text"/>	6	<input type="text"/>	<input type="text"/>

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.

Research

00015

...

Phase

#4

▼

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C

✎

<

>

Accession

Sel.

Rem.

1111AAAAAA	4	2
33323323	3	0
5160300028	1	2
5160300029	3	2
5160300030	4	5
5160300031	0	9
5160300032	0	9
5160300033	0	9
5160400009	2	7
5160400010	2	7
5160400011	3	6

↑

↓

New accession code

+

+=

✎

🗑

☰

Plant	Accession
1111AAAAAA.1	123ASD45
1111AAAAAA.2	TT80900
1111AAAAAA.3	TT78901
1111AAAAAA.4	AT86672547
33323323.1	TT80911
33323323.2	T67687900
33323323.2	T67687899
5160300028.1	TREK98P
5160300029.1	325474
5160300029.2	41245344
5160300029.3	123KKKPPP

↑


↓








































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.


Germination tasks


Code

Current date

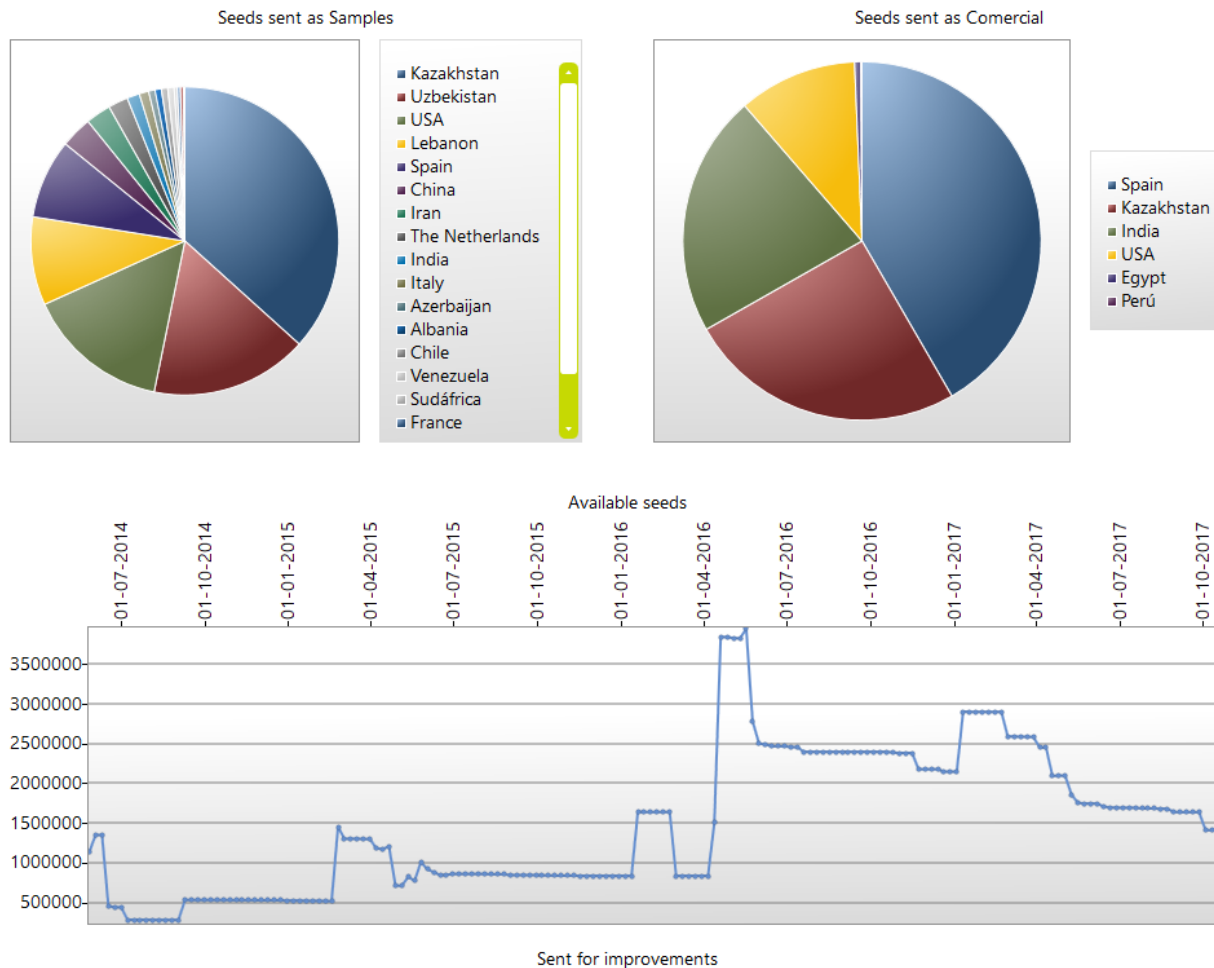


Lot	Accession	Date	Germination	Vigor	Samples	Planting	Spread-out	Days	%	Normal	Abnormal	Dead
40308/53	23423	02-08-2017 	15.02 %		333	02-08-2017 	Select a date 	22				
7486785	T767	02-08-2017 	7.81 %	25.00 %	333	02-08-2017 	Select a date 	22				
9579031	00011	02-08-2017 	28.53 %	24.00 %	333	02-08-2017 	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				
5502017	TREK777	02-08-2017 	3.30 %	14.00 %	333	02-08-2017 	Select a date 	22				

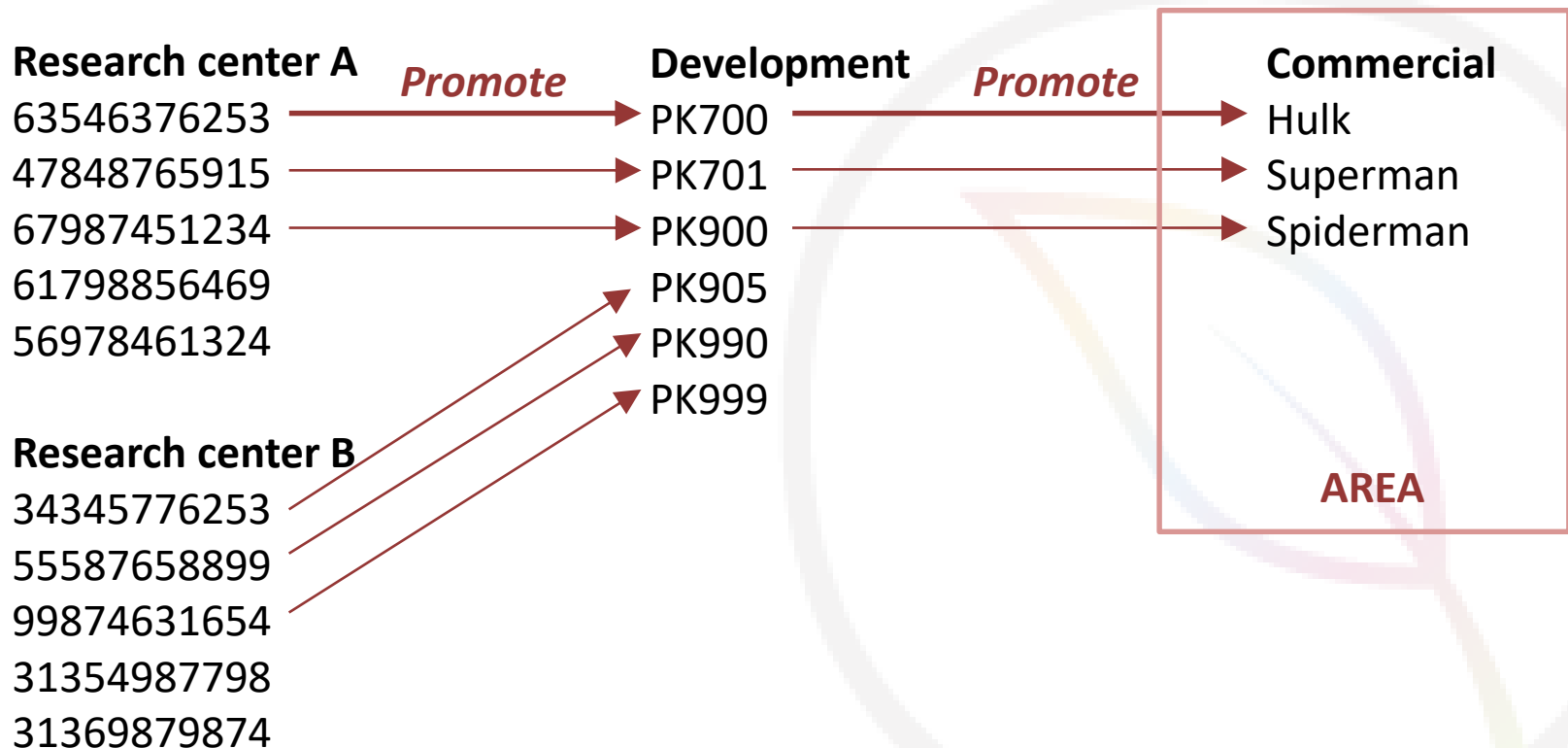




Noah provides a tool for showing statistics. Customers may require Bullsoft to add complex statistics or export Noah data to specific statistical analysis software.



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



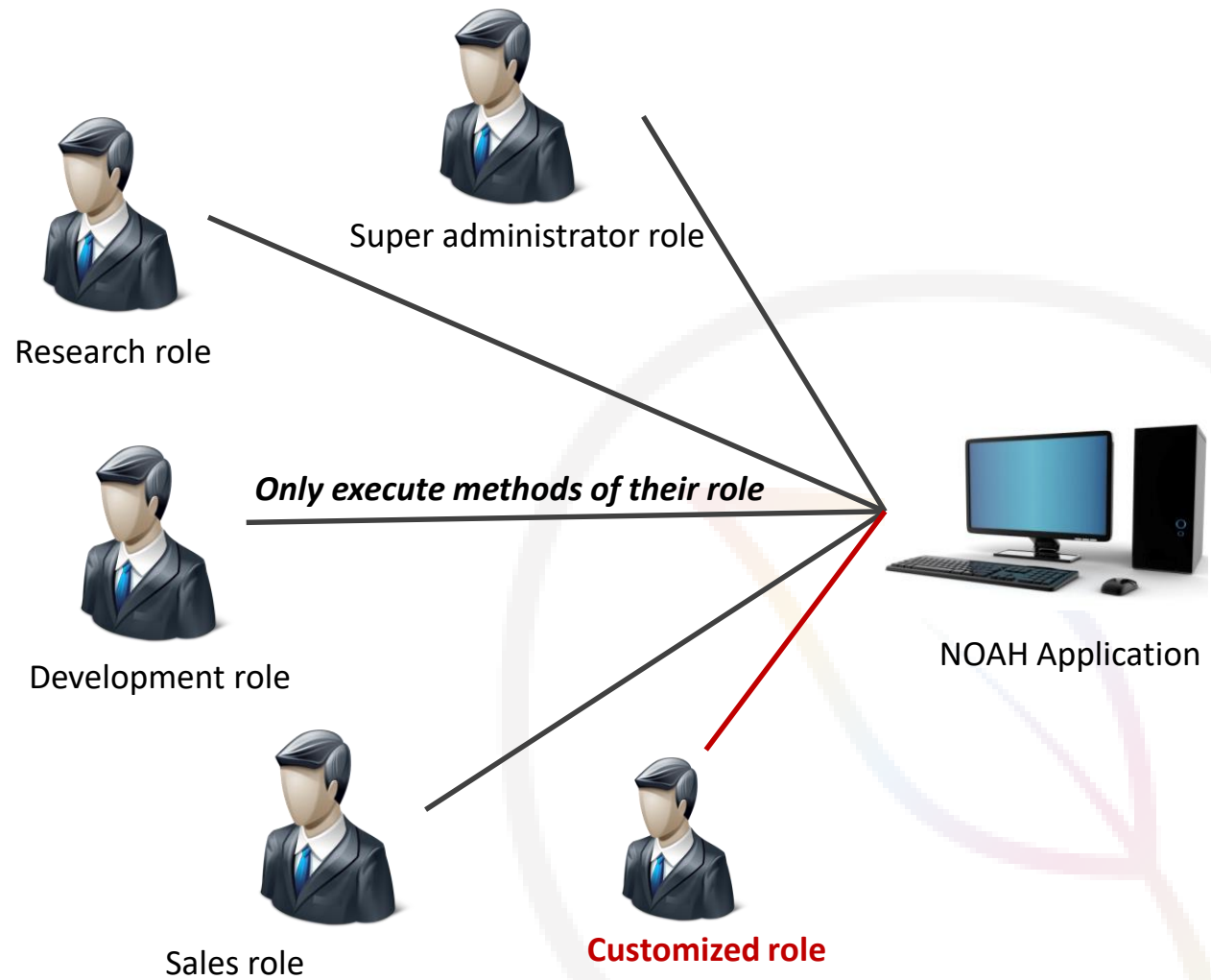
The configuration of the user roles allows to have a total control of the actions that each user can perform.

Administrator
Productions
User
Breeder assistant

Tomato *Solanum lycopersicum*

Characterization group	Mode
Inflorescence descriptors	ReadWrite
Seedling	ReadWrite
Plant characteristics	ReadWrite

- ☐ **Accession**
- ☒ Accession business state
- ☒ Accession business state client target
- ☒ Areas
- ☐ **Changes tracking**
- ☐ **Characterization**
 - ☒ Copy characterization group to accession
 - ☒ Create characterization data value directory
 - ☒ Delete characterization
 - ☒ Delete characterization data value
 - ☒ Delete characterization data value directory
 - ☒ Delete characterization group
 - ☒ Get characterization prediction
 - ☐ **List characteristics summary**
 - ☒ List characterization data values
 - ☒ List characterization groups
 - ☒ List characterizations
 - ☒ Load characterization
 - ☒ Load characterization data value



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

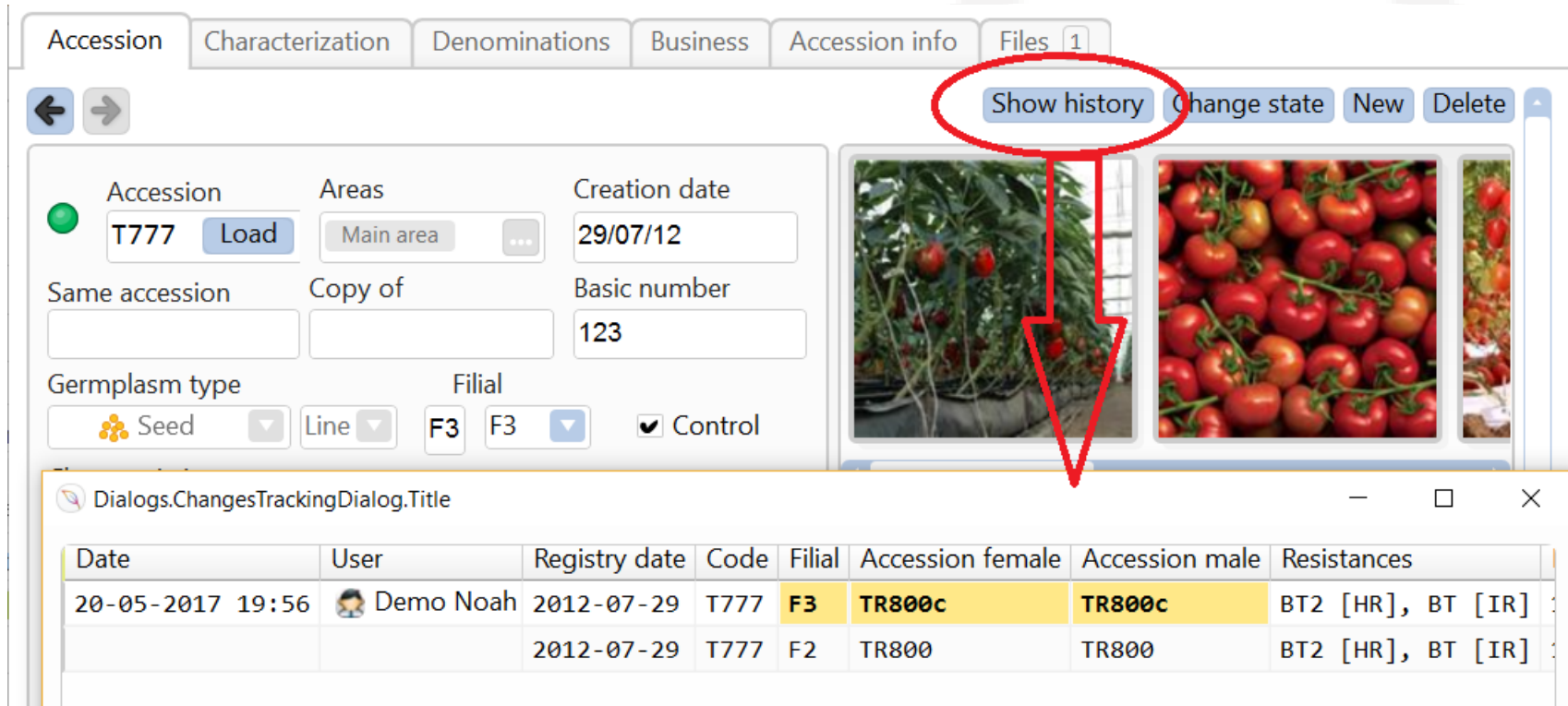
```
<pattern>
  <conditionalPattern>
    <condition param="PedigreeType" value="Haploid" />
    <param>SpeciesCodeB</param>
    <literal>S</literal>
    <param>CurrentYear</param>
    <param>AreaCode</param>
    <code defaultType="number" initialValue="0" fillLength="10-position" fillChar="0">
     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

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 SHOUSH A	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 screenshot shows the Noah plant germplasm ERP interface. The 'Files' tab is selected, and the 'Show history' button is circled in red. A red arrow points from the 'Show history' button to a table titled 'Dialogs.ChangesTrackingDialog.Title'.

Date	User	Registry date	Code	Filial	Accession female	Accession male	Resistances
20-05-2017 19:56	 Demo Noah	2012-07-29	T777	F3	TR800c	TR800c	BT2 [HR], BT [IR]
		2012-07-29	T777	F2	TR800	TR800	BT2 [HR], BT [IR]

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	RT017A0076	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.

List
Plate
Germplasm
Files 5

	Code	Accession
...	A1	11213
...	B1	123BN
...	C1	T767
...	D1	T777
...	E1	T103
...	F1	TR800
...	G1	00013
...	H1	A234
...	A2	T777B
...	B2	
...	C2	
...	D2	
...	E2	
...	F2	
...	G2	
...	H2	
...	A3	

123

1

2

3

A

B

C

D

E

11213

T777B

123BN

T767

T777

T103

Sunday, November 5, 2017
Mode
Clear
Import from excel
Export to excel

	Dehiscence	Flower sterility type	Inflorescence type	Petal length (mm.)	S
00001	* P	1	GM	2.0	
00003k	* P	1	B	2.0	
00004	L	2	GM	2.0	
00011	L	0	GM	2.0	
00011c	L	0	B		
00011f	X	2	GM		
00819	L	0	B		
01424	* P	1	GM	8.02	
01428	L	2	GU	32.03	
01429	L	2	GM	14.44	
01437	L	0	GM	44.09	

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

List accessions

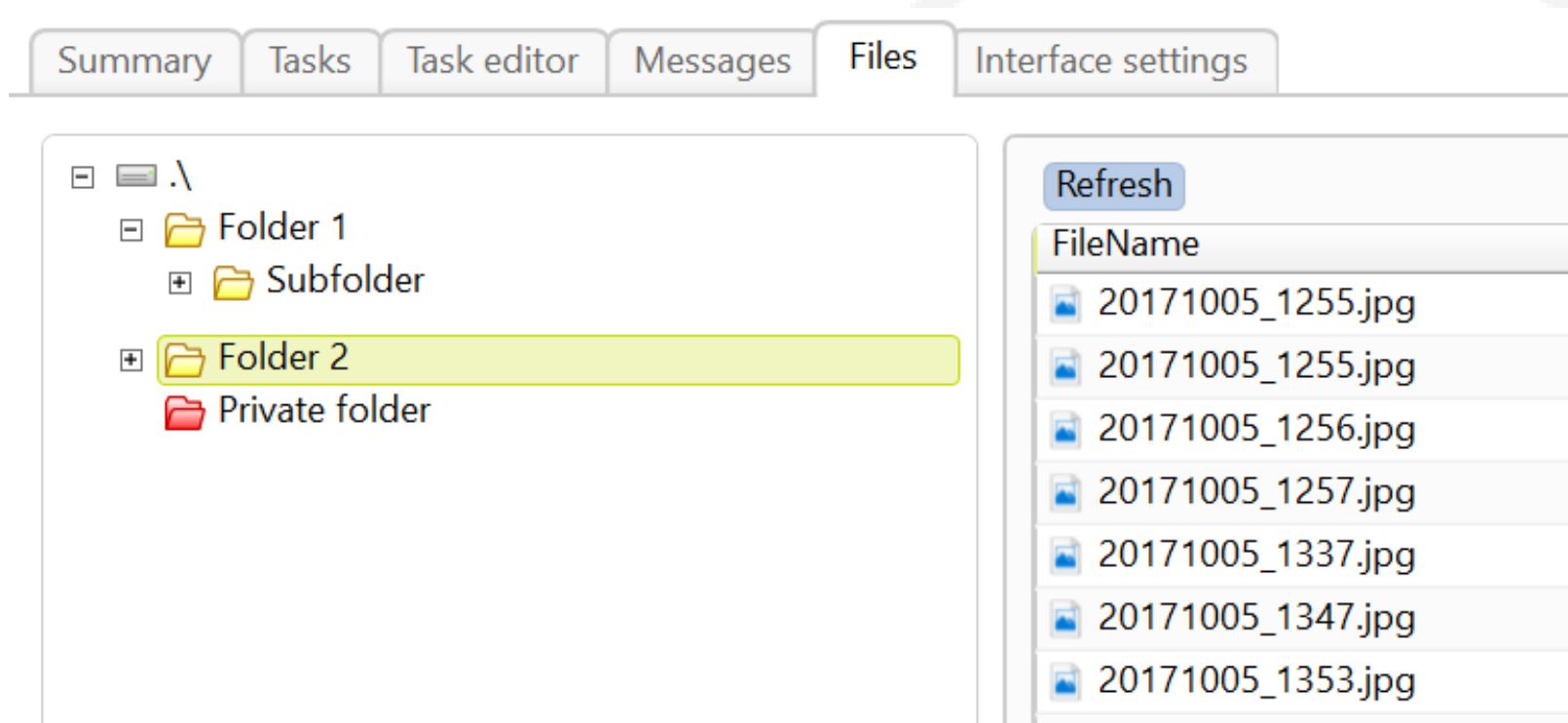
05-Nov-2017 Accessions: 19 (1-19) Total: 122

(
 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 0
00003	*P GM Style position
00003k	*P Flower sterility type:1
00004	NN3 L Flower sterility type:2 B
00006	Flower sterility type:2
9T777 dTREK777 9▶00003k d▶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:

Customers
Services
Trials
Researches
Plates
Characteristics
Configuration

Genus
Species
Subspecies
Subsubspecies
Resistances
Abiotic stresses
Scales

Types of tray
Business states
Germination
Code patterns
Users
Roles

Areas
Countries
Bank accounts
Type of customers
Type of documents

Types of provider
Improvements
Collections
Locations
Packaging
Type of plates

Collection
New
Delete

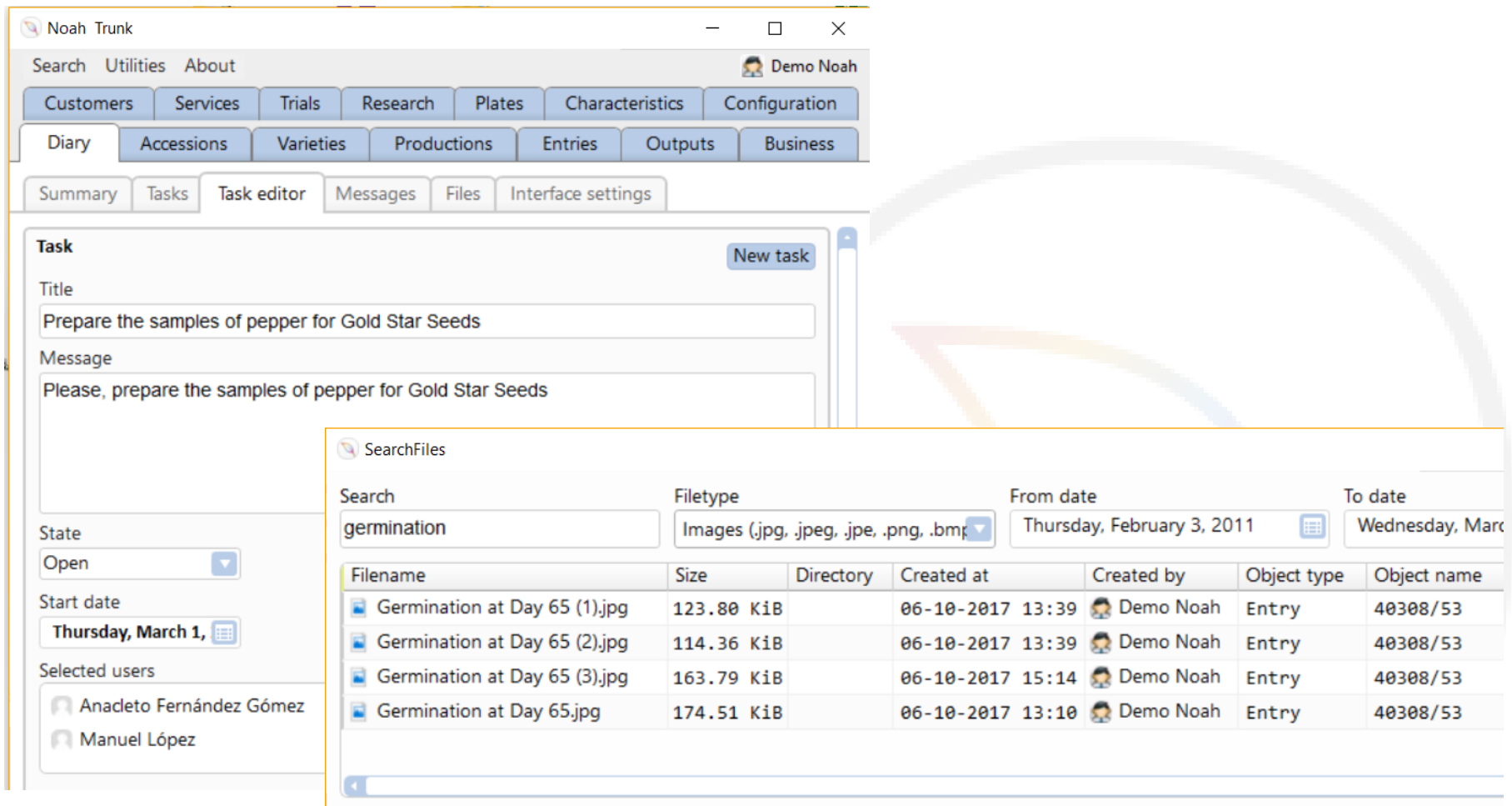
Name of the collection for packages
Backup package required

Indeterminada
☐ Backup package required
Save

List of collections

Name	Backup package required
Active	<input type="checkbox"/>
Base	<input type="checkbox"/>
Indeterminada	<input type="checkbox"/>
Commercial	<input checked="" type="checkbox"/>

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



The screenshot displays the Noah Trunk application interface. The main window has a menu bar with 'Search', 'Utilities', and 'About'. Below the menu bar are tabs for 'Customers', 'Services', 'Trials', 'Research', 'Plates', 'Characteristics', and 'Configuration'. A secondary row of tabs includes 'Diary', 'Accessions', 'Varieties', 'Productions', 'Entries', 'Outputs', and 'Business'. A third row of tabs shows 'Summary', 'Tasks', 'Task editor', 'Messages', 'Files', and 'Interface settings'. The 'Tasks' tab is active, showing a 'Task' section with a 'New task' button. The task title is 'Prepare the samples of pepper for Gold Star Seeds' and the message is 'Please, prepare the samples of pepper for Gold Star Seeds'. Below the task section, there are fields for 'State' (set to 'Open'), 'Start date' (set to 'Thursday, March 1'), and 'Selected users' (listing 'Anadeto Fernández Gómez' and 'Manuel López').

Overlaid on the main window is a 'SearchFiles' dialog box. It features a search bar with the text 'germination', a file type dropdown set to 'Images (.jpg, .jpeg, .jpe, .png, .bmp)', and date range filters for 'From date' (Thursday, February 3, 2011) and 'To date' (Wednesday, March 1, 2011). The search results are displayed in a table with the following data:

Filename	Size	Directory	Created at	Created by	Object type	Object name
Germination at Day 65 (1).jpg	123.80 KiB		06-10-2017 13:39	Demo Noah	Entry	40308/53
Germination at Day 65 (2).jpg	114.36 KiB		06-10-2017 13:39	Demo Noah	Entry	40308/53
Germination at Day 65 (3).jpg	163.79 KiB		06-10-2017 15:14	Demo Noah	Entry	40308/53
Germination at Day 65.jpg	174.51 KiB		06-10-2017 13:10	Demo Noah	Entry	40308/53

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	Eleapsed 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	Eleapsed 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	Eleapsed 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	Eleapsed 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	Eleapsed 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	Eleapsed 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	Eleapsed 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=

NOAH

plant germplasm ERP



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