

Observations & Sub-Observations

BMS 12.0 Manual

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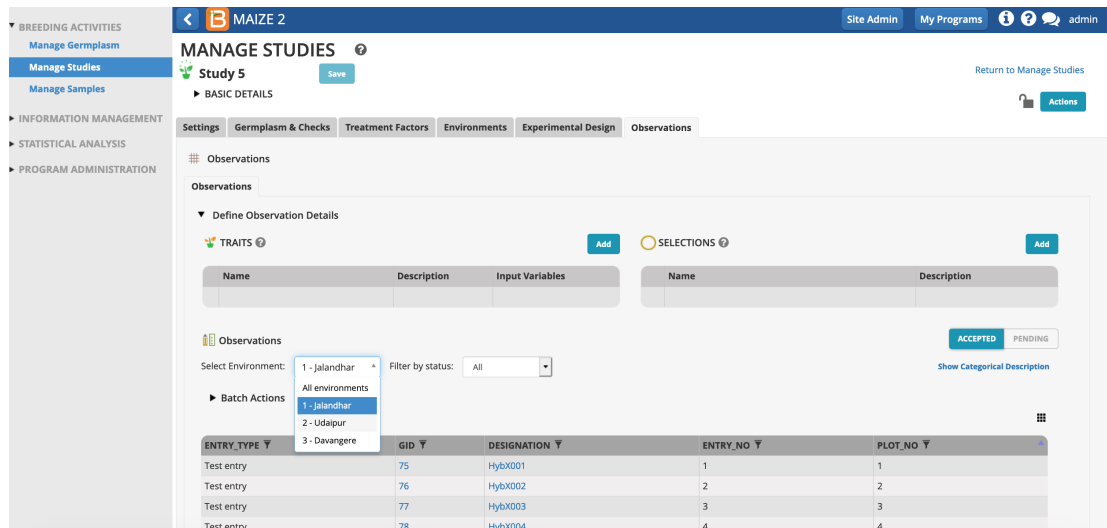
About

Once the study design has been generated or imported, the Observations table is populated with independent study variables and sub-observation datasets can be created to record repeated measures.

Observations

The rows of Observations table represent the experimental units, which are randomized or non-randomized depending on design. Experimental units can be defined in many ways: plots, pots, individual plants, fruits, ect. The manual will use "plots" to describe the highest level of observation, as this is the most common experimental unit in breeding.

- Saving the trial will paginate the Observations table by environment. Select any environment to review the plot details.



MANAGE STUDIES Study 5

Observations

Define Observation Details

TRAITS Add SELECTIONS Add

Name	Description	Input Variables	Name	Description

Observations

Select Environment: 1 - Jalandhar Filter by status: All

Batch Actions: All environments, 1 - Jalandhar, 2 - Udaipur, 3 - Davangere

ENTRY_TYPE	GID	DESIGNATION	ENTRY_NO	PLOT_NO
Test entry	75	HybX001	1	1
Test entry	76	HybX002	2	2
Test entry	77	HybX003	3	3
Test entry	78	HybX004	4	4

Reveal/Hide Columns

Independent variables can be hidden and revealed in the tabular user interface. One important column, OBS_UNIT_ID, is hidden by default, because it is not meant to be human readable. OBS_UNIT_ID is an alphanumeric sequence designed for data capture that uniquely identifies the observation. The OBS_UNIT_ID is appropriate for barcoding the observation unit (plot, plant, pot, ect...) when the Study Book file is exported

- Make columns of data by visible/hidden by selecting the dotted rectangle.

ENTRY_TYPE	GID	DESIGNATION	ENTRY_NO	PLOT_NO	BLOCK_NO
Test entry	1000083	BMS-12	14	16	3
Check entry	1000097	CK-1	1	17	3
Test entry	1000076	BMS-5	7	18	3
Check entry	1000098	CK-2	2	19	3
Test entry	1000091	BMS-20	22	20	3
Test entry	1000084	BMS-13	15	21	3
Test entry	1000072	BMS-1	3	22	4
Test entry	1000082	BMS-11	13	23	4
Check entry	1000097	CK-1	1	24	4
Test entry	1000094	BMS-23	25	25	4

OBS_UNIT_ID is be revealed in the user interface after the selection.

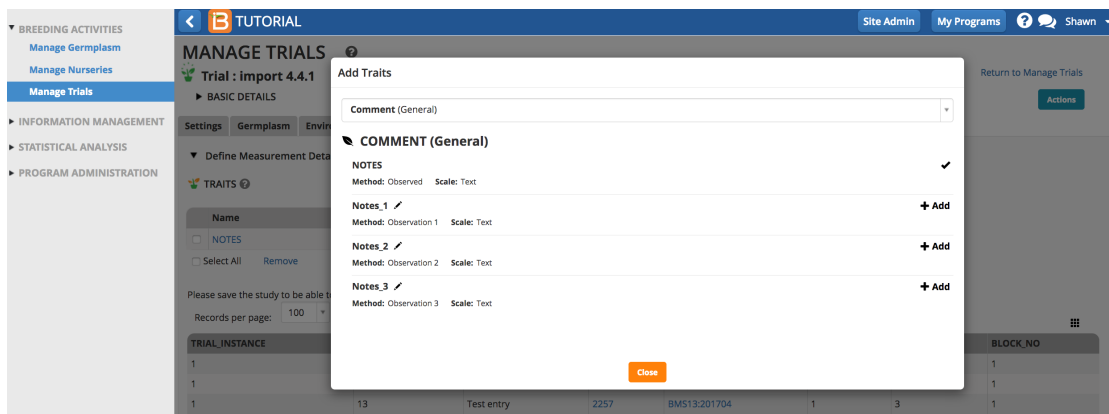
ENTRY_TYPE	GID	DESIGNATION	ENTRY_NO	OBS_UNIT_ID	PLOT_NO	BLOCK_NO
Test entry	1000085	BMS-14	16	9205b42f-fdea-4309-bb9b-d3fe90109eee	10	2
Test entry	1000087	BMS-16	18	865d0787-30c5-4bef-9df7-471400c69bb9	11	2
Test entry	1000073	BMS-2	4	5d0c1a9a-30db-4e56-a65a-6aa8f1351c35	12	2
Check entry	1000097	CK-1	1	3316e07d-7165-4fbf-a662-df1bc0acf3ed	13	2
Test entry	1000080	BMS-9	11	7e83ed87-3803-441a-a210-d578e623321c	14	2
Test entry	1000075	BMS-4	6	f1cd54e-cd9f-4027-a0ba-db6b423bd969	15	3
Test entry	1000083	BMS-12	14	e10a7a67-c366-4b82-98eb-...	16	3

Add Traits

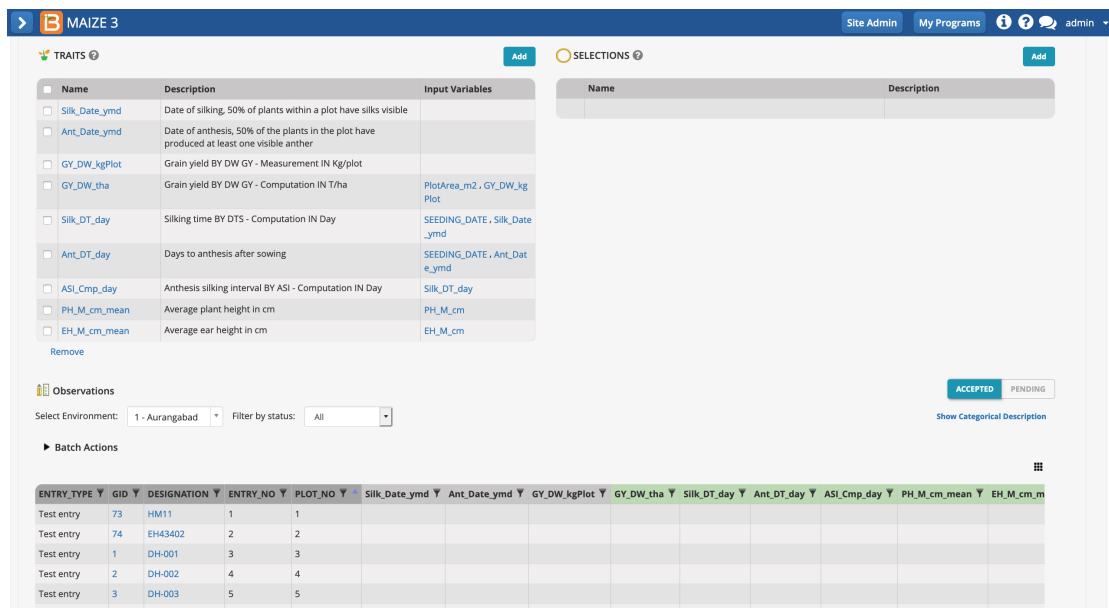
Traits and trait aliases are defined by the crop ontology. If you do not find a trait of interest from the drop down menu, see [Manage Ontology](#) for instructions on adding new traits. If the desired trait cannot be found, the new trait must be added to the crop ontology.

- Select the **Add** button to specify traits to measure, or the dependent variables. Type a word or part of a word that describes the trait that will be measured. You can search by name or the alias of the variable.

Once selected, the traits of interest will appear as an empty column of data in the measurements table.



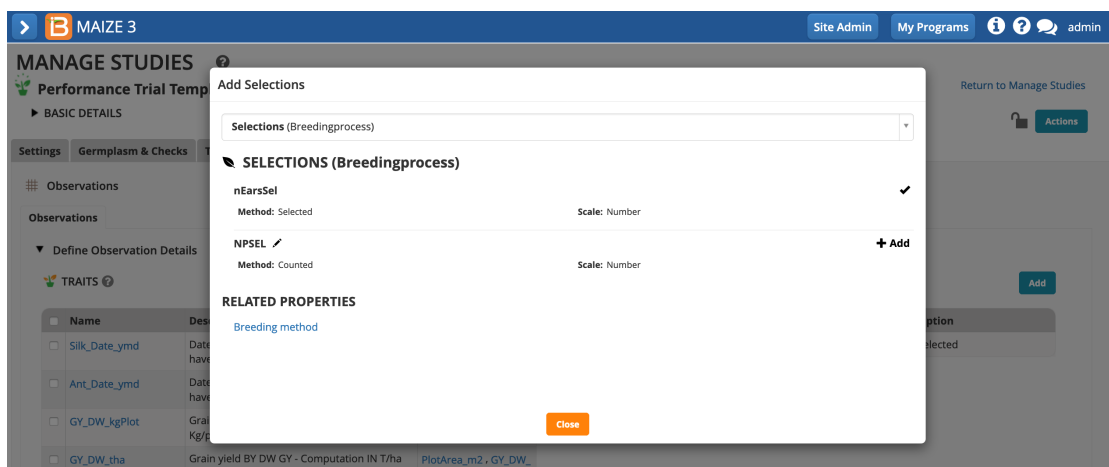
The saved study is ready for (1) data collection or the creation of a (2) sub-observation dataset to record repeated measures.



Add Selection

If you want to advance within plot selections a selection variate must be added to the study (see more on [Advancement](#))

- Select Add Selections. Choose selection variate. Close popup.



The selection variate is included as a column in the measurements table, and is ready to be filled with the number of ears selected from each plot.

BREEDING ACTIVITIES

Manage Germplasm

Manage Studies

Manage Samples

INFORMATION MANAGEMENT

STATISTICAL ANALYSIS

PROGRAM ADMINISTRATION

MAIZE 3

Site Admin My Programs admin

TRAITS

SELECTIONS

Name	Description	Input Variables
<input type="checkbox"/> Silk_Date_ymd	Date of silking. 50% of plants within a plot have silks visible	
<input type="checkbox"/> Ant_Date_ymd	Date of anthesis. 50% of the plants in the plot have produced at least one visible anther	
<input type="checkbox"/> GY_DW_kgPlot	Grain yield BY DW GY - Measurement IN Kg/plot	
<input type="checkbox"/> GY_DW_tha	Grain yield BY DW GY - Computation IN T/ha	PlotArea_m2, GY_DW_kgPlot
<input type="checkbox"/> Silk_DT_day	Silking time BY DTS - Computation IN Day	SEEDING_DATE, Silk_Date_ymd
<input type="checkbox"/> Ant_DT_day	Days to anthesis after sowing	SEEDING_DATE, Ant_Date_ymd
<input type="checkbox"/> ASI_Cmp_day	Anthesis silking interval BY ASI - Computation IN Day	Silk_DT_day
<input type="checkbox"/> PH_M_cm_mean	Average plant height in cm	PH_M_cm
<input type="checkbox"/> EH_M_cm_mean	Average ear height in cm	EH_M_cm

Remove

Observations

Select Environment:

1 - Aurangabad

Filter by status:

All

Batch Actions

ACCEPTED PENDING

Show Categorical Description

ENTRY_TYPE	GID	DESIGNATION	ENTRY_NO	PLOT_NO	nEarsSel	Silk_Date_ymd	Ant_Date_ymd	GY_DW_kgPlot	GY_DW_tha	Silk_DT_day	Ant_DT_day
Test entry	73	HM11	1	1							
Test entry	74	EH43402	2	2							
Test entry	1	DH-001	3	3							

Create Sub-Observation Unit Dataset

Once experimental design has been generated and the Observation table established, you are able to create additional data collection tables for repeated measures (sub-observations units).

Common repeated measures include:

- Measure individual plants within a plot
- Measure different quadrats within a plot
- Measure the same trait at multiple time points -**Beta**
- Create sub-observation units to take repeated measures.

BREEDING ACTIVITIES

Manage Germplasm

Manage Studies

Manage Samples

INFORMATION MANAGEMENT

STATISTICAL ANALYSIS

PROGRAM ADMINISTRATION

MAIZE 3

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MANAGE STUDIES

Performance Trial Template

Save

Return to Manage Studies

BASIC DETAILS

Settings Germplasm & Checks Treatment Factors Environments Experimental Design Observations

Observations

Create sub-observation units

Define Observation Details

Observations

Select Environment:

1 - Aurangabad

Filter by status:

All

Batch Actions

ACC

Show Cat

Design and planning options

Crossing options

Observation unit options

Field map options

Data collection options

Execute calculated variable

Create genotyping samples

Advance study options

Close study

Delete study

Lock Study

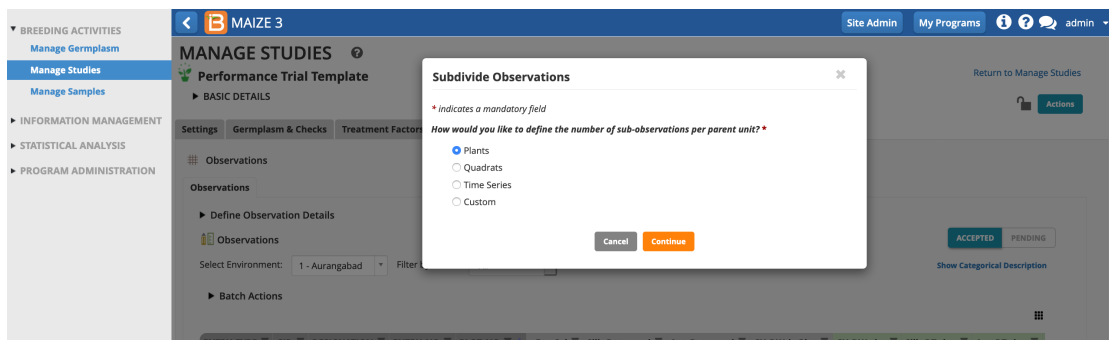
ENTRY_TYPE	GID	DESIGNATION	ENTRY_NO	PLOT_NO	nEarsSel	Silk_Date_ymd	Ant_Date_ymd	GY_DW_kgPlot	GY_DW_tha	Silk_DT_day	Ant_DT_day
Test entry	73	HM11	1	1							
Test entry	74	EH43402	2	2							
Test entry	1	DH-001	3	3							
Test entry	2	DH-002	4	4							
Test entry	3	DH-003	5	5							
Test entry	4	DH-004	6	6							

Define Sub-Observation Units

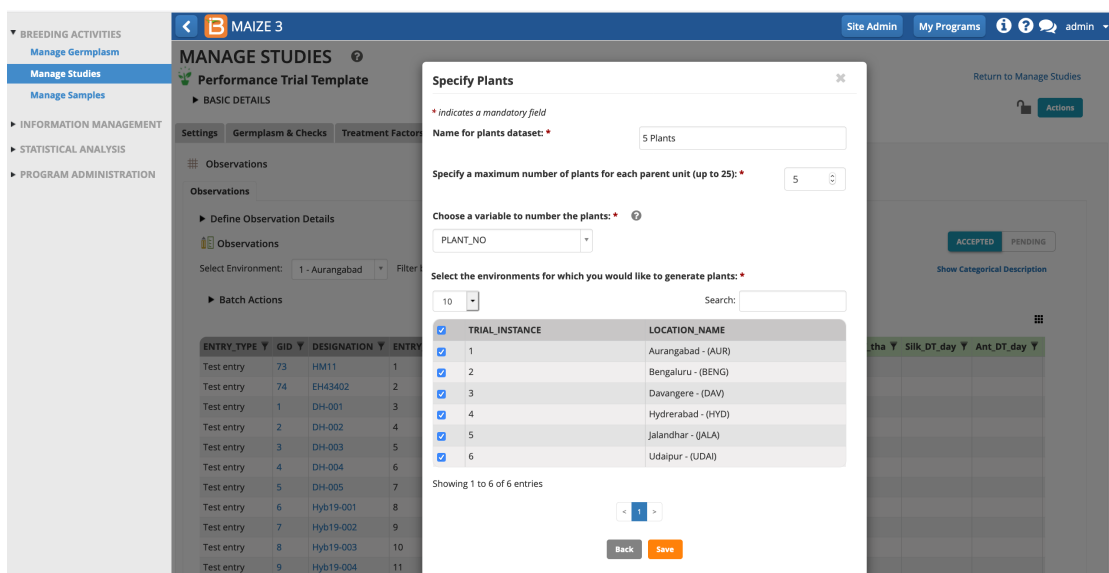
Example Plant Sub-Sampling

In the following example, a maize breeder is planning to measure the height of 5 plants per plot at maturity.

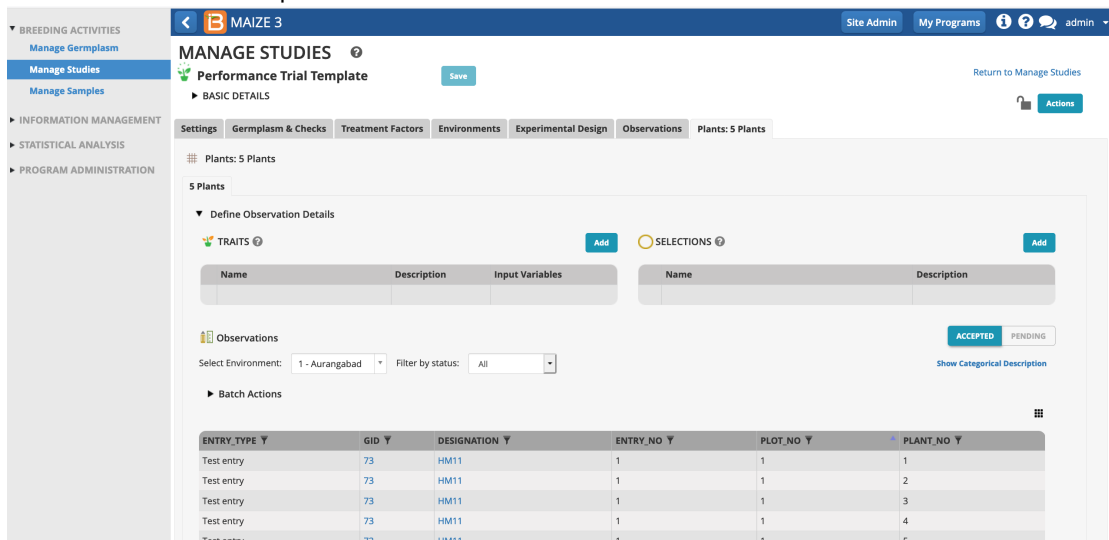
- Select Plants as the sub-observation units.



- Give the sub-observation data set a unique name. Specify 5 plants per plot. Leave PLANT_NO as the default numbering variable. Choose to sub-sample all study locations and Save.



- Select Add to add plant level trait details.



Each plot now contains 5 rows corresponding to 5 plants per plot.

- Select the traits and/or selection variables of interest to include as columns in the sub-observation dataset.

MANAGE STUDIES Performance Trial Template Save Return to Manage Studies

BASIC DETAILS

Plants: 5 Plants

Define Observation Details

TRAITS Add **SELECTIONS** Add

Name	Description	Input Variables
<input type="checkbox"/> PH_M_cm	Plant height BY PH - Measurement IN cm	
<input type="checkbox"/> EH_M_cm	Ear height BY EH - Measurement IN Cm	

Remove

Observations ACCEPTED PENDING Show Categorical Description

Select Environment: 1 - Aurangabad Filter by status: All

Batch Actions

ENTRY_TYPE	GID	DESIGNATION	ENTRY_NO	PLOT_NO	PLANT_NO	PH_M_cm	EH_M_cm
Test entry	73	HM11	1	1	1		
Test entry	73	HM11	1	1	2		
Test entry	73	HM11	1	1	3		
Test entry	73	HM11	1	1	4		
Test entry	73	HM11	1	1	5		
Test entry	74	EH43402	2	2	1		

In this sub-observation dataset plant and ear heights (cm) will be measured from 5 representative plants in each plot. Each plant in the sub-observation dataset receives a unique OBS_UNIT_ID (see above for more info) suitable for barcoding individual plants within the plot.

Example Custom Sub-Sampling

In the following example, a maize breeder is planning to gather ears of interest from experimental plots to take ear-specific measurements. The breeder doesn't know in advance how many ears will be collected, but expects to collect no more than 7 per plot.

- 'Ears' is not a default sub-sampling option. Select the Custom option and Continue.

SY MAIZE Site Admin My Programs Shawn

MANAGE STUDIES SS2 Save Return to Manage Studies

BASIC DETAILS

Define Observation Details

TRAITS

Name	Description
<input type="checkbox"/> Pit_Date	plant
<input type="checkbox"/> Mat_Date	date
<input type="checkbox"/> Mat_DT_day	Maturity time BY Days to maturity - Computation IN Day

Select All Remove

Subdivide Observations

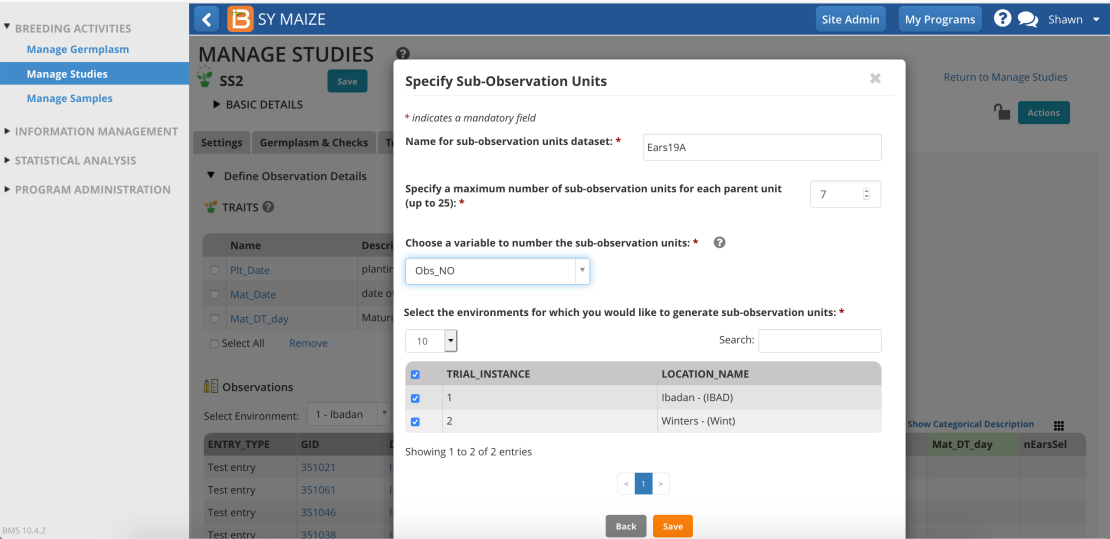
** indicates a mandatory field*

How would you like to define the number of sub-observations per parent unit? *

☐ Plants
☐ Quadrats
☐ Time Series
☒ Custom

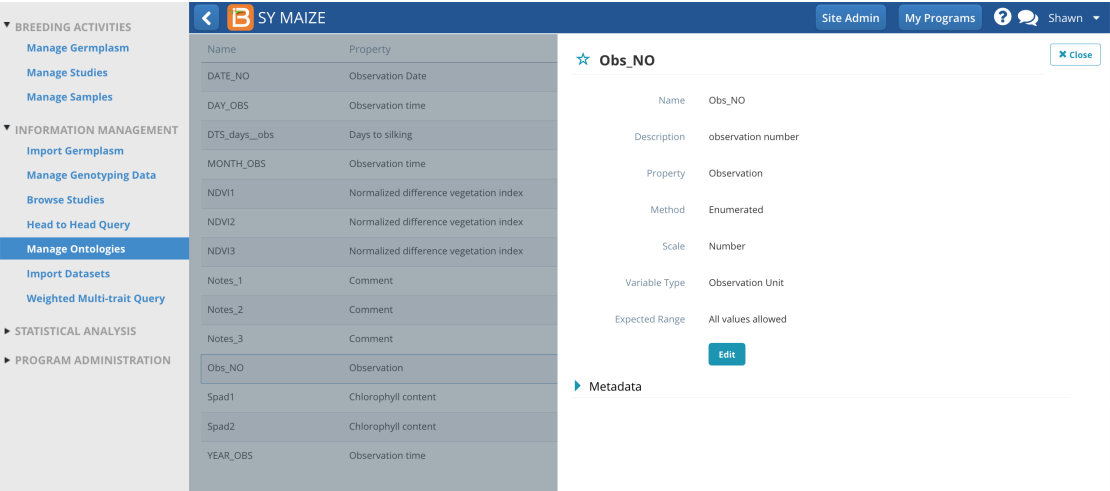
Cancel Continue

- Give the sub-observation data set a unique name.
- Specify 7 ears as the maximum collected per plot.
- Choose a numbering variable. In this case, Obs_NO. Note: custom sub-observations units will not have a corresponding numbering variable until you create one (see details in blue info box below).
- Choose to sub-sample both study locations.
- Save.



Customize Observation Unit Variable

The observation unit variable, Obs_NO, provides a generic way to number any observation. Alternatively a more specific term, like EAR_NO, could be created via [Manage Ontologies](#).



- The Ears sub-observation dataset is now ready to accept 7 ear measurements per plot. Add ear traits to the dataset and Save.

