Crops, Descriptors, & Observations

NordGen Webinar Series
Session 1 - Dec. 5, 2023

Marty Reisinger, Instructor

Sessions

Session	Topic	Lecture/Demo	QA
1	**Introduction / Overview**	**05 Dec. 2023**	12 Dec. 2023
2	Creating Ancillary (Related) Records and Standards	10 Jan. 2024	17 Jan. 2024
3	NordGen's Crop Methods and Projects Mapping	24 Jan. 2024	31 Jan. 2024
4	GG requirements for Establishing Crops, Traits, and Coded Values in GG	06 Mar. 2024	13 Mar. 2024
5	How GG crop tables interrelate	20 Mar. 2024	27 Mar. 2024
6	Recording Observation records in GG	17 Apr. 2024	24 Apr. 2024
7	Using GG's features to search on and report on the data	01 May. 2024	08 May. 2024
8	Review of Crops and Descriptors	15 May. 2024	

Today

Agenda

Introduction / Overview – Session 1

Review

GG traits and observations at a high level

how the Public Website is used to display and search accessions using existing observations

- GG terminology
- Know what data should be recorded under *Crop* Descriptors versus *Source Habitat* descriptors
- Public Website & Curator Tool Examples
- GG hierarchy of Crop- related tables

GG Terminology

- Method
- Crop
- Crop Mapping – Taxonomy Species Map
- Trait
- Code
- Language table: Trait Language and Code Language
- Attachments tables: Crop, Trait

What is a Method?

Method

Method Example

APPLE.MORPHOLOGIC.91

Evaluation location: New York, United States
Study Name: Malus.morphologic.91 Experiment Type: Field field Study Year: 1990 Exp. Location: E1 S1 T1 O24 Latitude: 42 Degrees 52 Minutes N Longitude: 76 Degrees 59 Minutes W Elevation: 161 meters Hardiness Zone: 6A Zone source: USDA Topography: flat Soil class: Ontario Soil texture: Gravelly Loam Min photoperiod: 11 Max photoperiod: 16 Min temperature: -2 Max temperature: 35 Avg temperature: 16 Solar radiation: 422 (gm cal/cm2) Water type: RF Total rainfall: 1155 Mean daily rainfall: 3 mm/day Irrigation type: rain Fertilizer type: N Year started: 04/10/1990 Year planted: 05/15/1985 Year ended: 10/31/1991 Experiment length: 2 years Publication flag: N

Method Example

SORGHUM.BRIX.ISABELA.2016

A total of 756 and 760 accessions were evaluated for sugar content (i.e. Brix) in 2015 and 2016, respectively. Each year these accessions were grown in a completely randomized block design with plots measuring 1.8 m in length with 0.9 m between rows. When the plot reached its physiological maturity (30-45 days after flowering), three to five plants per plot (leaf and stalk)

with plots measuring 1.8 m in length with 0.9 m between rows. When the plot reached its physiological maturity (30-45 days after flowering), three to five plants per plot (leaf and stalk)
were pressed with a three-roller sugarcane mill (Raja-1 US Ice Machine Manufacturing Co. FL, U
to collect the total juice. The Brix of the total juice was measured using a handle refractometer (Atago U.S.A. Inc., Bellevue, WA).

Converted lines developed in the Sorghum Conversion Program conducted cooperatively by USDA/ARS at Mayaguez, Puerto Rico and the Texas Agricultural Experiment Station.

Resistance of sorghum converted lines to Anthracnose, Rust, Ladder Spot, and Zonate Leaf Spot

Method Example

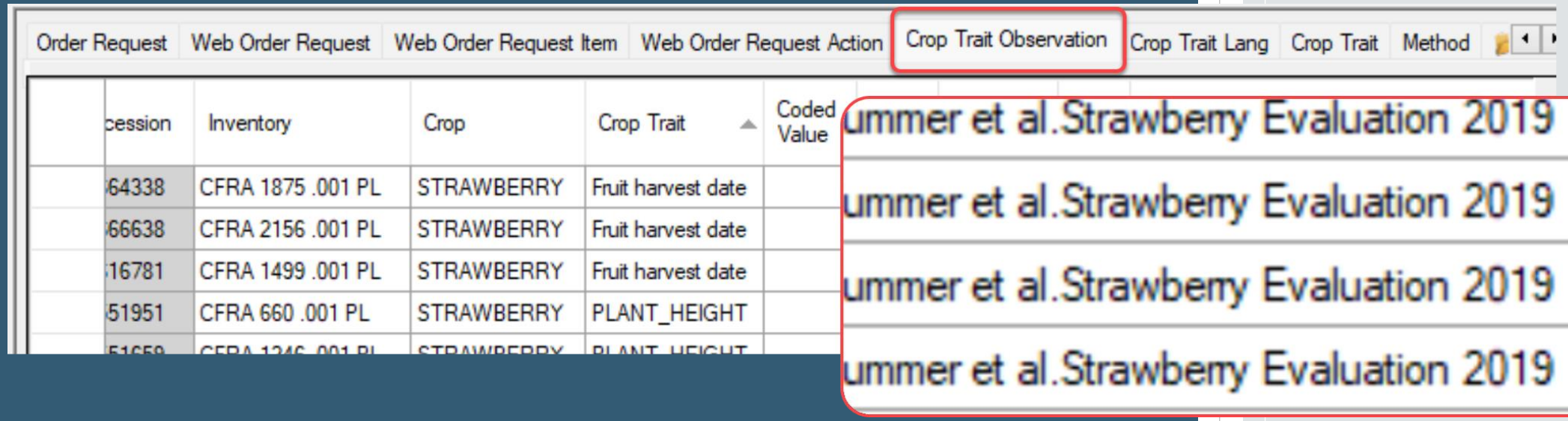
Hummer et al.Strawberry Evaluation 2019

In September 2018, 288 cultivars were planted in a field on the North Farm of the USDA, 33707 Peoria Road, Corvallis, Oregon, 97333-2521. For this field study, three replicates of each cultivar were planted in a randomized complete block design (RCBD). The blocks are defined based on irrigation proximity and soil compaction. Guard rows of strawberries were planted around the perimeters of the plot and central water wheel row.
Plant spacing is 0.762m (2.5') x 0.762m (2.5') so that the plants can be tilled across rows and within rows using existing tractors and tillers. This prevents runners from contaminating adjacent clones. Irrigation is provided by a center waterwheel that travels the length of the plot.

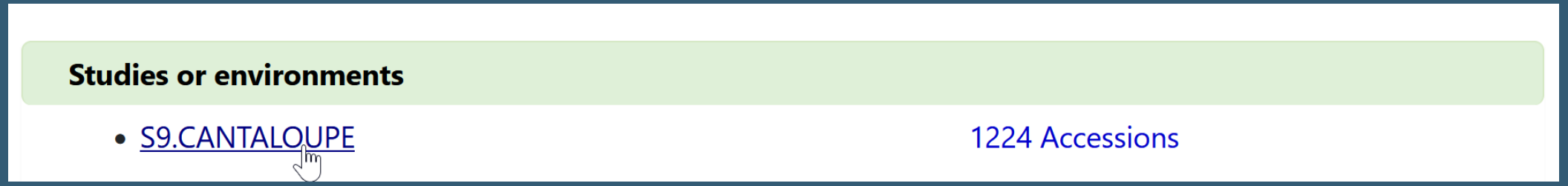
Traits evaluated in spring-summer 2019:
Plant Height measured early May
First Flower Date taken weekly from 1 March through Mid-June
Average number of runners per crown collected during the week of 1 July
Average number of plants per runner

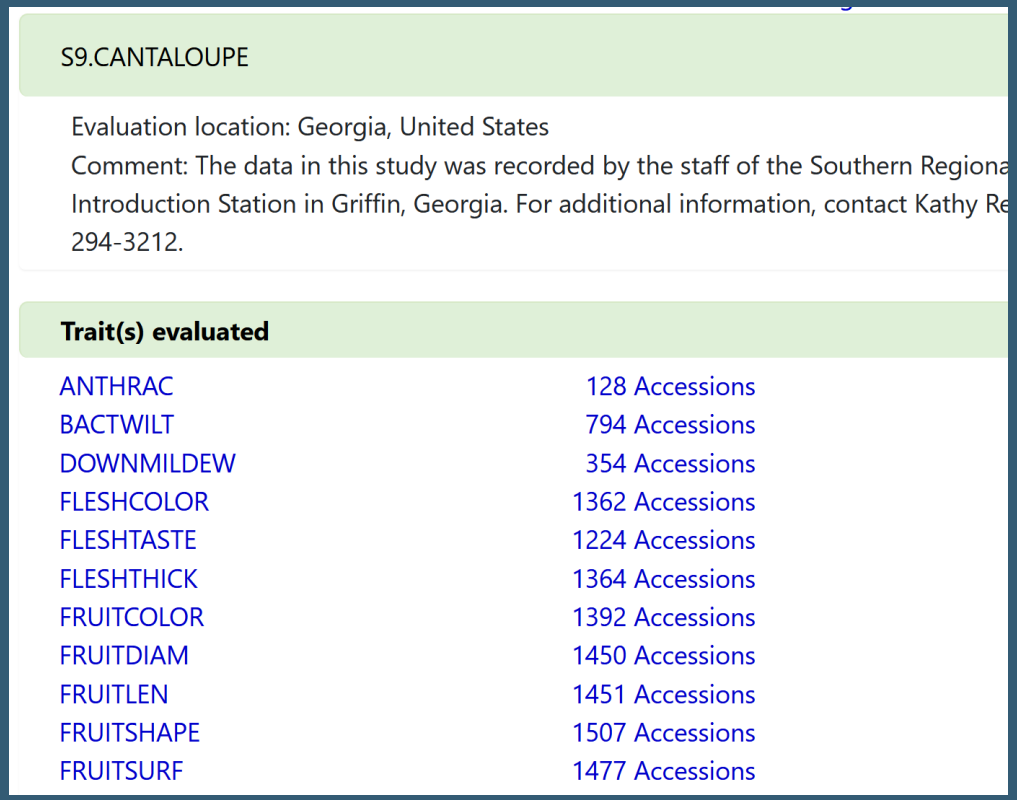
In GG, when you record each observation record, you indicate the method that was followed

Method



GG Public Website images





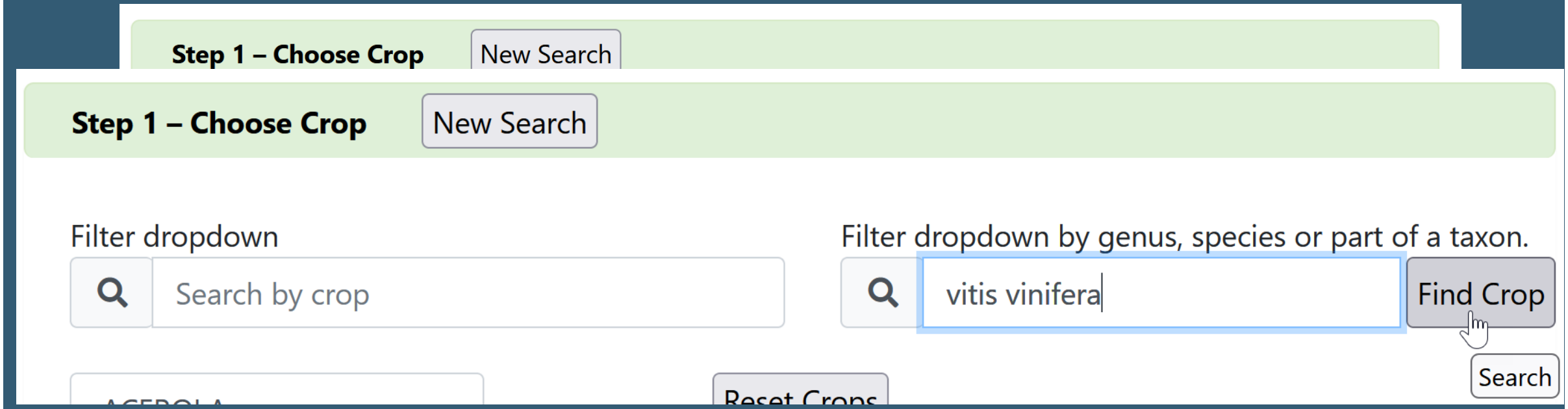
What is a "crop"?

a set of species determined by the curator

Crop

as defined in GG

Can a species be in more than one crop?



Example

GRAPE-DAVIS

Species

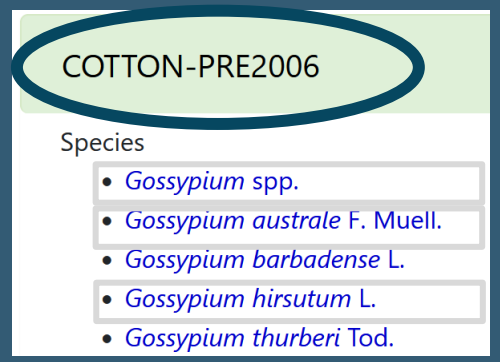
- *Ampelopsis* spp.
- *Ampelopsis delavayana* Planch. var. *delavayana*
- *Ampelopsis delavayana* Planch. var. *glabra* (Diels & Gilg) C. L. Li
- *Ampelopsis glandulosa* (Wall.) Momiy. var. *brevipedunculata* (Maxim.) Momiy.
- *Ampelopsis vitifolia* Planch.
- *Parthenocissus quinquefolia* (L.) Planch.
- *Vitis* hybr.
- *Vitis* spp.
- *Vitis* ×*andersonii* Rehder
- *Vitis* ×*bourquiniana* W. A. Taylor
- *Vitis rupestris* Scheele
- *Vitis shuttleworthii* House
- *Vitis tiliifolia* Humb. & Bonpl. ex Willd.
- *Vitis treleasei* Munson ex L. H. Bailey
- *Vitis vinifera* L.
- *Vitis vinifera* L. subsp. *sylvestris* Hegi
- *Vitis vinifera* L. subsp. *vinifera*
- *Vitis vulpina* L.

GRAPE-GENEVA

Species

- *Ampelopsis cordata* Michx.
- *Ampelopsis glandulosa* (Wall.) Momiy. var. *brevipedunculata* (Maxim.) Momiy.
- *Parthenocissus* spp.
- *Vitis* hybr.
- *Vitis* spp.
- *Vitis* ×*andersonii* Rehder
- *Vitis* ×*champinii* Planch.
- *Vitis palmata* Vahl
- *Vitis piasezkii* Maxim. var. *pagnuccii* (Rom. Caill. ex Planch.) Rehder
- *Vitis piasezkii* Maxim. var. *piasezkii* Maxim.
- *Vitis popenoei* J. H. Fennel
- *Vitis riparia* Michx.
- *Vitis romanetii* Rom. Caill.
- *Vitis rupestris* Scheele
- *Vitis vinifera* L. subsp. *vinifera*
- *Vitis vulpina* L.

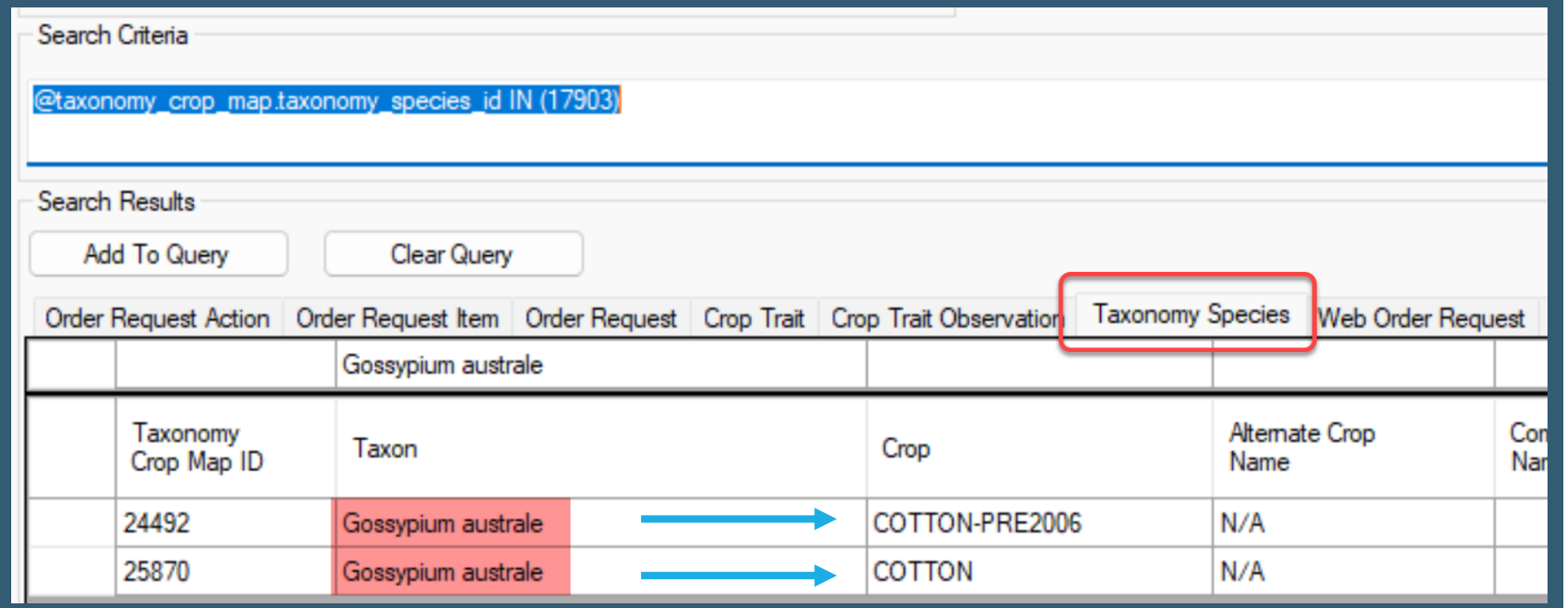
Example


COTTON-PRE2006
Species
Gossypium spp.
Gossypium australe F. Muell.
Gossypium barbadense L.
Gossypium hirsutum L.
Gossypium thurberi Tod.


COTTON
Species
Gossypium hybr.
Gossypium spp.
Gossypium anapoides J. M. Stewart et al.
Gossypium anomalum Wawra
Gossypium anomalum Wawra subsp. anomalum
Gossypium anomalum Wawra subsp. senarense (Fenzl ex Wawra) Vollesen
Gossypium arboreum L.
Gossypium areysianum Deflers
Gossypium aridum (Rose & Standl.) Skovst.
Gossypium armourianum Kearney
Gossypium australe F. Muell.
Gossypium barbadense L.
Mattei
Gossypium herbaceum L.
Gossypium herbaceum L. var. africanum (G. Watt) J. B. Hutch. ex S. C. Harland
Gossypium hirsutum L.
Gossypium incanum (O. Schwartz) Hillc.

- In GG, a map table is used to associate multiple items from one table to items in another table

- Taxonomy Species



Map

A ***descriptor*** is defined as an attribute, characteristic or measurable trait that is observed in an accession ...

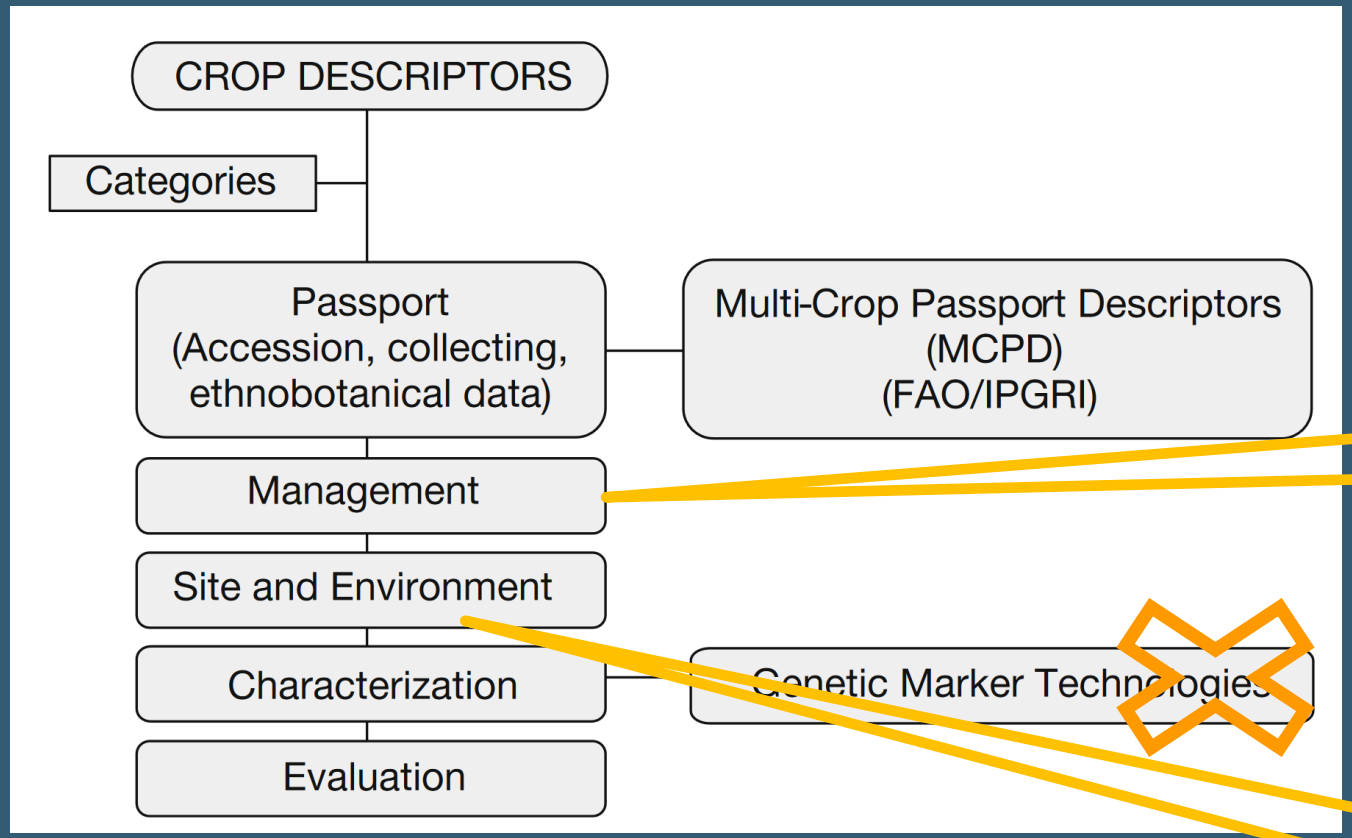
It is used to facilitate data classification, storage, retrieval, exchange and use

Descriptor

as defined in

"bulletin13.pdf" (references)

BIOVERSITY INTERNATIONAL TECHNICAL BULLETIN SERIES NO. 13



"descriptor lists of crops with similar maintenance regimes can be consulted"

In GG,
Source Habitat Descriptors

plant or seed management descriptors

multiplication or regeneration descriptors

Management Descriptors

In GG,

Inventory and Inventory viability data

GG is not the best place to store the raw genetic marker data

Genetic Markers

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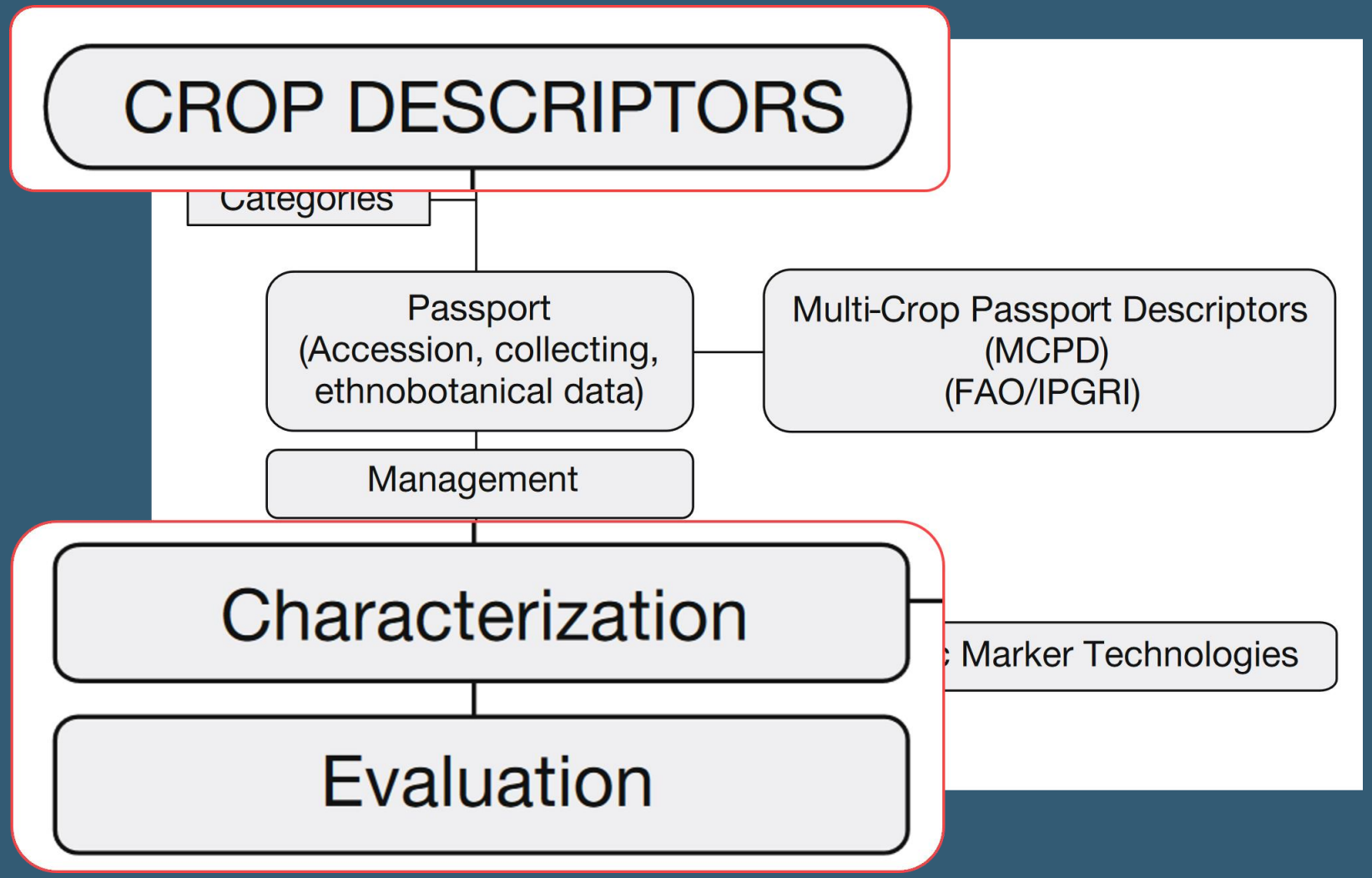


Codes for Traits

Alfalfa – Plant growth

USDA

Codes for Traits

Alfalfa – Plant growth

USDA

Plant growth habit

Number of accessions (652)

Equal to

2=DECUMBENT (NORSEMAN)
3=SEMI-DECUMBENT (VERNAL)
5=INTERMEDIATE (SARANAC)
7=SEMI-ERECT (MESILLA)

Accession Quarantine | Accession Inventory Name | Web Order Request Item | Crop Trait Code Lang | Cr

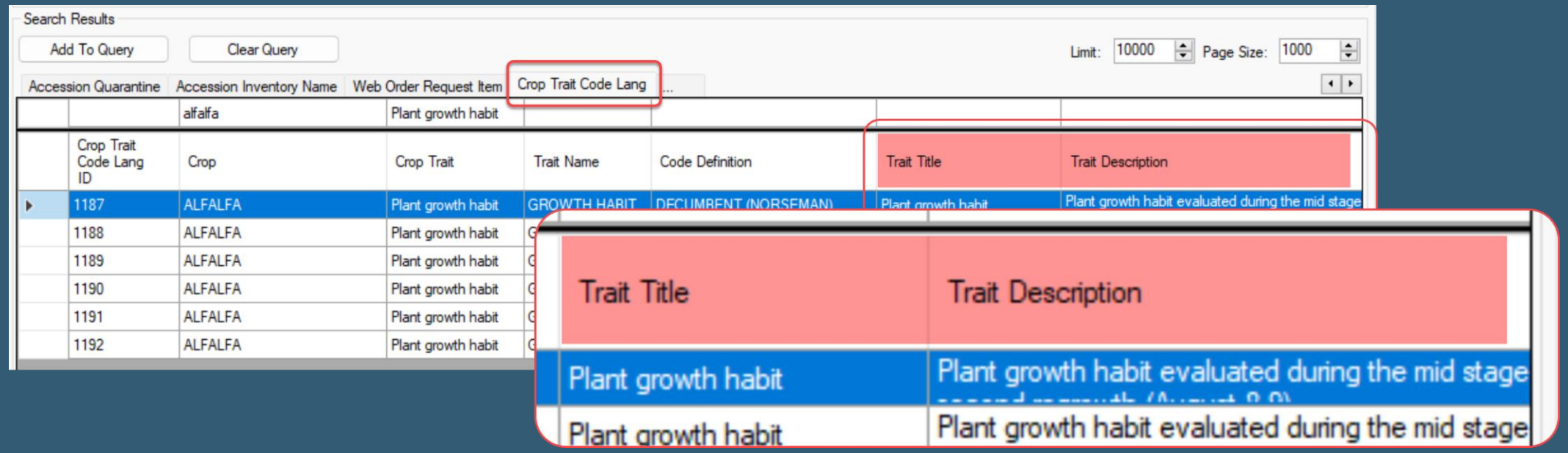
Crop Trait Code ID	Crop	Trait Name	Crop Trait	Trait Description	Code Title	Code Description
1187	ALFALFA	GROWTH HABIT	Plant growth habit	Plant growth habit evaluated during th mid stage of the se	DECUMBENT (NORSEMAN)	DECUMBENT (NORSEMAN)
1188	ALFALFA	GROWTH HABIT	Plant growth habit	Plant growth habit	SEMI-DECUMBENT (VERNAL)	SEMI-DECUMBENT (VERNAL)
1189	ALFALFA	GROWTH HABIT	Plant growth habit	Plant growth habit	INTERMEDIATE (SARANAC)	INTERMEDIATE (SARANAC)
1190	ALFALFA	GROWTH HABIT	Plant growth habit	Plant growth habit	SEMI-ERECT (MESILLA)	SEMI-ERECT (MESILLA)
1191	ALFALFA	GROWTH HABIT	Plant growth habit	Plant growth habit	ERECT (CUF 101)	ERECT (CUF 101)
1192	ALFALFA	GROWTH HABIT	Plant growth habit	Plant growth habit	VERY ERECT	VERY ERECT

Trait Code

2
3
5
7
8
9

Language Tables

Crop Trait Language and *Crop Trait Code* Language



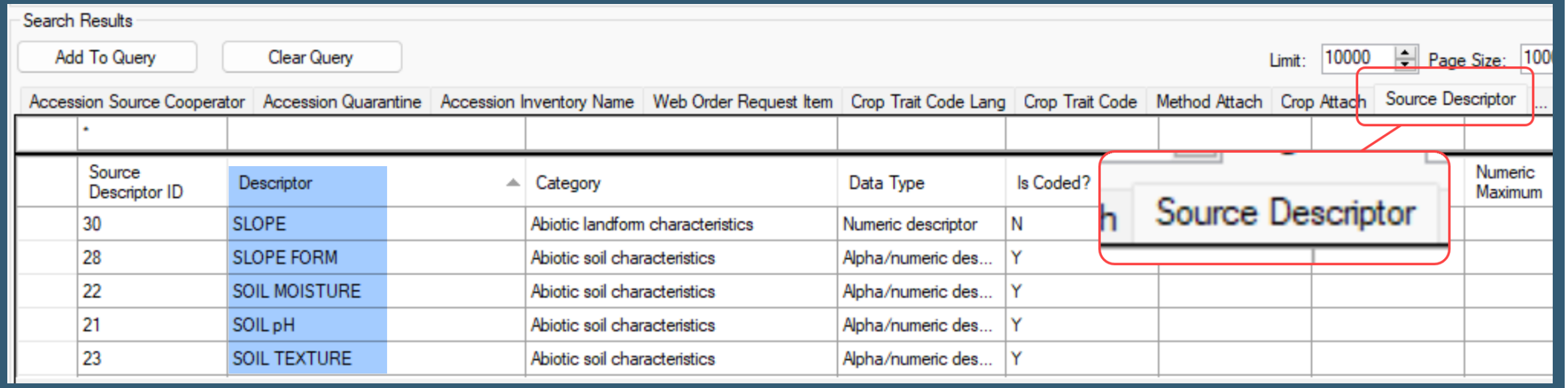
Language records provide titles and descriptions

Images and other file types

– linked to GG records

Attachments

Source Habitat Descriptors


Search Results

Add To Query | Clear Query | Limit: 10000 | Page Size: 100

Accession Source Cooperator	Accession Quarantine	Accession Inventory Name	Web Order Request Item	Crop Trait Code Lang	Crop Trait Code	Method Attach	Crop Attach	Source Descriptor	...
*									

Source Descriptor ID	Descriptor	Category	Data Type	Is Coded?	Numeric Maximum
30	SLOPE	Abiotic landform characteristics	Numeric descriptor	N	
28	SLOPE FORM	Abiotic soil characteristics	Alpha/numeric des...	Y	
22	SOIL MOISTURE	Abiotic soil characteristics	Alpha/numeric des...	Y	
21	SOIL pH	Abiotic soil characteristics	Alpha/numeric des...	Y	
23	SOIL TEXTURE	Abiotic soil characteristics	Alpha/numeric des...	Y	

Source Descriptor

W6 57609

Source History

Collected

19 June 2018.
Cádiz Province, Andalucía, Spain
Locality: Villaluenga del Rosario. Road A-374 Villaluenga del Rosario/Grazalema, between Las Covezuelas recreational area and road.
Coordinates: 54.9000, 55.1200 (Map it)
Elevation: 841m.
Georeference protocol: Lat/lon determined by GPS
Habitat: Wild Habitat
Environment description: Roadside next to holm oak forest.
Number of plants sampled: 75
Associated species: Associated with: Lathyrus setifolius, Quercus rotundifolia, Vicia sativa.
Aspect: ; **Slope:** 22; **Sample Area:** 4. > 100 <= 500 Sq M; **Soil Ph:** Alkaline; **Modifying Factors:** ; **Population Size:** >50 <100; **Sample Coverage:** 100%
Comment: Only fruits and fruits already dispersed. Collectors: C. Andrés, F.J. Berrio and T. Marcos.
Collector(s):

- Dempewolf, Hannes, Global Crop Diversity Trust

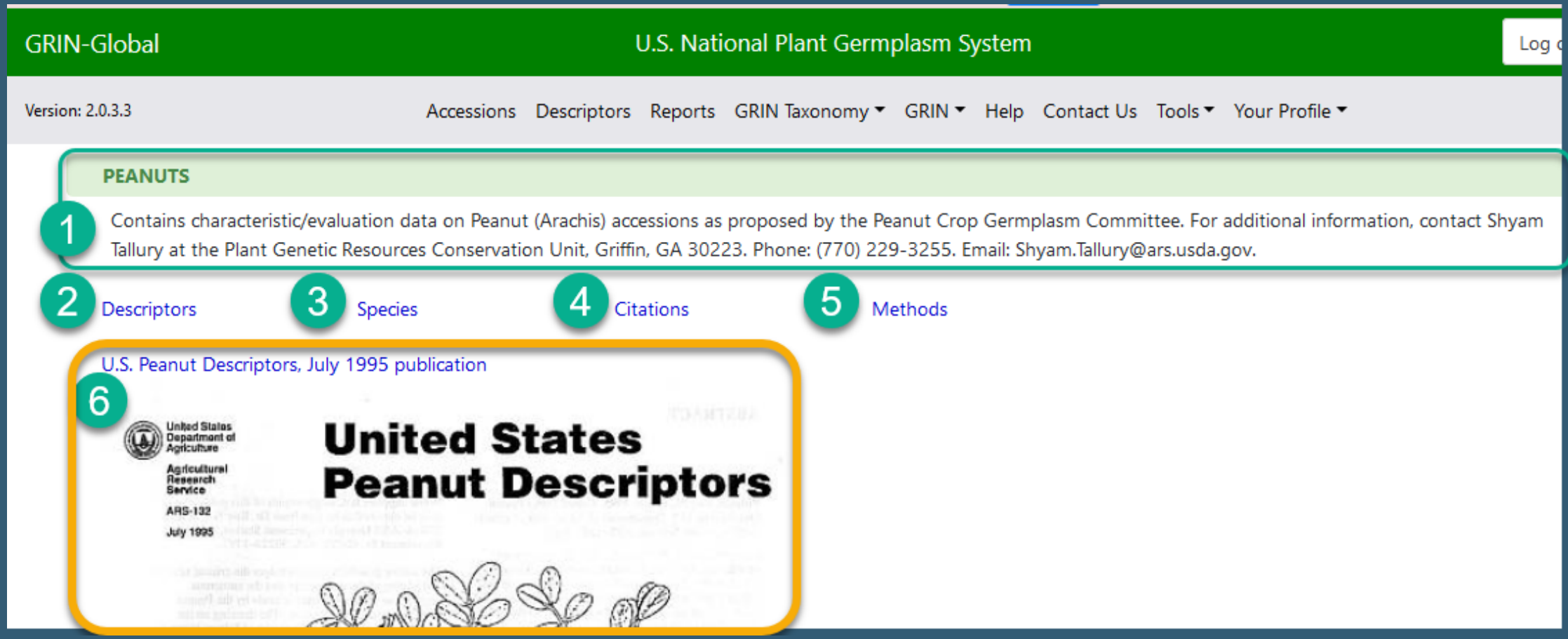
Public Website & Curator Tool examples

For better or worse

Demo

Peanuts - crop page
Cotton – Growth habit
selecting the descriptor
selecting the descriptor by code values
Apple – crop page
crop trait attachments
Phaseolus – image 1
Brassica Methods in CT

Crop Example: PEANUTS



- Keep the descriptors simple
- Use images and drawings to support textual descriptions
- Provide clear definitions of descriptors to enable others to apply them
- Analyse carefully the unit costs per measurement
- Specify the unit of measurement

Characterization Data

Guidelines

Each descriptor consists of a descriptor name, a descriptor state, and a descriptor *method* explaining how the descriptor should be measured and recorded.

Descriptor elements

"bulletin13.pdf"

… a descriptor state …

GG Values

- Text
- Numeric
- Coded

In GG,

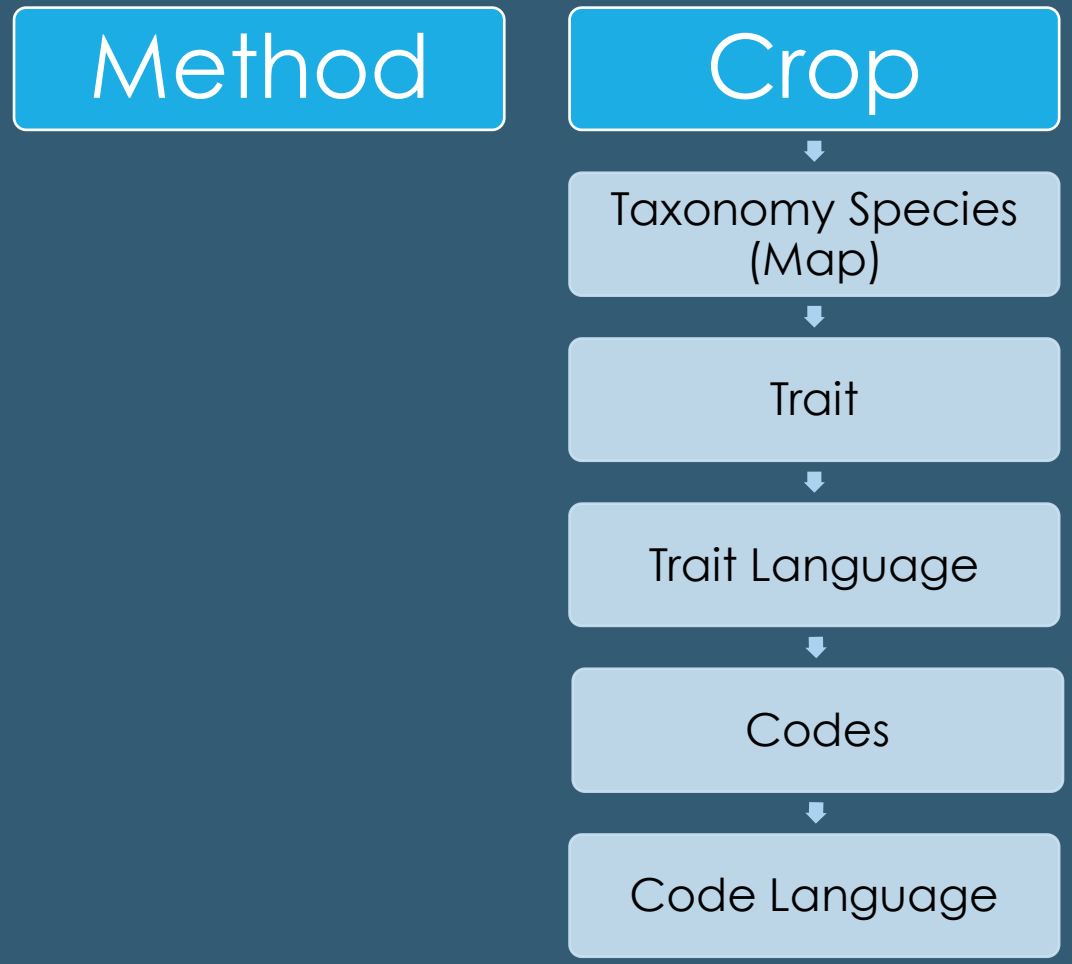
Observations are one of three possible types

A scary slide and then some interesting slides

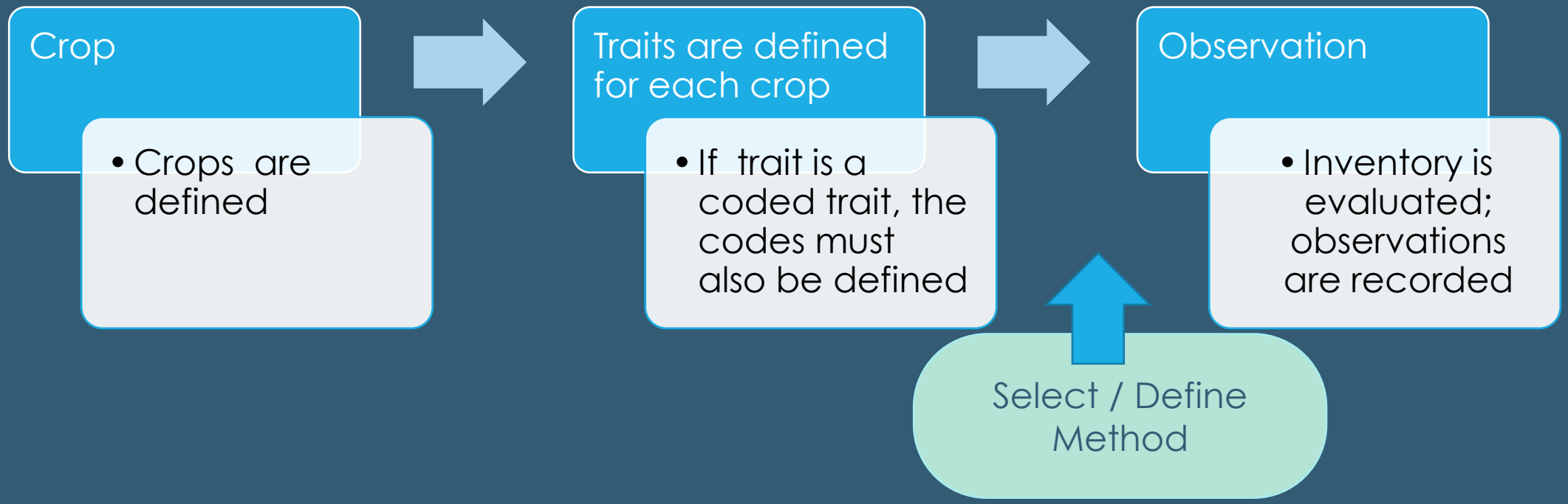
Jan Svensson

Data grouping	Data view	Comment
Crop	Crop	
	Crop attach	
	Taxonomy Crop Map	Specie(s) -> crop
Trait	Crop Trait	Main trait data
	Crop Trait Attach	
	Crop Trait Lang	
	Crop Trait Code	Main coded trait data
	Crop Trait Code Attach	
	Crop Trait Code Lang	
Method	Method	Trial info
	Method citation	
	Method attachment	
	Method Map	Trial cooperators
Scores (data)	Crop Trait Observation Data	(reps)
	Crop Trait Observation	(summary statistics)
Project (grouping of trials)	Project	GENBIS
	Project Map	GENBIS
	Project Method	GENBIS
Genbis	Crop Trait Observation Generator	GENBIS

Before adding any observation



Before an Observation Can Be Recorded…



GG hierarchy of Crop-related tables

5 main dataviews to be defined:

Crop…
Crop Trait…
Crop Trait Language…
Crop Trait Code…
Crop Trait Code Language…

References

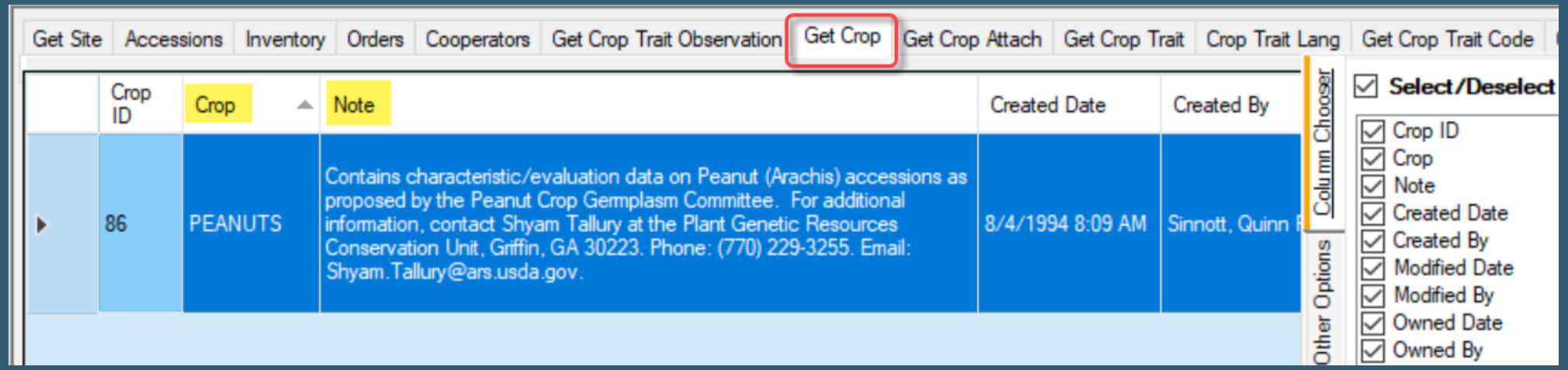
- BIOVERSITY INTERNATIONAL TECHNICAL BULLETIN SERIES NO. 13

- cropgenebank.sgrp.cgiar.org/images/file/learning_space/technicalbulletin13.pdf

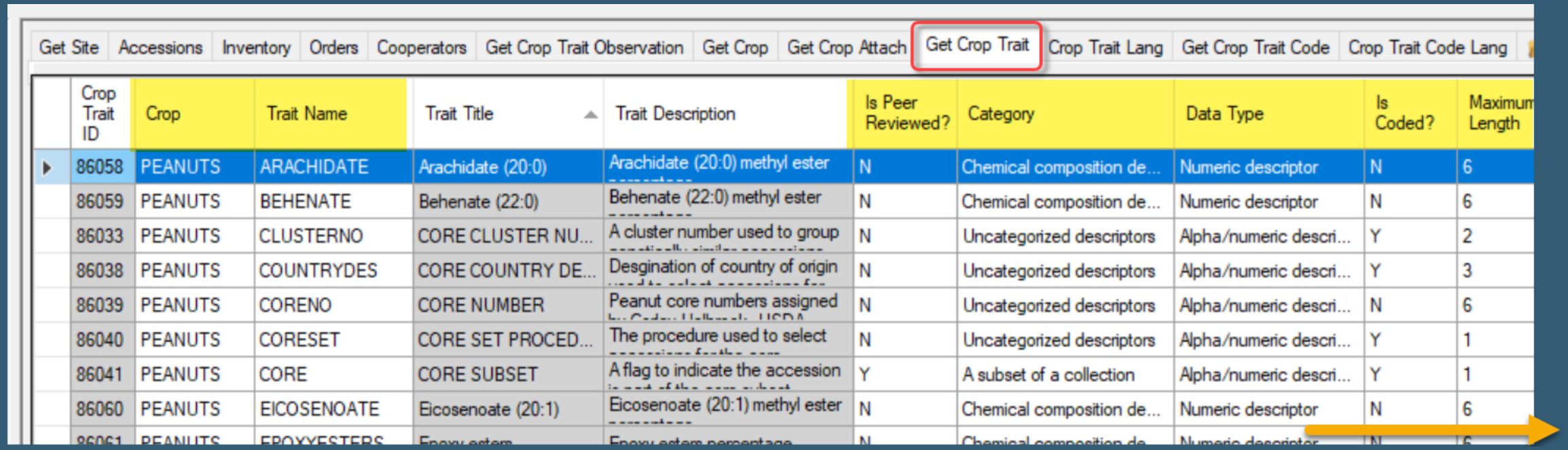
References

- http://rrginc.com/gg/nordgenObs/

CROP Table Records



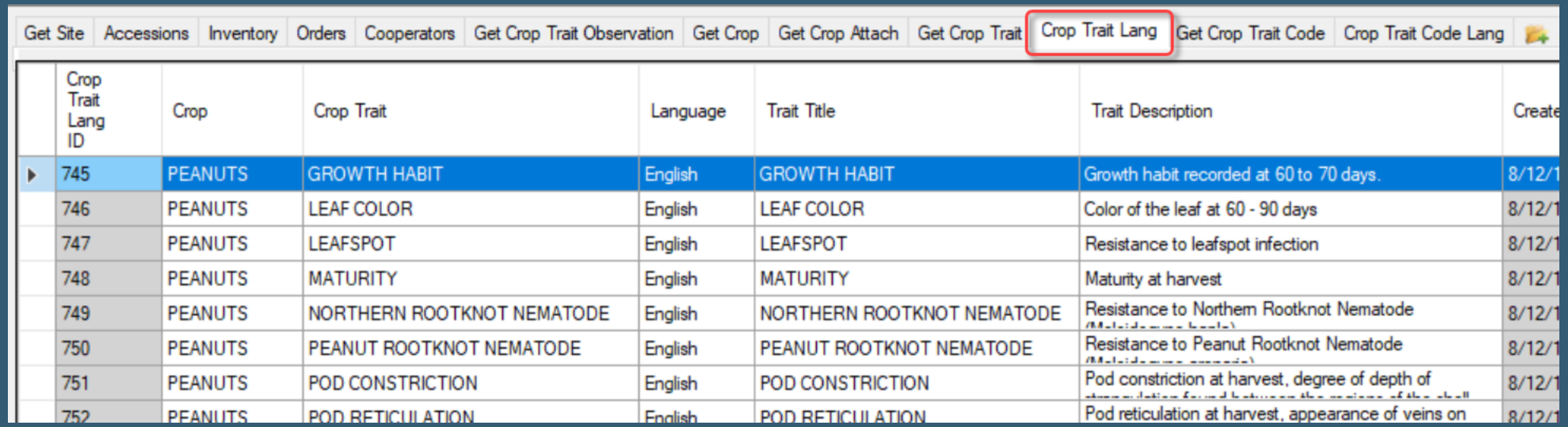
Crop Trait



Get Site | Accessions | Inventory | Orders | Cooperators | Get Crop Trait Observation | Get Crop | Get Crop Attach | **Get Crop Trait** | Crop Trait Lang | Get Crop Trait Code | Crop Trait Code Lang

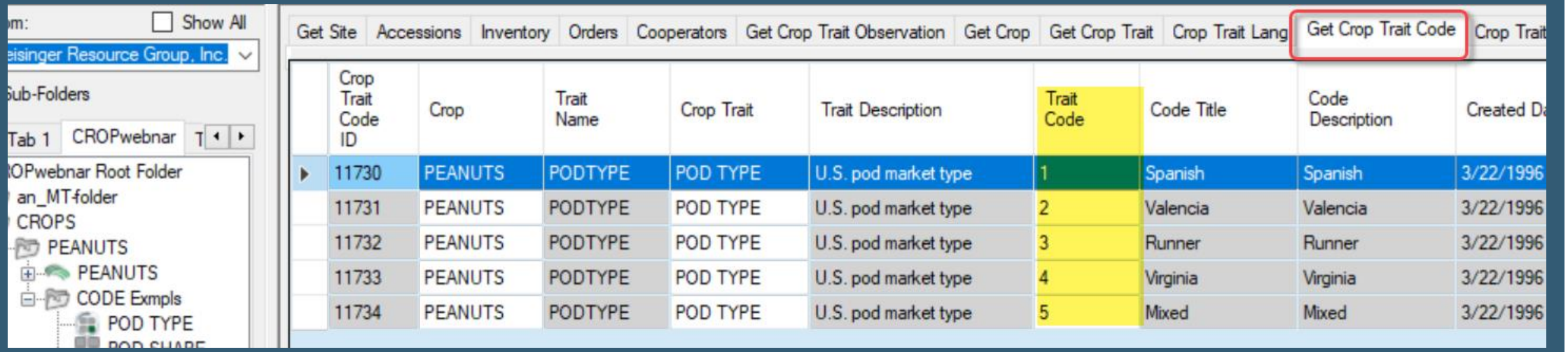
Crop Trait ID	Crop	Trait Name	Trait Title	Trait Description	Is Peer Reviewed?	Category	Data Type	Is Coded?	Maximum Length
86058	PEANUTS	ARACHIDATE	Arachidate (20:0)	Arachidate (20:0) methyl ester	N	Chemical composition de...	Numeric descriptor	N	6
86059	PEANUTS	BEHENATE	Behenate (22:0)	Behenate (22:0) methyl ester	N	Chemical composition de...	Numeric descriptor	N	6
86033	PEANUTS	CLUSTERNO	CORE CLUSTER NU...	A cluster number used to group	N	Uncategorized descriptors	Alpha/numeric descri...	Y	2
86038	PEANUTS	COUNTRYDES	CORE COUNTRY DE...	Desgination of country of origin	N	Uncategorized descriptors	Alpha/numeric descri...	Y	3
86039	PEANUTS	CORENO	CORE NUMBER	Peanut core numbers assigned	N	Uncategorized descriptors	Alpha/numeric descri...	N	6
86040	PEANUTS	CORESET	CORE SET PROCED...	The procedure used to select	N	Uncategorized descriptors	Alpha/numeric descri...	Y	1
86041	PEANUTS	CORE	CORE SUBSET	A flag to indicate the accession	Y	A subset of a collection	Alpha/numeric descri...	Y	1
86060	PEANUTS	EICOSENOATE	Eicosenoate (20:1)	Eicosenoate (20:1) methyl ester	N	Chemical composition de...	Numeric descriptor	N	6
86061	PEANUTS	EPOXYESTERS	Epoxy estem	Epoxy estem percentage	N	Chemical composition de...	Numeric descriptor	N	6

Crop Trait Lang

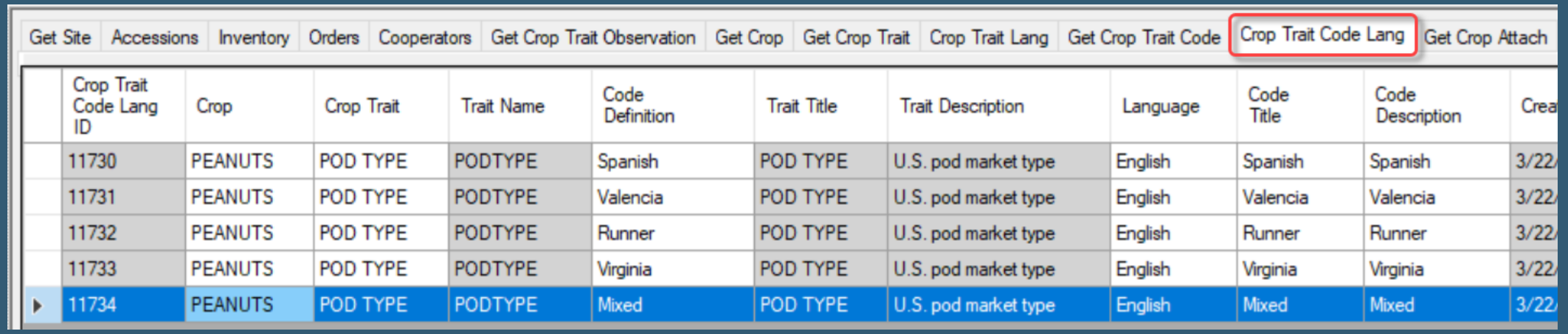


Crop Trait Lang ID	Crop	Crop Trait	Language	Trait Title	Trait Description	Create
745	PEANUTS	GROWTH HABIT	English	GROWTH HABIT	Growth habit recorded at 60 to 70 days.	8/12/1
746	PEANUTS	LEAF COLOR	English	LEAF COLOR	Color of the leaf at 60 - 90 days	8/12/1
747	PEANUTS	LEAFSPOT	English	LEAFSPOT	Resistance to leafspot infection	8/12/1
748	PEANUTS	MATURITY	English	MATURITY	Maturity at harvest	8/12/1
749	PEANUTS	NORTHERN ROOTKNOT NEMATODE	English	NORTHERN ROOTKNOT NEMATODE	Resistance to Northern Rootknot Nematode	8/12/1
750	PEANUTS	PEANUT ROOTKNOT NEMATODE	English	PEANUT ROOTKNOT NEMATODE	Resistance to Peanut Rootknot Nematode	8/12/1
751	PEANUTS	POD CONSTRICTION	English	POD CONSTRICTION	Pod constriction at harvest, degree of depth of	8/12/1
752	PEANUTS	POD RETICULATION	English	POD RETICULATION	Pod reticulation at harvest, appearance of veins on	8/12/1

Codes


Show All
Sub-Folders
Tab 1
CROPwebnar
CROPwebnar Root Folder
an_MT-folder
CROPS
PEANUTS
PEANUTS
CODE Exmpls
POD TYPE
Get Site
Accessions
Inventory
Orders
Cooperators
Get Crop Trait Observation
Get Crop
Get Crop Trait
Crop Trait Lang
Get Crop Trait Code
Crop Trait
Crop Trait Code ID
Crop
Trait Name
Crop Trait
Trait Description
Trait Code
Code Title
Code Description
Created Da
11730 PEANUTS PODTYPE POD TYPE U.S. pod market type 1 Spanish Spanish 3/22/1996
11731 PEANUTS PODTYPE POD TYPE U.S. pod market type 2 Valencia Valencia 3/22/1996
11732 PEANUTS PODTYPE POD TYPE U.S. pod market type 3 Runner Runner 3/22/1996
11733 PEANUTS PODTYPE POD TYPE U.S. pod market type 4 Virginia Virginia 3/22/1996
11734 PEANUTS PODTYPE POD TYPE U.S. pod market type 5 Mixed Mixed 3/22/1996

Crop Trait Code Lang



Get Site | Accessions | Inventory | Orders | Cooperators | Get Crop Trait Observation | Get Crop | Get Crop Trait | Crop Trait Lang | Get Crop Trait Code | **Crop Trait Code Lang** | Get Crop Attach

Crop Trait Code Lang ID	Crop	Crop Trait	Trait Name	Code Definition	Trait Title	Trait Description	Language	Code Title	Code Description	Crea
11730	PEANUTS	POD TYPE	PODTYPE	Spanish	POD TYPE	U.S. pod market type	English	Spanish	Spanish	3/22/
11731	PEANUTS	POD TYPE	PODTYPE	Valencia	POD TYPE	U.S. pod market type	English	Valencia	Valencia	3/22/
11732	PEANUTS	POD TYPE	PODTYPE	Runner	POD TYPE	U.S. pod market type	English	Runner	Runner	3/22/
11733	PEANUTS	POD TYPE	PODTYPE	Virginia	POD TYPE	U.S. pod market type	English	Virginia	Virginia	3/22/
11734	PEANUTS	POD TYPE	PODTYPE	Mixed	POD TYPE	U.S. pod market type	English	Mixed	Mixed	3/22/