iDigBio Orientation: Accessing and using digitized data from biodiversity collections

NSF Award DBI-2027654 (2021-2026)

Presented by:
Ron Canepa, Makenzie Mabry, and Molly Phillips

iDigBio is funded by grants from the National Science Foundation [DBI-1115210 (2011-2018), DBI-1547229 (2016-2022), & DBI-2027654 (2021-2026)]. Any opinions, findings, and conclusions or recommendations expressed in this material are those of the author(s) and do not necessarily reflect the views of the National Science Foundation.

Agenda

- Introductions to facilitators
- Introduction to the iDigBio Portal
- Introduction to APIs
- Research Example
- Teaching with the Portal
- Teaching with the API example
- API Example
- Questions

Introduction to iDigBio web portal

(demo)

My Session Today

- Some brief slides about APIs in general
- Not focusing on code itself
- A few technical terms
- iDigBio API offerings

Uh oh: Technical Terms?

- 3 technical terms and 3 only
- Keep me honest and let's see how I do

Briefly: What is an API?

Ron's tech term #1: *API*

Application Programming Interface

- An organization has a system...
- That they want to allow external people / systems to interact with…
- And so they make it available on the web via an "endpoint"
- Some will require a registration / an account, others won't
  - iDigBio does not require registration

Endpoint: Odd Name, Same Thing

Ron's tech term #2: *endpoint*

- An *endpoint* is a web address for the API

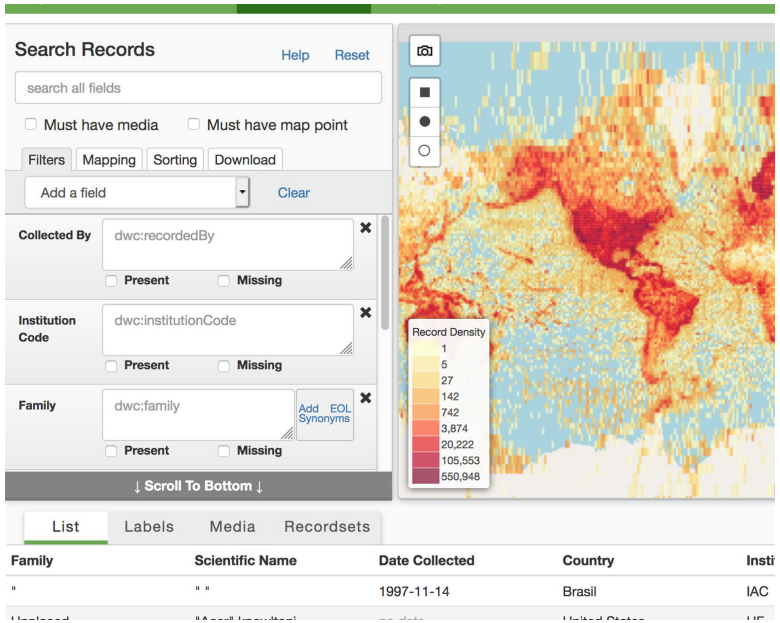
For instance, iDigBio:

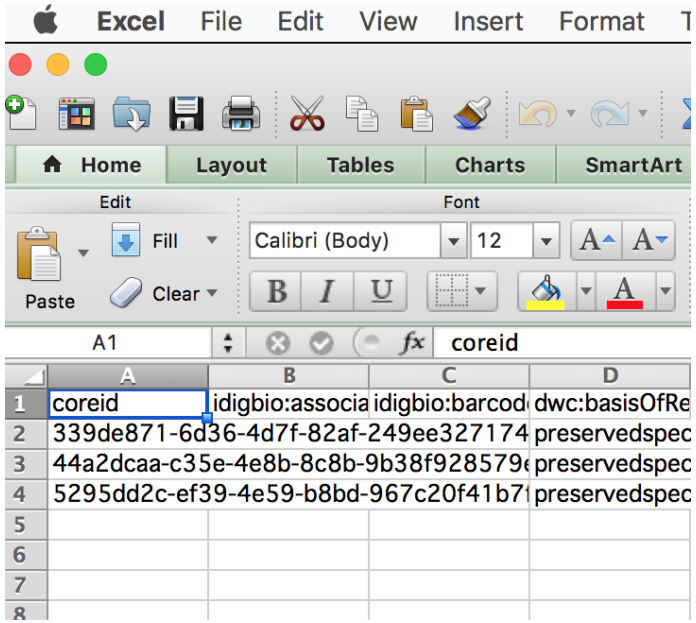
- https://search.idigbio.org/v2/search/
- https://search.idigbio.org/v2/mapping/

National Park Service:

- https://developer.nps.gov/api/v1/alerts

A point of comparison...





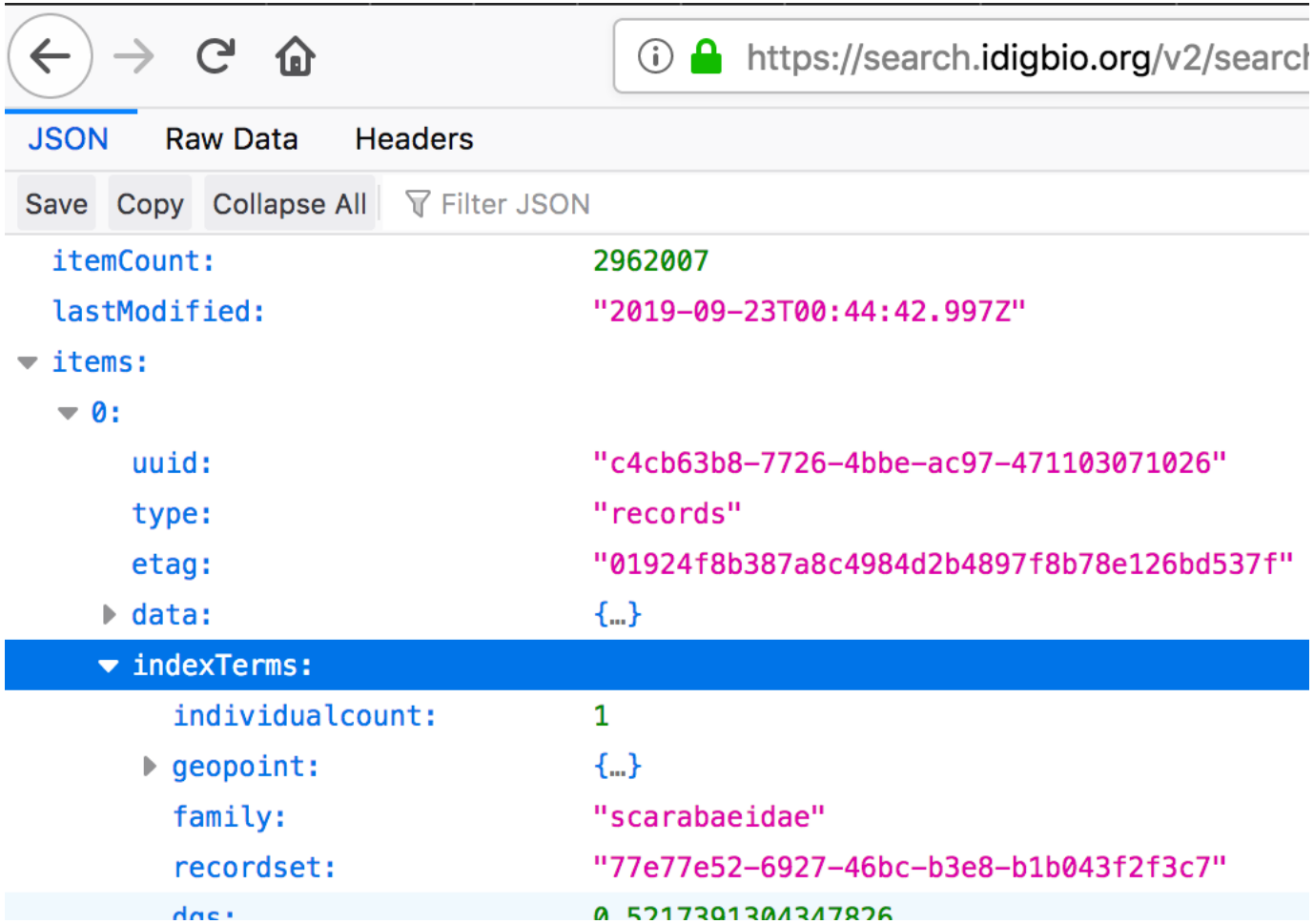
Talking With an API

Ron's tech term #3: *request*

A human or a computer makes a request to the API

- Asking for an interaction
- "Please search for these terms and return the results…"
- "Please download this file…"
- "Please count how many results match my query…"

This is the actual communication across the web



https://search.idigbio.org/v2/search/records?rq={%22stateprovince%22:%22Florida%22}&limit=1000

Why APIs?

AUTOMATE ALL THE THINGS!

http://hyperboleandahalf.blogspot.com/2010/06/this -is-why-ill-never-be-adult.html

Why APIs?

There are other benefits:

- Self-documenting procedures
- Repeatable for yourself
- Reproducible for others!
- Bring your own programming language
- DIY instead of waiting for features
- And more…

iDigBio APIs

Search API:

- https://github.com/iDigBio/idigbio-search-api/wiki

Ways to interact:

- Directly via your language of choice
- ridigbio packge for R
- SPOCC: an rOpenSci package
- Examples coming up later in the workshop

iDigBio APIs

But what if I want a *lot* of records?

No, like, *really a lot…*

http://clipart -library.com , free for non-commercial use

iDigBio APIs

Download API:

- https://www.idigbio.org/wiki/index.php/IDigBio_Download_API

A Few Other Thoughts

Don’t re-invent the wheel:

- Use things like ridigbio or SPOCC where possible
- Ask your community!
- Check the API documentation
  - https://github.com/iDigBio/idigbio-search-api/wiki
- Email data@idigbio.org

Thank you!

data@idigbio.org

Research Example - *Food Crop Security: Using Digitized Collections to Identify Sources of Diversity For Future Crop Improvement*

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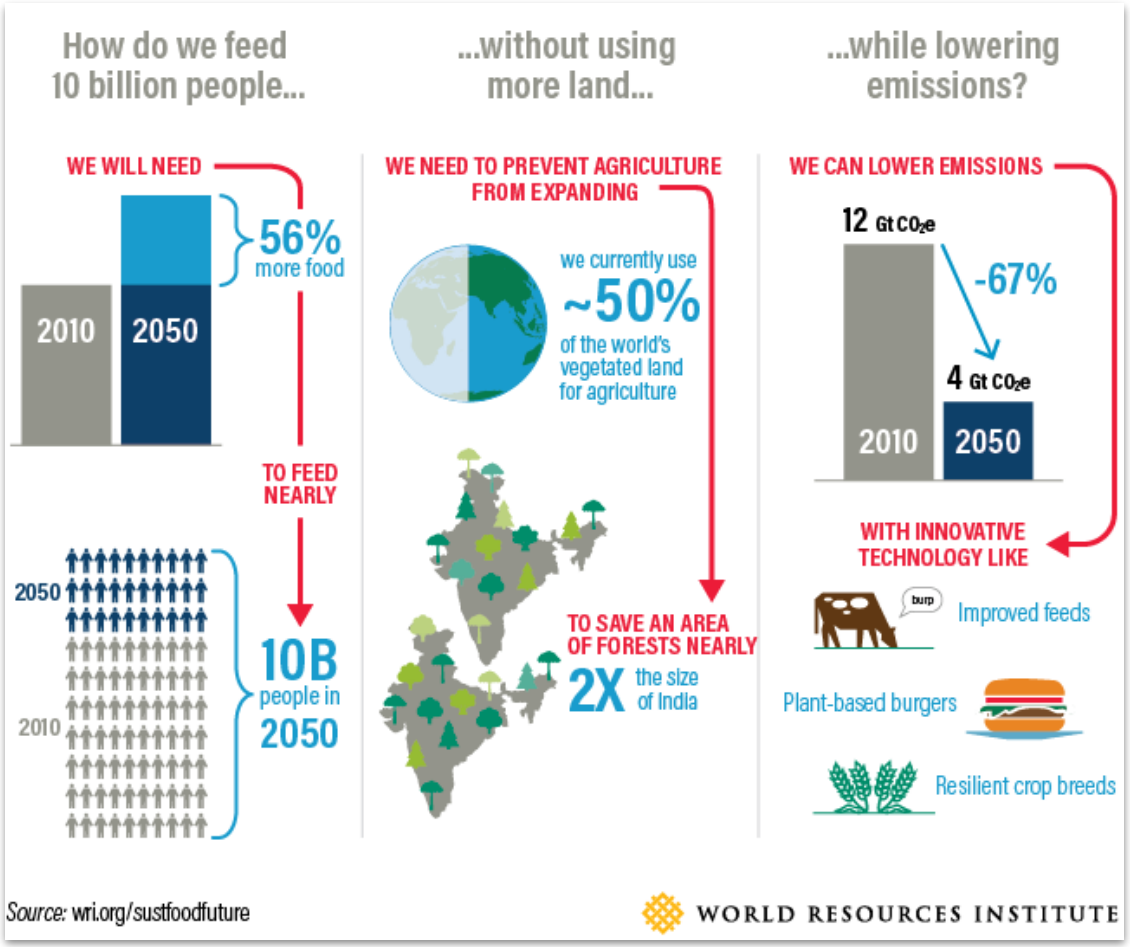

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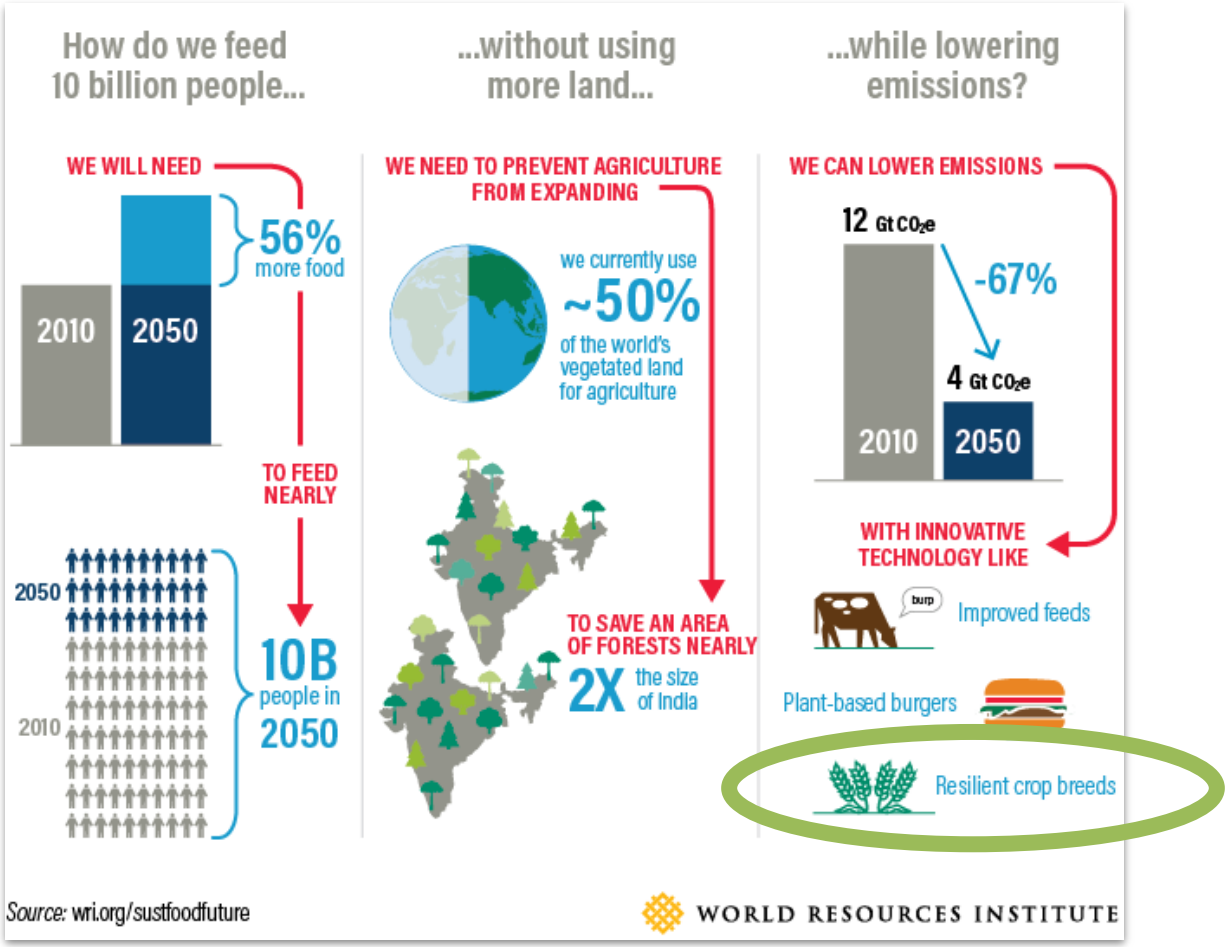

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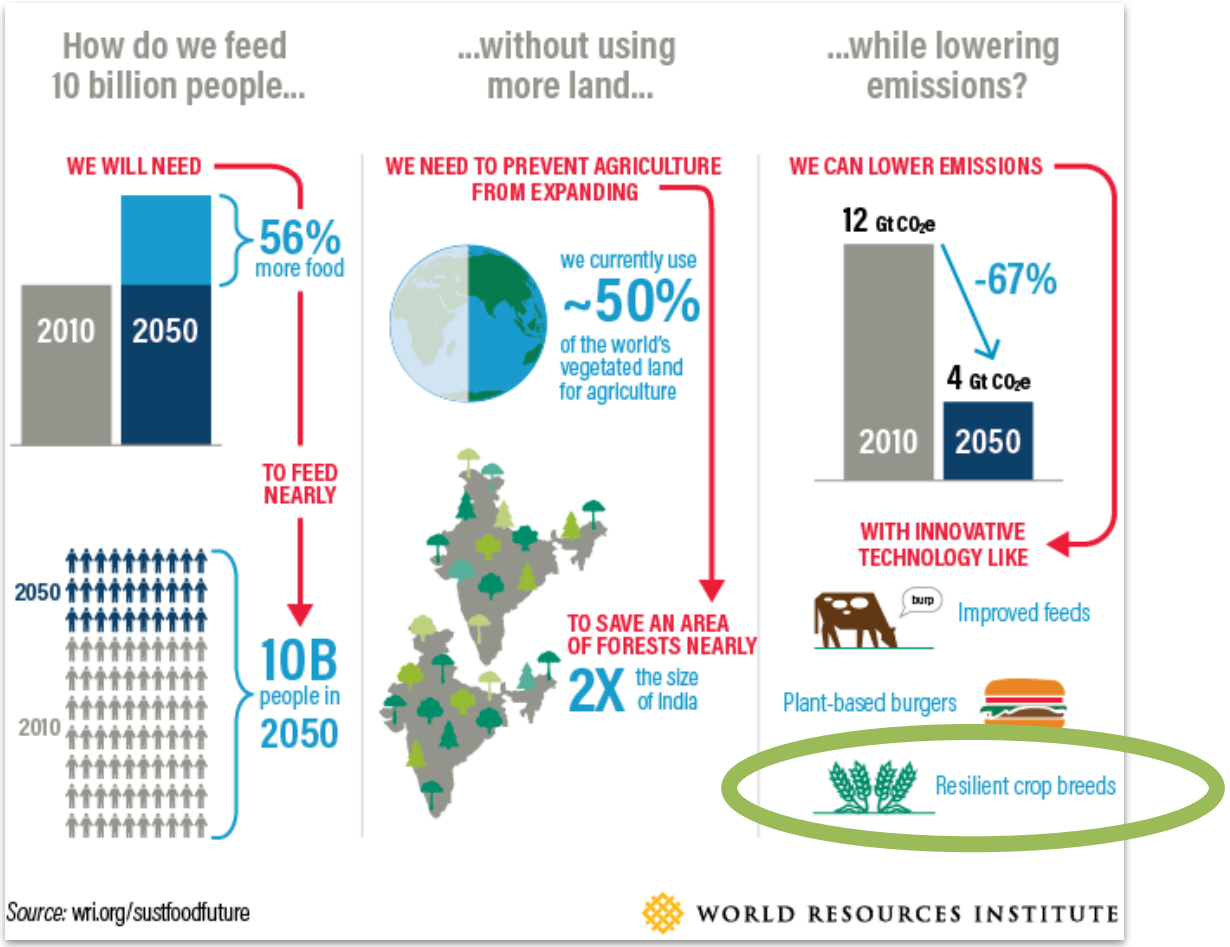

Brassica cretica

Solanum incanum

Wild

Brassica oleracea

Solanum melongena

Domesticated

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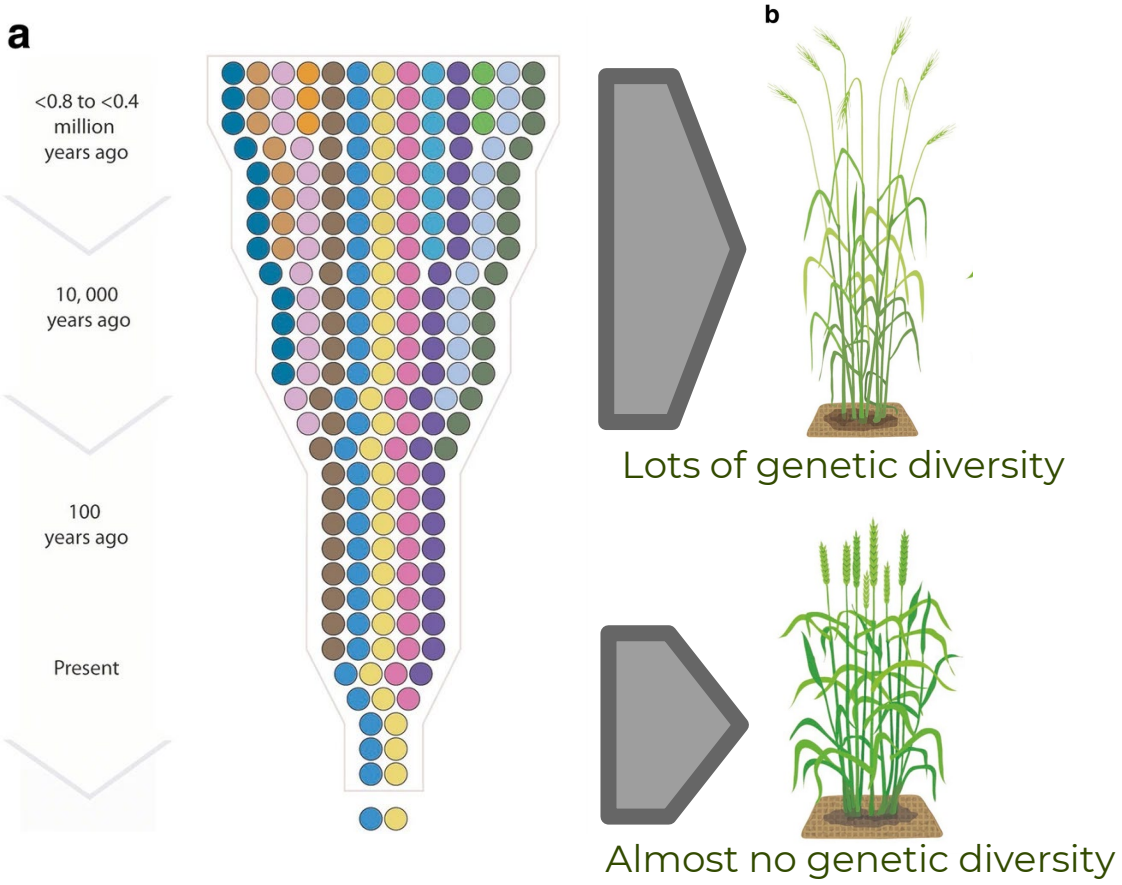

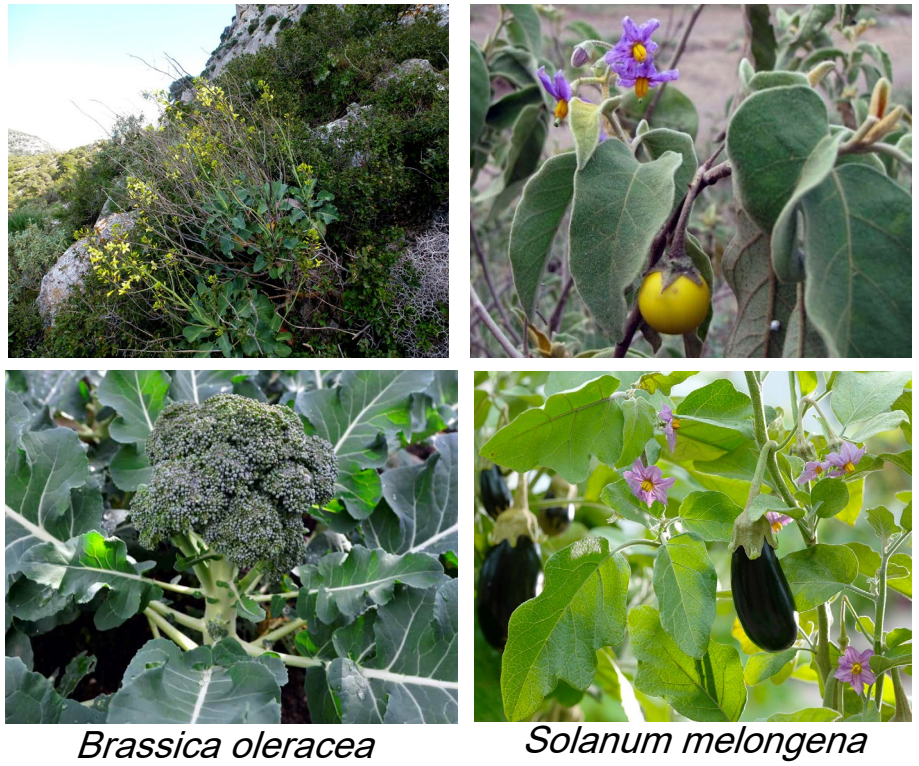

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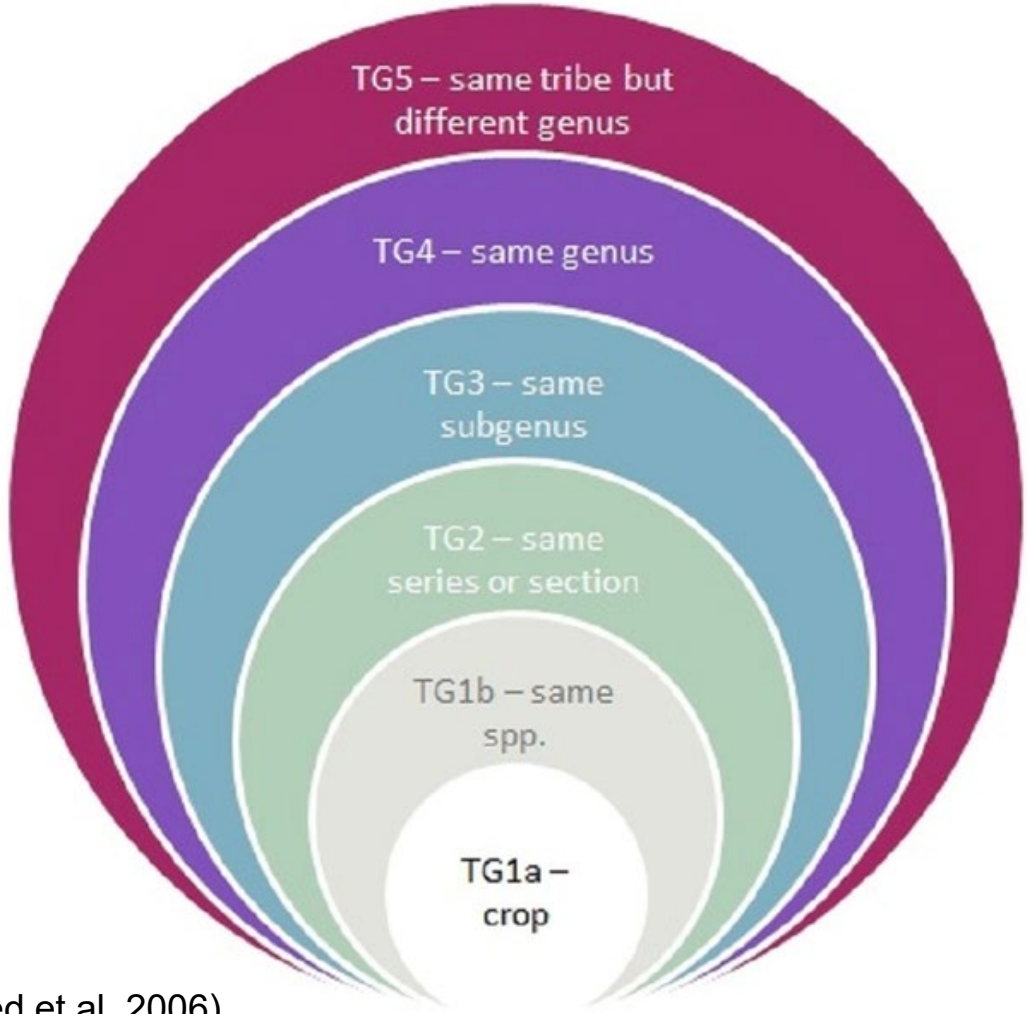

(Maxted et al. 2006)

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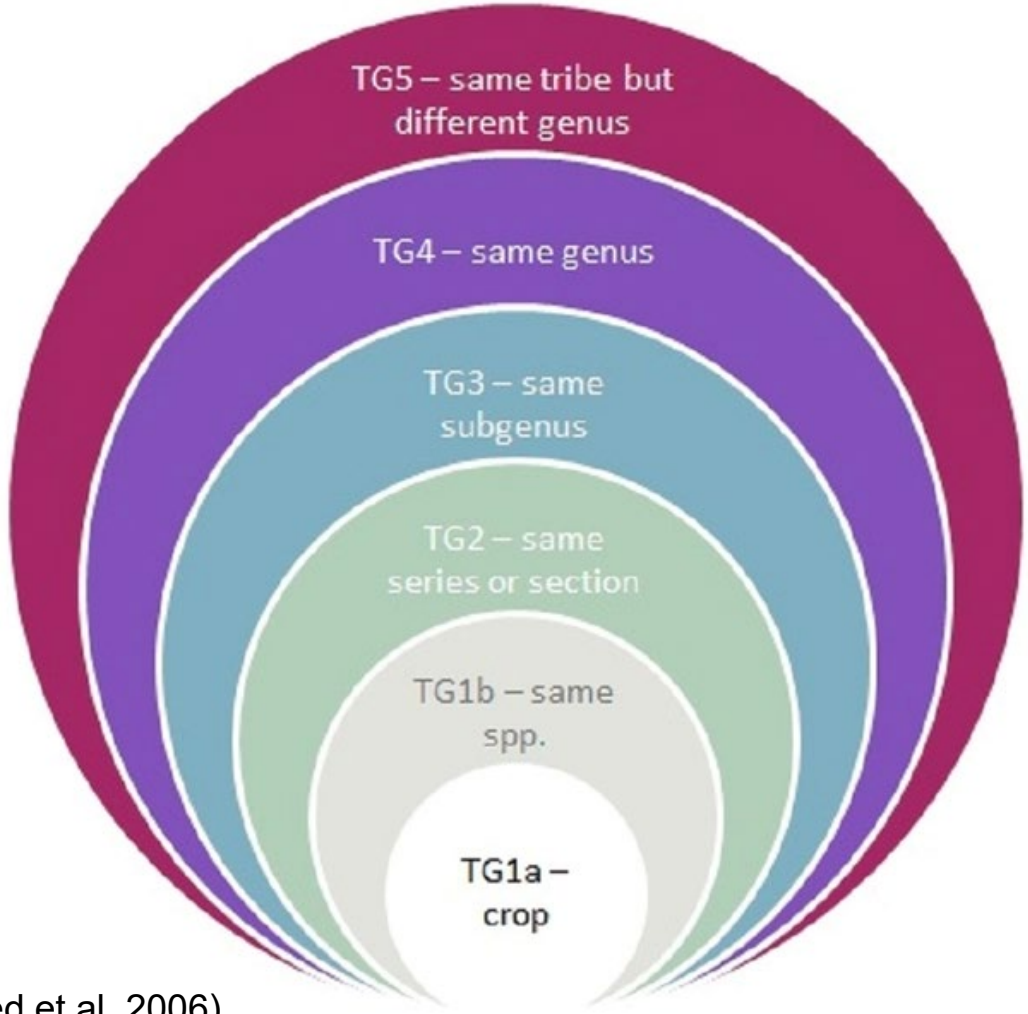
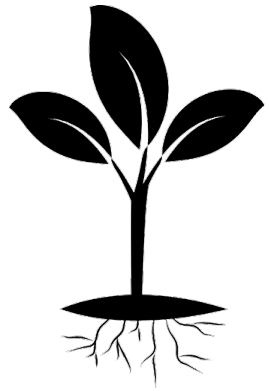


(Maxted et al. 2006)

Research Example - *Food Crop Security: Using Digitized Collections to Identify Sources of Diversity For Future Crop Improvement*

iDigBio API
(+GBIF +BISON)
to get record info for
1000s of specimens
quickly



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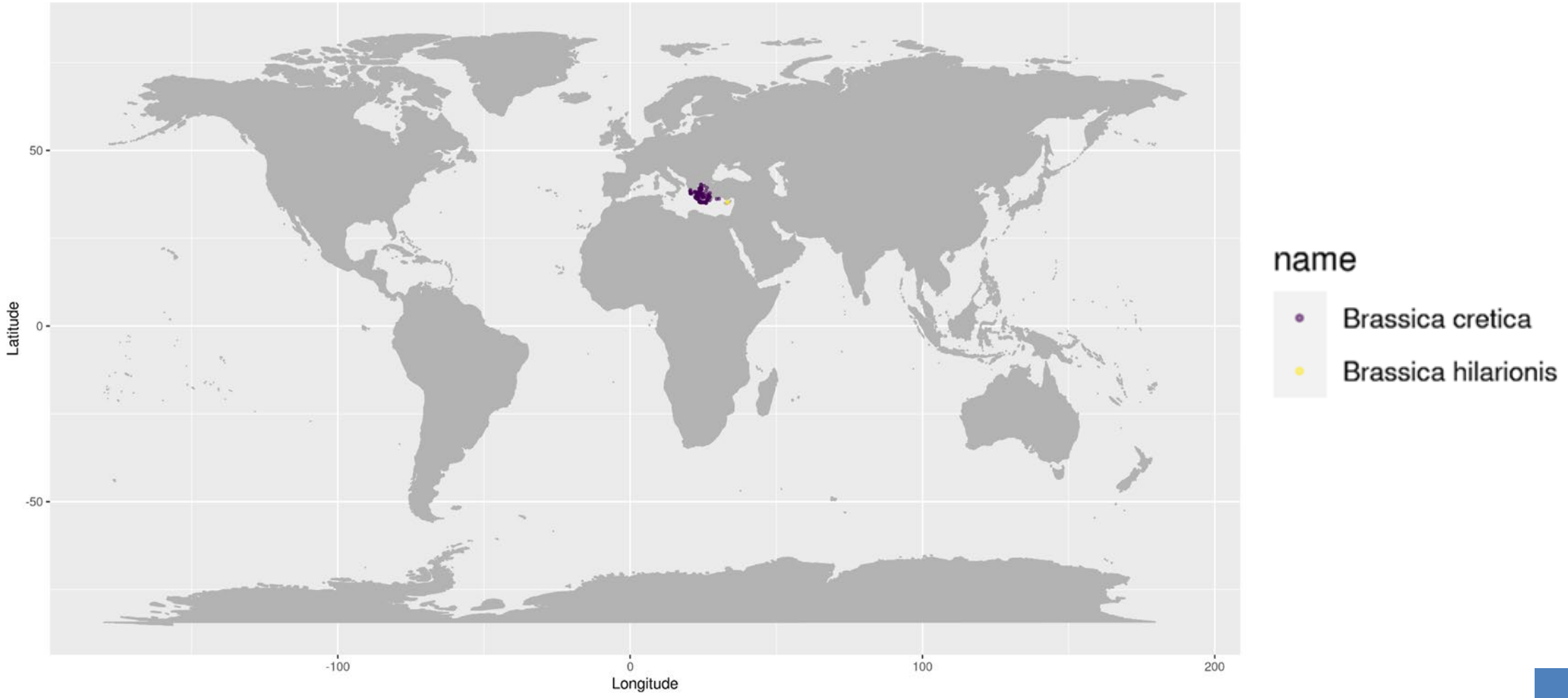

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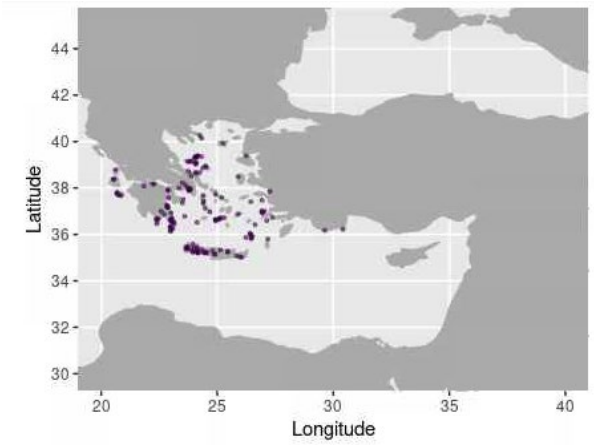

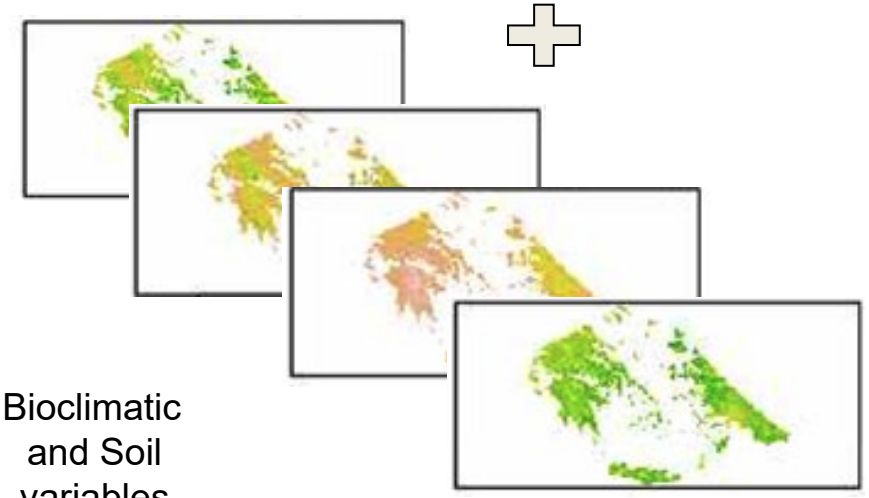

Bioclimatic and Soil variables

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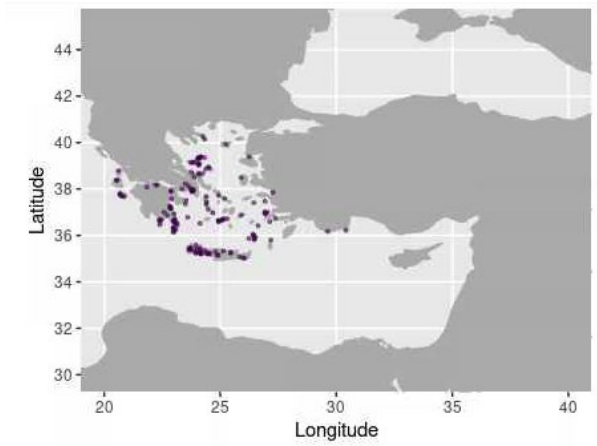

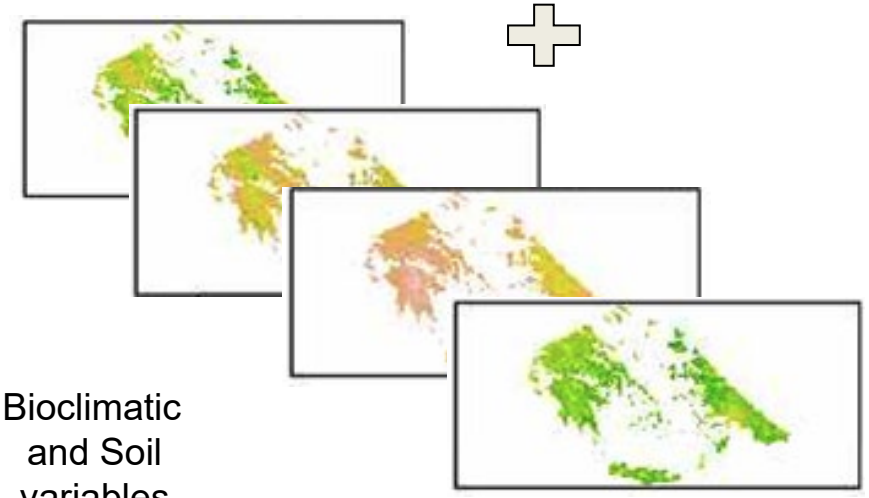

Bioclimatic and Soil variables

Maxent

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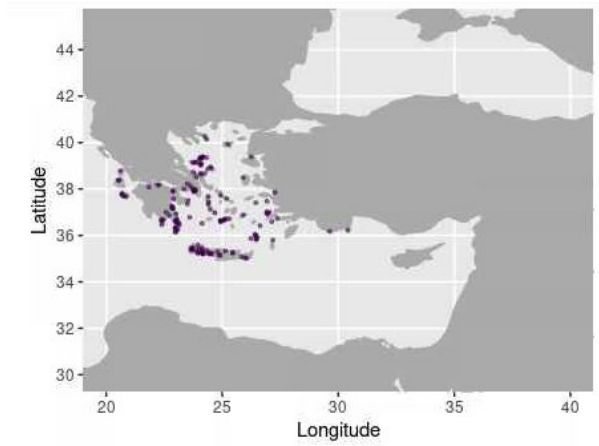
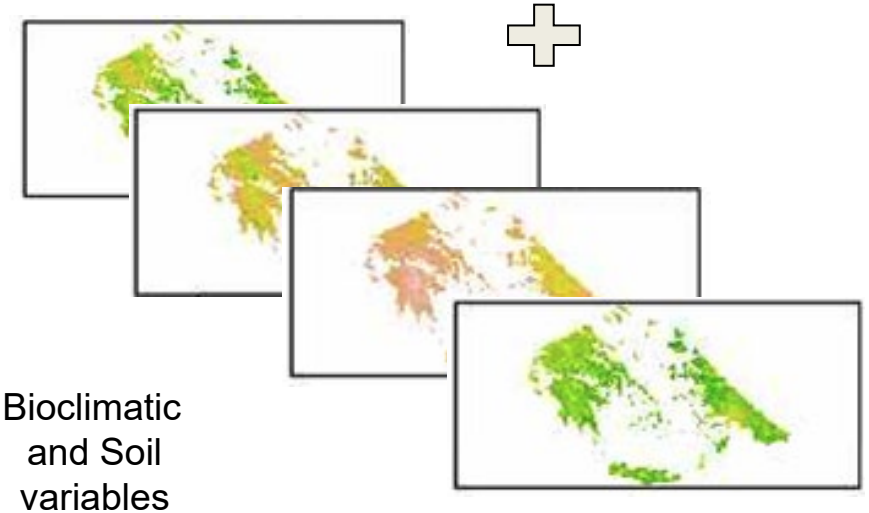
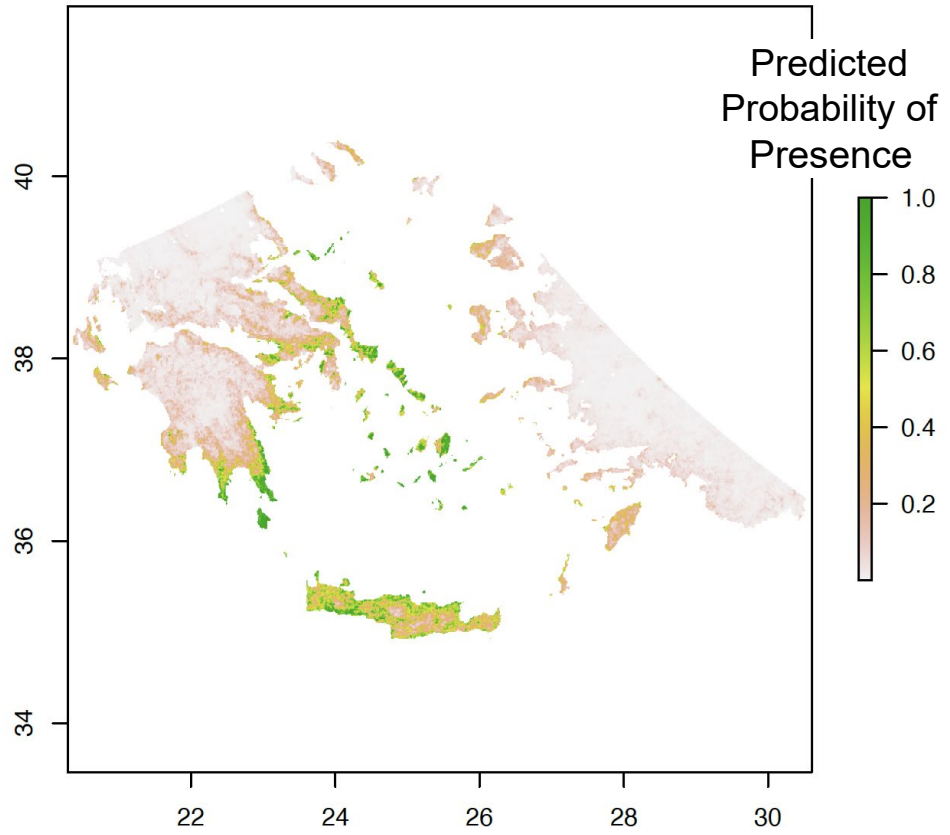




Bioclimatic and Soil variables

Maxent

Species Distribution Model



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BIO2 = Mean Diurnal Range (Mean of monthly (max temp - min temp))

BIO18 = Precipitation of Warmest Quarter

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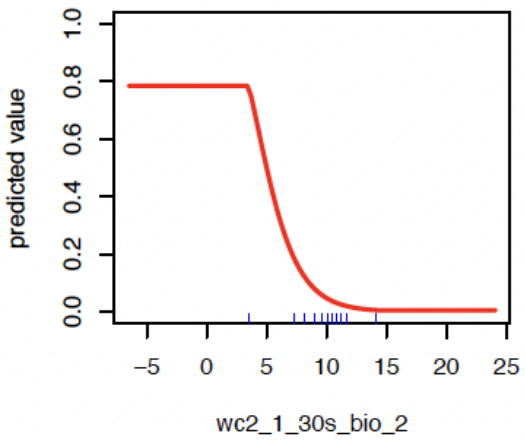

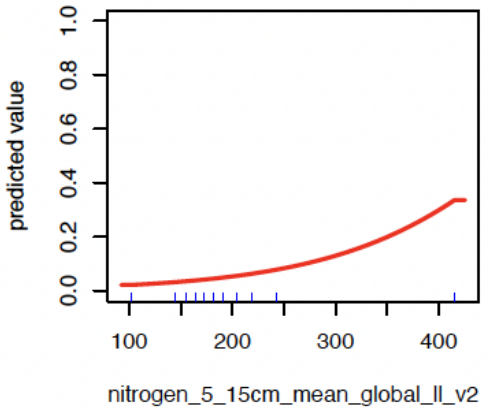

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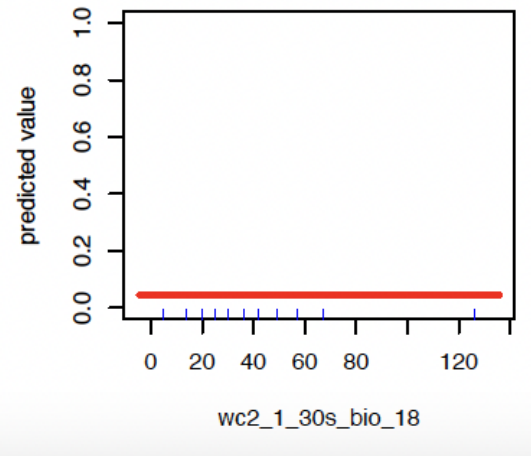

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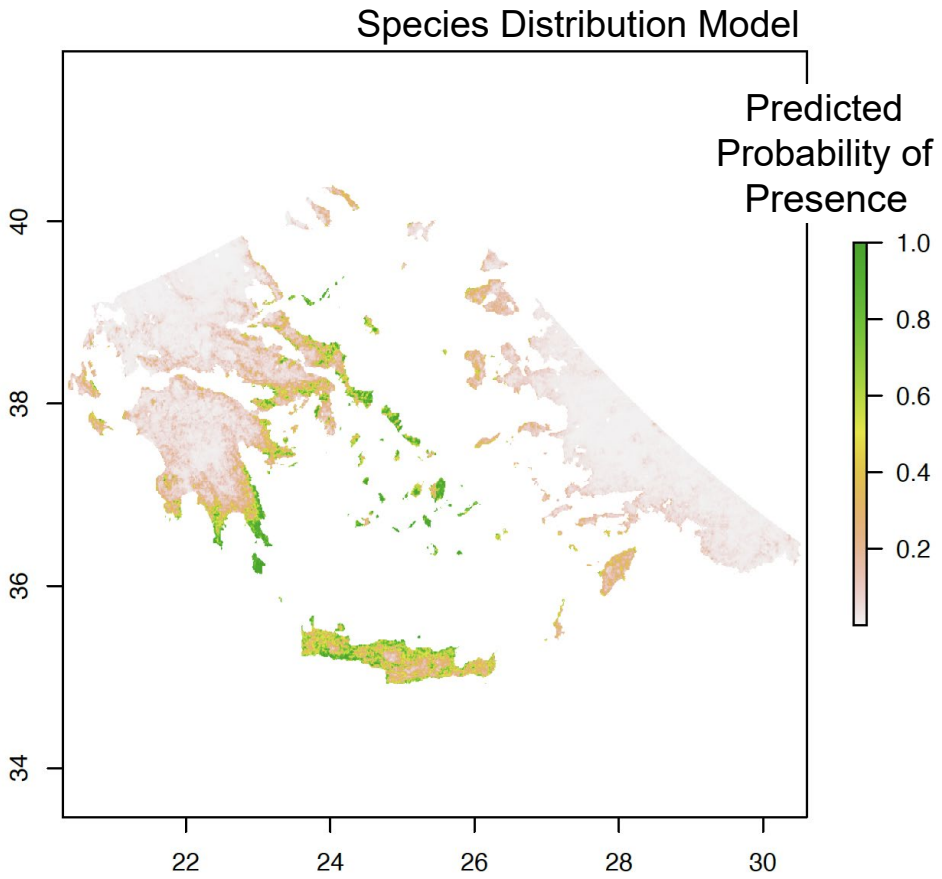

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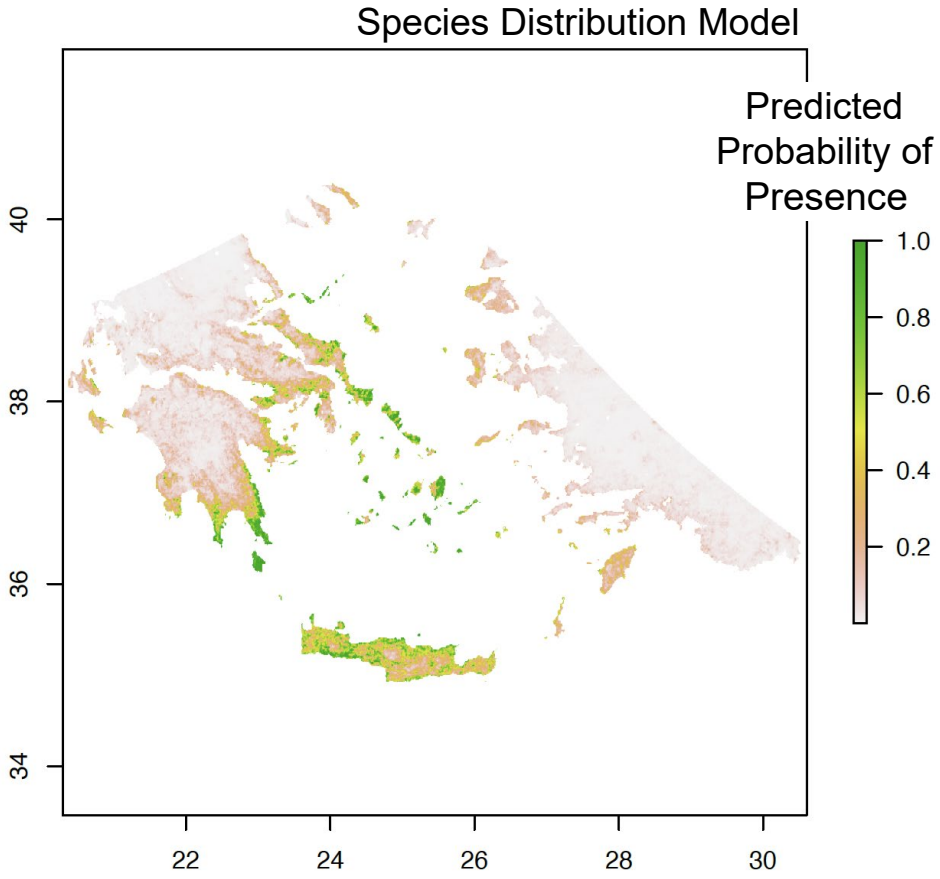

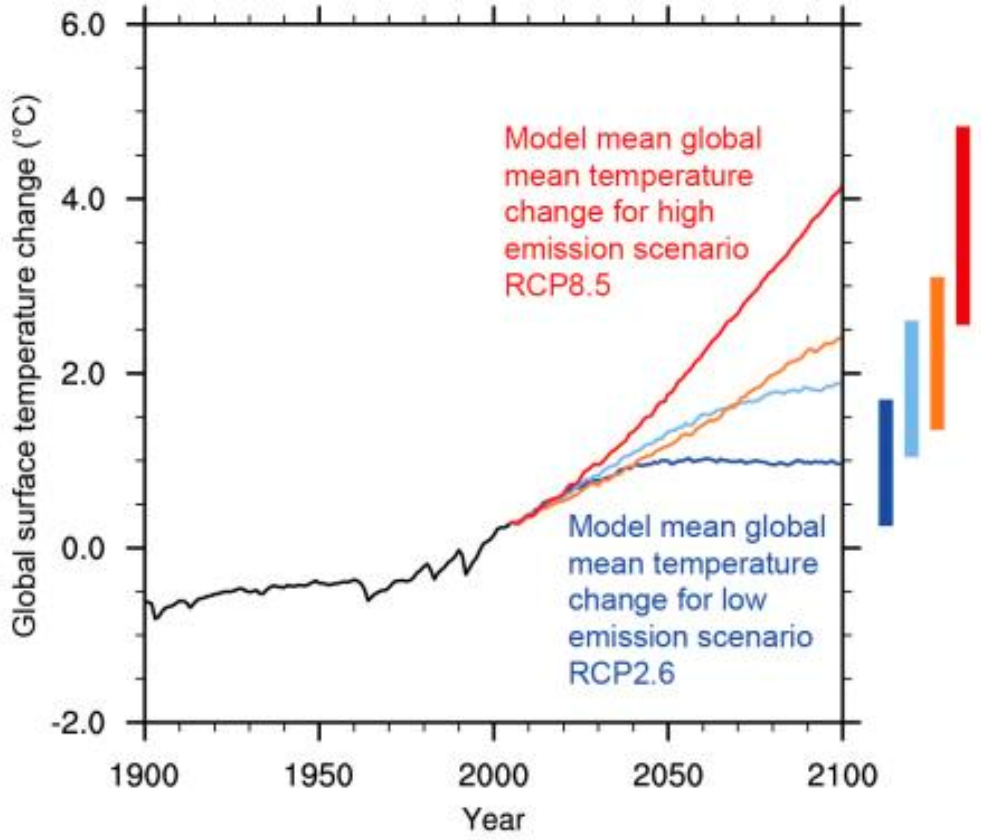

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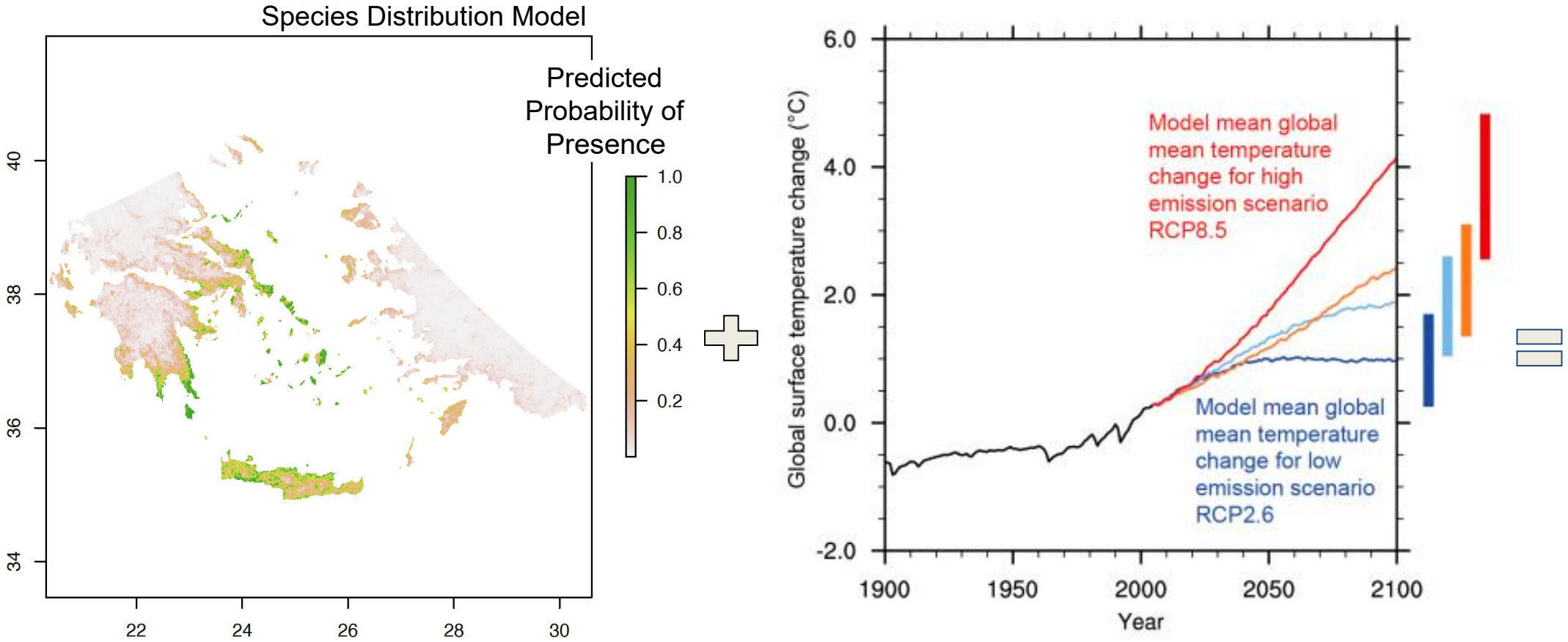

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Download crop herbarium collections

Zea mays

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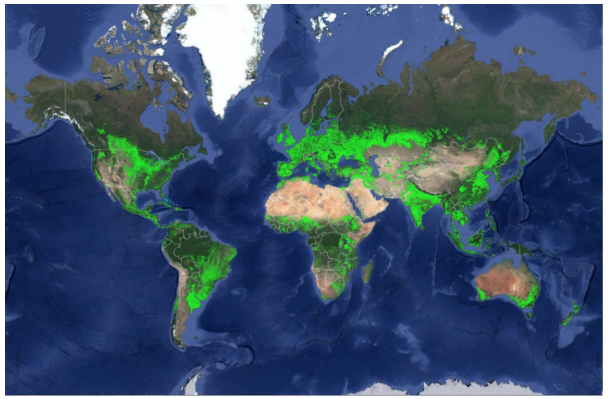
Filter those out on know croplands



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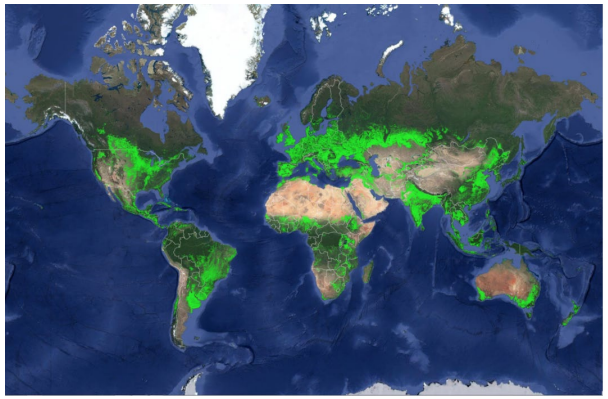
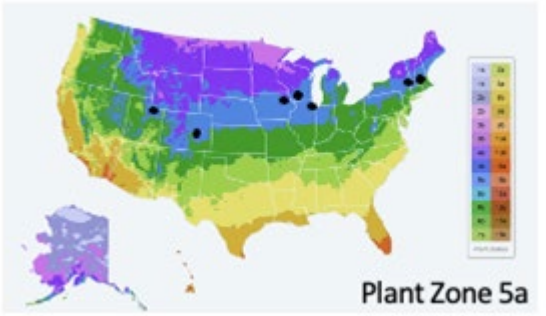


Separate feral populations into plant hardiness zones



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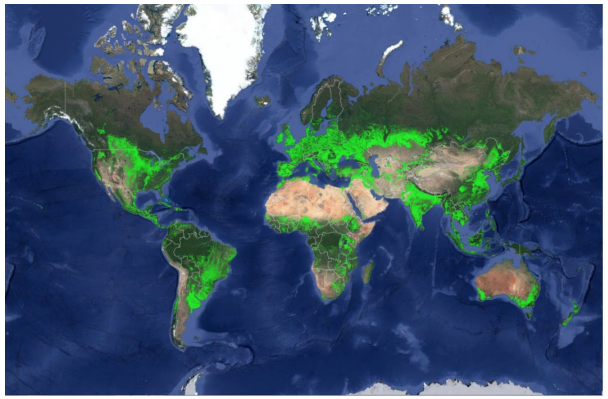

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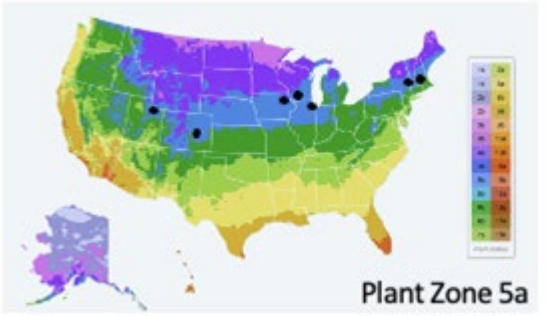

Assess for signals of local adaption

Research Example - *Food Crop Security: Using Digitized Collections to Identify Sources of Diversity For Future Crop Improvement*

1. Uniting Herbaria and Crop Science = better for everyone!

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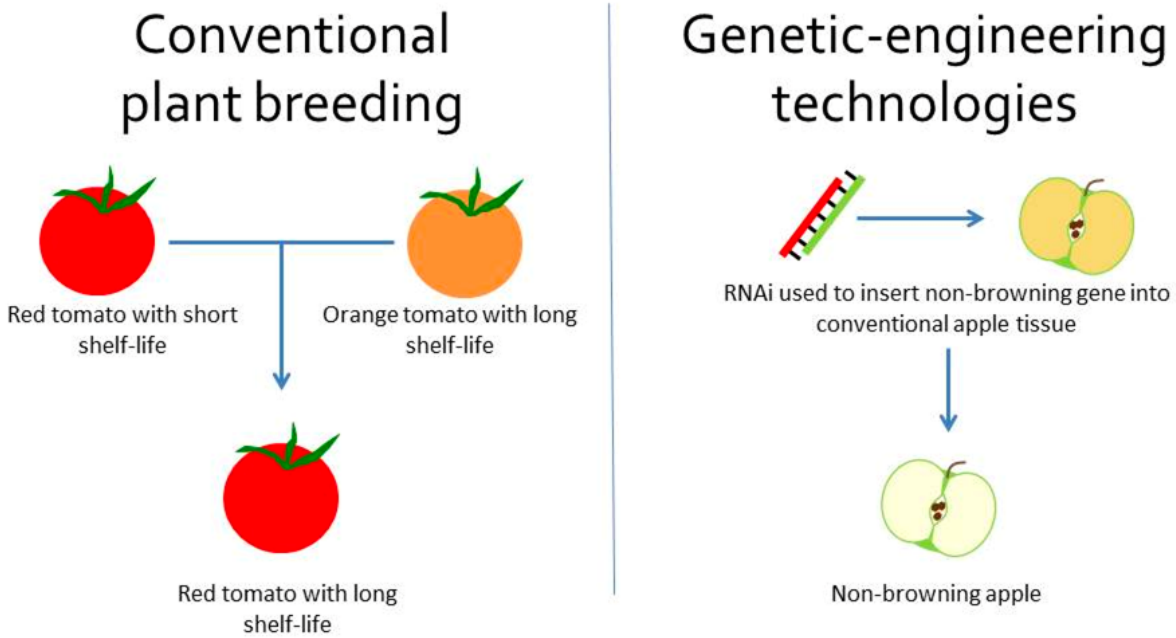
1. Uniting Herbaria and Crop Science = better for everyone!

2. Climate adapted crops



Teaching with the iDigBio Portal

Amphibian Diversity: Species Richness and Precipitation

Author(s): Debra Linton[1], Anna Monfils[1], Molly Phillips[2], Libby Ellwood[3] https://qubeshub.org/publications/1101/1

1. Central Michigan University 2. iDigBio, Florida Museum of Natural History, University of Florida 3. iDigBio

Watch resource

Share:

Summary:
This activity will explore how natural history specimen data can be used to investigate the relationship between precipitation levels in a region and species diversity of amphibians.

Version **1.0** - published on 19 Mar 2019 doi:10.25334/Q4P15S - cite this

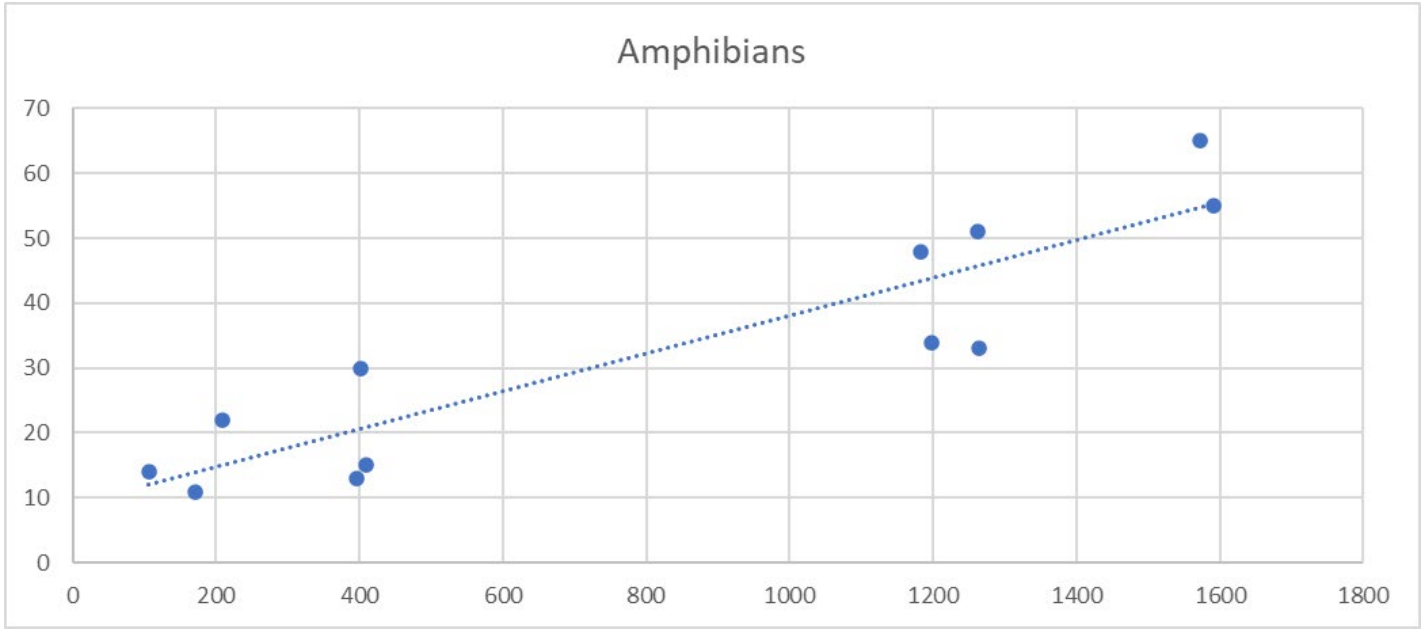
Tags

Audience Level | Undergraduate | Instructional Setting | Lab | Activity Length | Less than 1 hour | data in the classroom | Biodiversity | trade-offs | natural history collection | Amphibans and Reptiles

Brought to you by Biodiversity Literacy in Undergraduate Education

Amphibian Diversity: Species Richness and Precipitation

- Learning Objectives
  - download, clean and analyze data from digitized natural history collections
- Introduction
  - osmoregulation & amphibians
  - biodiversity data
- Simple Portal search instructions
  - using lat/long and circle feature
  - adding filters and searching by class
- Cleaning data using Excel
  - removing duplicates
  - standardizing scientific names
- Analyzing data
  - scatter plot with trendline
- Interpreting the data



Teaching with the API

Introduction to R with Biodiversity Data

Author(s): **Shelly Gaynor**

University of Florida

https://qubeshub.org/publications/2199/1

Watch resource

Share:

Summary:
Students will learn R basics while downloading biodiversity data from multiple data repositories. This module will walk students through installing R, navigating R,writing reproducible scripts in R, and using R to download biodiversity data.

Version **1.0** - published on 16 Dec 2020 doi:10.25334/84FC-TE88 - **cite this**

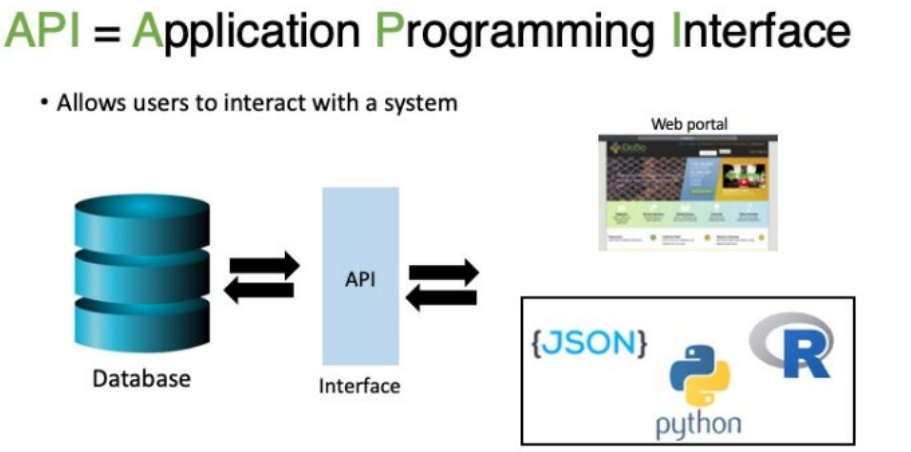
Tags

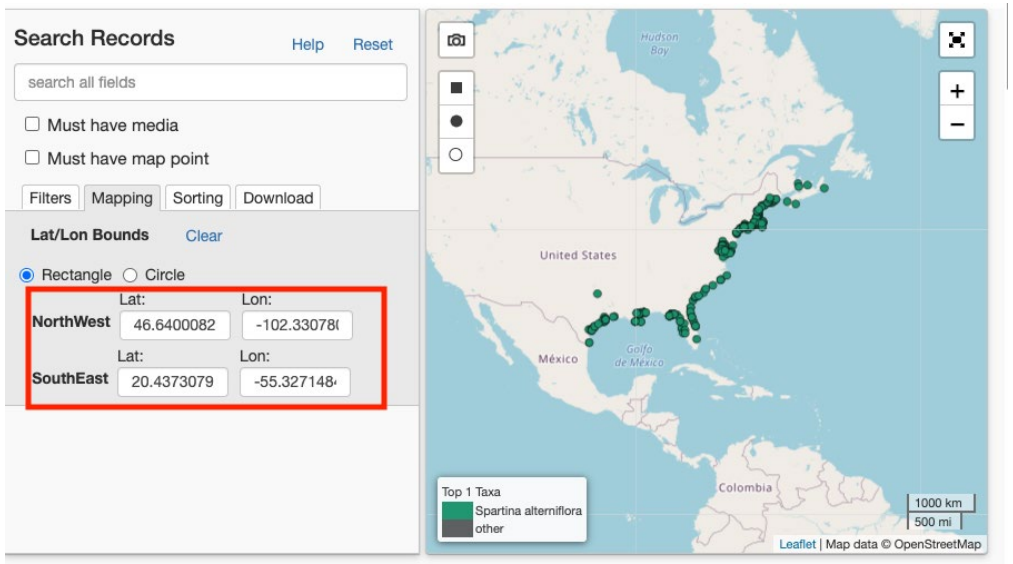
Audience Level: Undergraduate, Introductory
Instructional Setting: Homework
Instructional Setting: Lecture
Instructional Setting: Online course
Activity Length: More than 1 hour

Brought to you by
Biodiversity Literacy in Undergraduate Education

Introduction to R with Biodiversity Data

- General Info
  - learning objectives
  - Why R?
- Setup
  - Installing R and R Studio
  - Introduction to R Studio
- Pre-Activity
  - R scripts
  - Terms
  - Running code
  - Troubleshooting
  - Reproducibility
- Class Activity
  - Background info
  - Downloading data
  - Limiting the extent
- Assessment



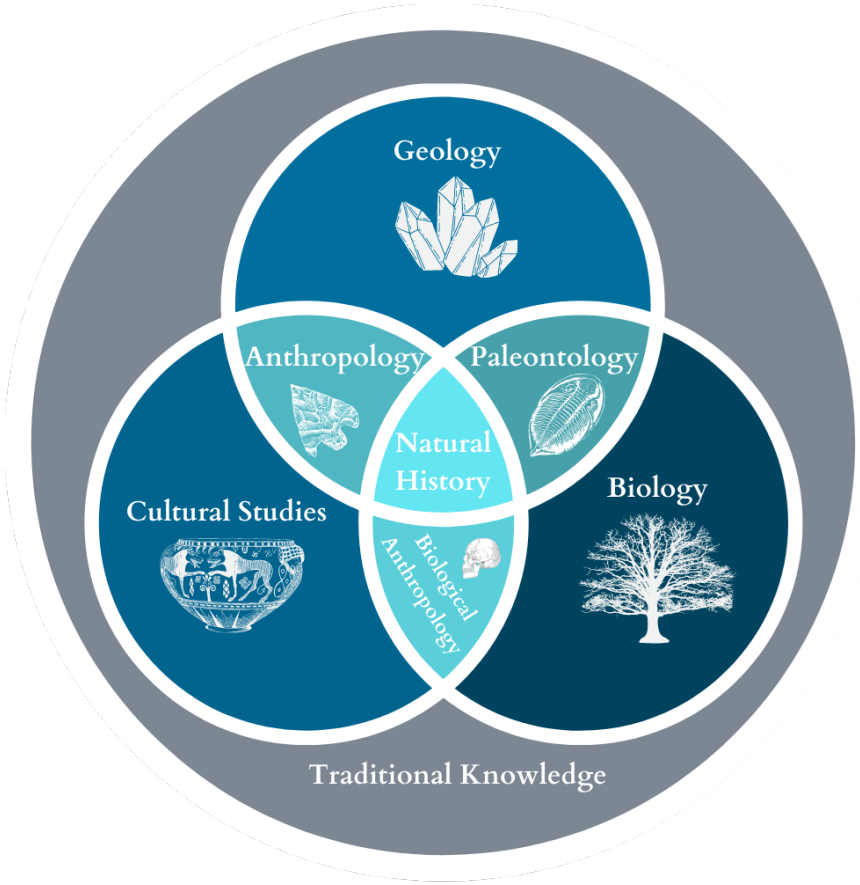


http://mlgaynor.com/BLUE-Intro2RwithBiodiversityData/_book/general-information.html

More Teaching Resources

Natural History Education Portal
https://qubeshub.org/community/groups/collections

Using iDigBio in the Classroom
https://www.idigbio.org/content/using-idigbio-classroom



Questions

Survey: https://ufl.qualtrics.com/jfe/form/SV_8dj1FtMT6Sp45T0

www.idigbio.org

facebook.com/iDigBio

twitter.com/iDigBio

vimeo.com/idigbio

idigbio.org/rss-feed.xml

webcal://www.idigbio.org/events-calendar/export.ics

iDigBio is funded by grants from the National Science Foundation [DBI-1115210 (2011-2018), DBI-1547229 (2016-2022), & DBI-2027654 (2021-2026)]. Any opinions, findings, and conclusions or recommendations expressed in this material are those of the author(s) and do not necessarily reflect the views of the National Science Foundation.