GCP Crop Ontology

www.cropontology.org

An online platform enabling participatory development, curation and annotation of crop trait information.

Why?

The Initial Problem

The volume of agriculture-related information and terminology related to phenotype, breeding, germplasm, pedigree, traits, among others, is increasing exponentially.

In order to facilitate access to the data held within and/or across the databases, GCP initiated the development of a Crop Ontology, a tool to facilitate powerful manipulations of the data through ontology-driven approaches.
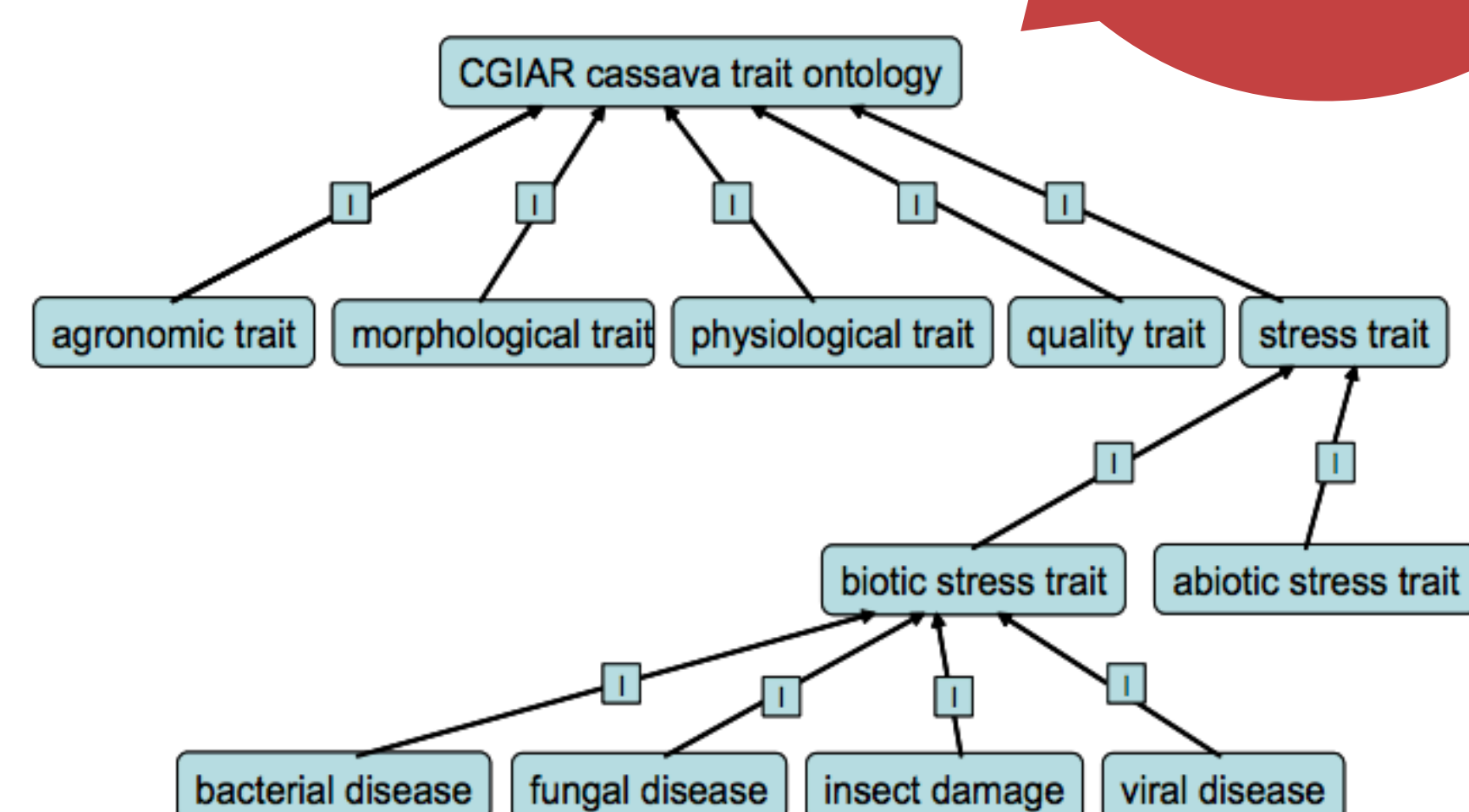
Ontology

What are the benefits of an ontology?

List of terms

- bacterial disease
- fungal disease
- insect damage
- viral disease

VS

Ontology

CGIAR cassava trait ontology

- agronomic trait
- morphological trait
- physiological trait
- quality trait
- stress trait
  - biotic stress trait
    - bacterial disease
    - fungal disease
    - insect damage
    - viral disease
  - abiotic stress trait

Agriculture-related terms aren't merely words. They're information about things in the real world, and understanding the relationships between real-world concepts can help us gather more relevant information.
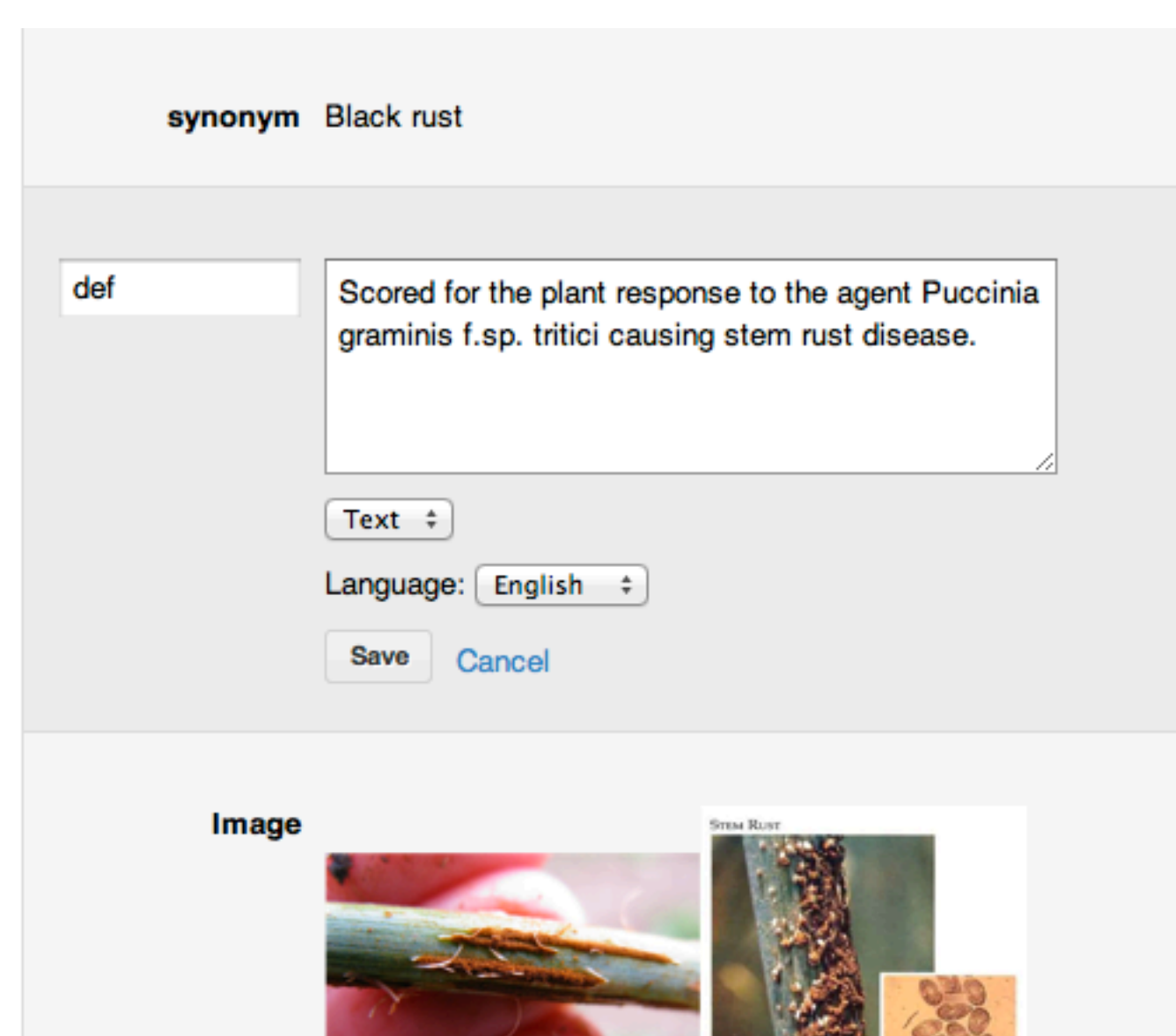
- Ontologies help make explicit the scope, definition, and language and meaning (semantics) of a given domain or world view.
- Ontologies may provide the power to generalize about their domains.
- Ontologies, if hierarchically structured in part (and not all are), can provide the power of inheritance.
- Ontologies provide guidance for how to correctly "place" information in relation to other information in that domain.
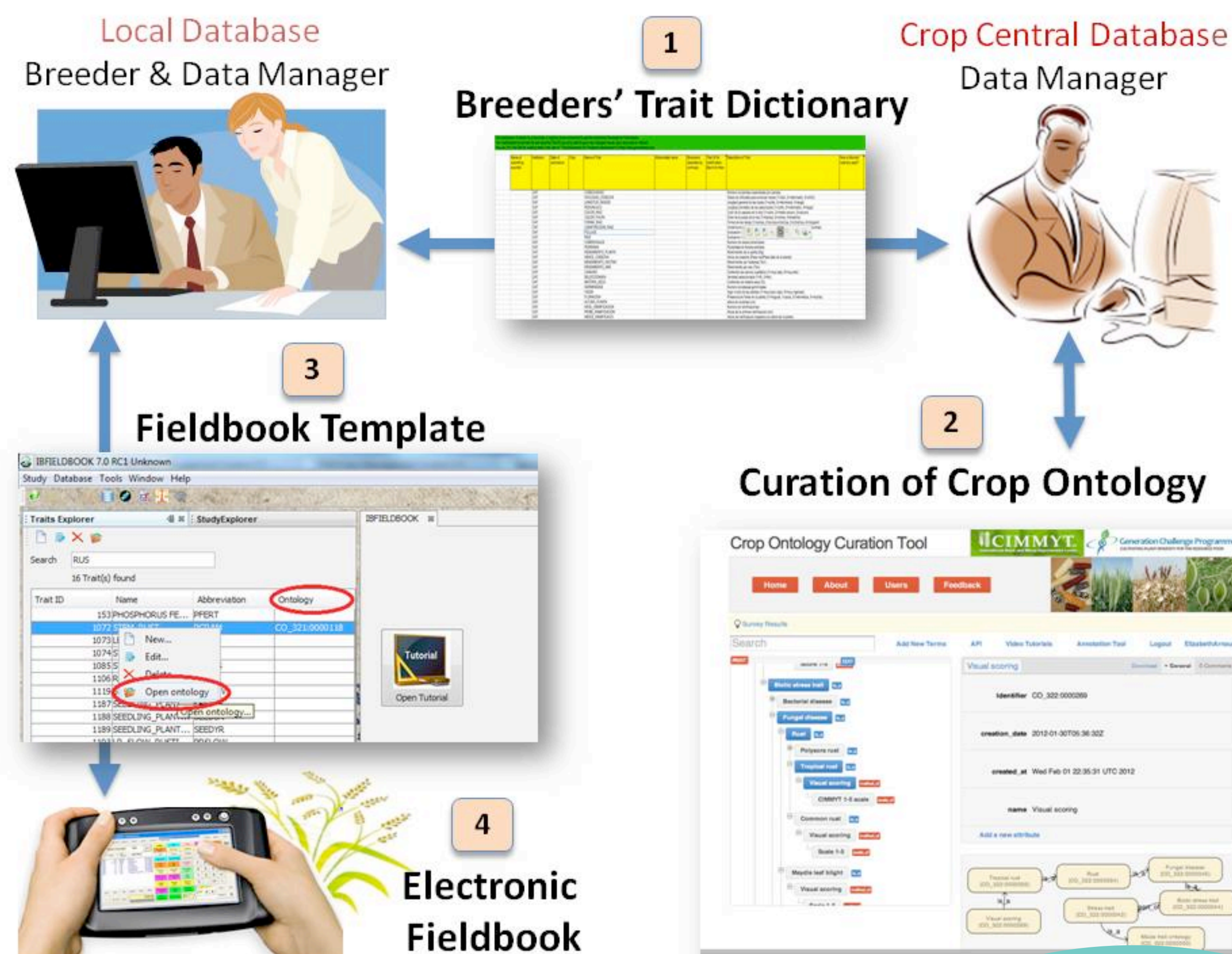- Ontologies may provide the basis to reason or infer over its domain.

Collaboration

How do we allow for easier collaboration?

Through a user-friendly website we allow people from anywhere in the world to access and collaborate on the ontology.

The system works similarly to Wikipedia. It allows anyone to sign up and create their ontologies. However, only after a moderator has validated their terms do they then become "public".

synonym Black rust

def Scored for the plant response to the agent Puccinia graminis f.sp. tritici causing stem rust disease.

Text
Language: English
Save Cancel

Image

Local Database
Breeder & Data Manager

1 Breeders' Trait Dictionary

Crop Central Database
Data Manager

3 Fieldbook Template

2 Curation of Crop Ontology

4 Electronic Fieldbook

Observations

Websites are highly accessible

Thanks to web standards such as HTML5 and CSS3, we can build highly interactive and easy to use interfaces. This allows users to more easily create and edit ontologies from any computer or mobile device.

Ontologies build connections

rice — trait — plant height — measurement — cm
cassava — trait

Ontologies allow us to build connections between terms and find information that we couldn't otherwise.

APIs increase productivity

By building a platform with a programmable interface (API) we enable others to extend the functionality of our application in ways we didn't think of, or didn't have resources for. This results in a stronger community with a more transparent access to data.

Map | Chart
API
Crop Ontology

What we built

- The GCP Crop Ontology currently provides validated names, definitions and relations for traits for eight crops: **cassava**, **chickpea**, **groundnut**, **maize**, **musa**, **potato**, **rice**, **sorghum** and wheat. Trait lists are being developed for **common beans** and **cowpea**.

- To improve the informative role of this new Crop Ontology site for crop breeders and crop biologists, the information related to the crop traits is being progressively completed with methods and scales (units of measurements), as well as images.
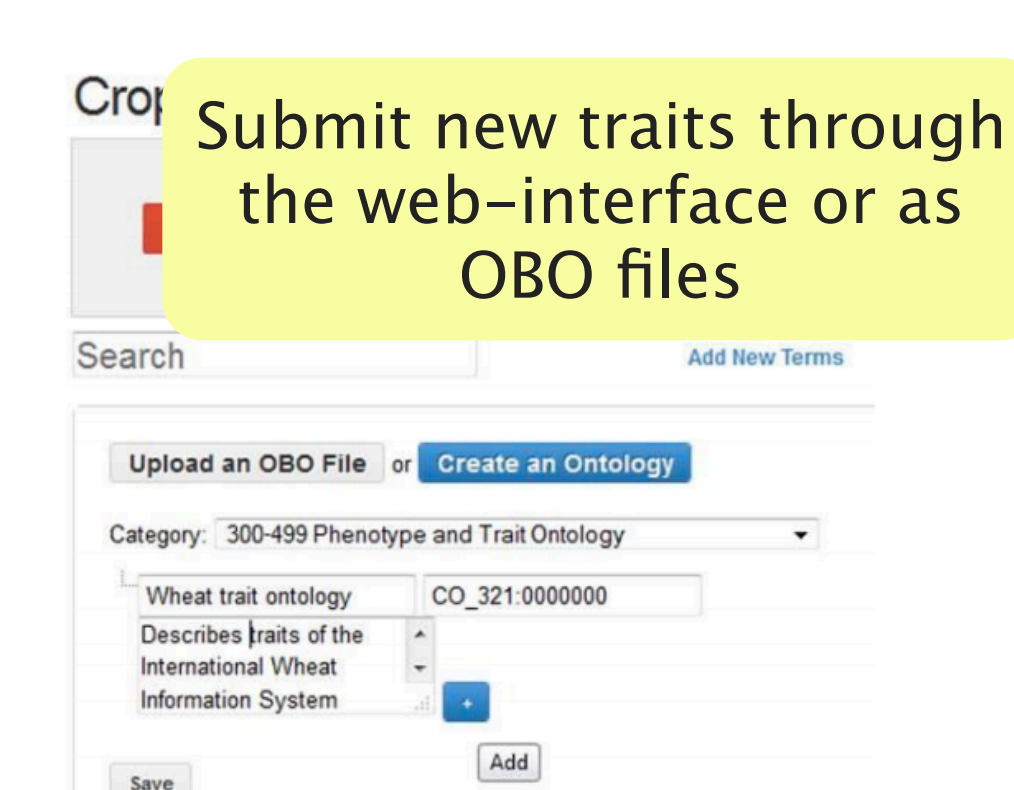
- The Ontology curators are able to upload a full ontology in OBO format, create it online, add attribute information, including photos, and submit or delete terms from the GCP Crop Ontology.

Log in and post comments
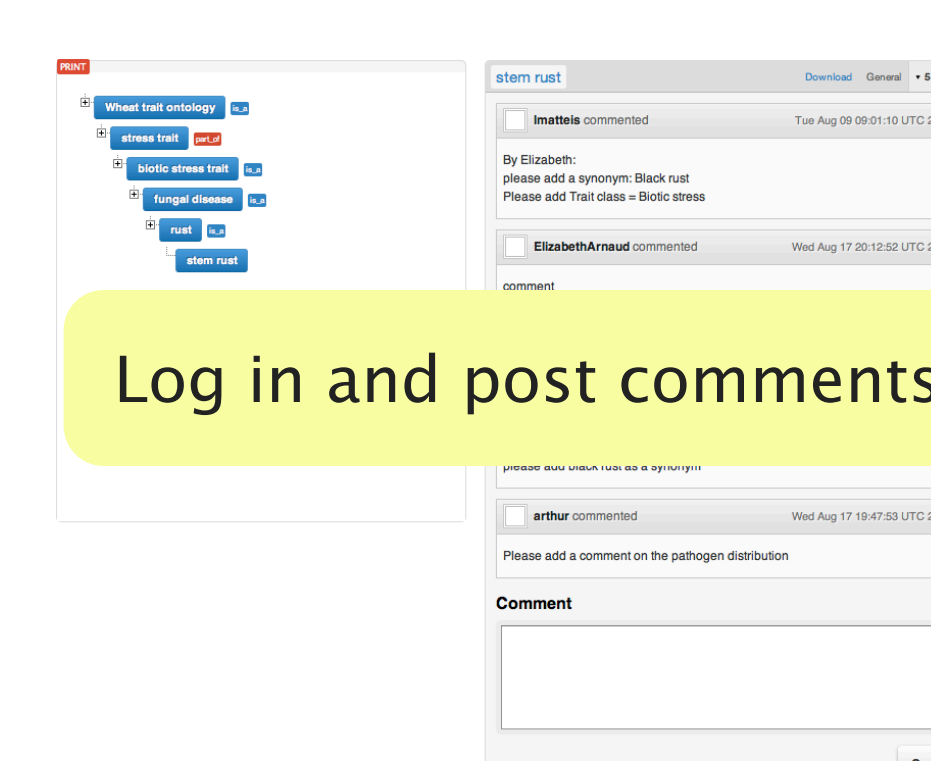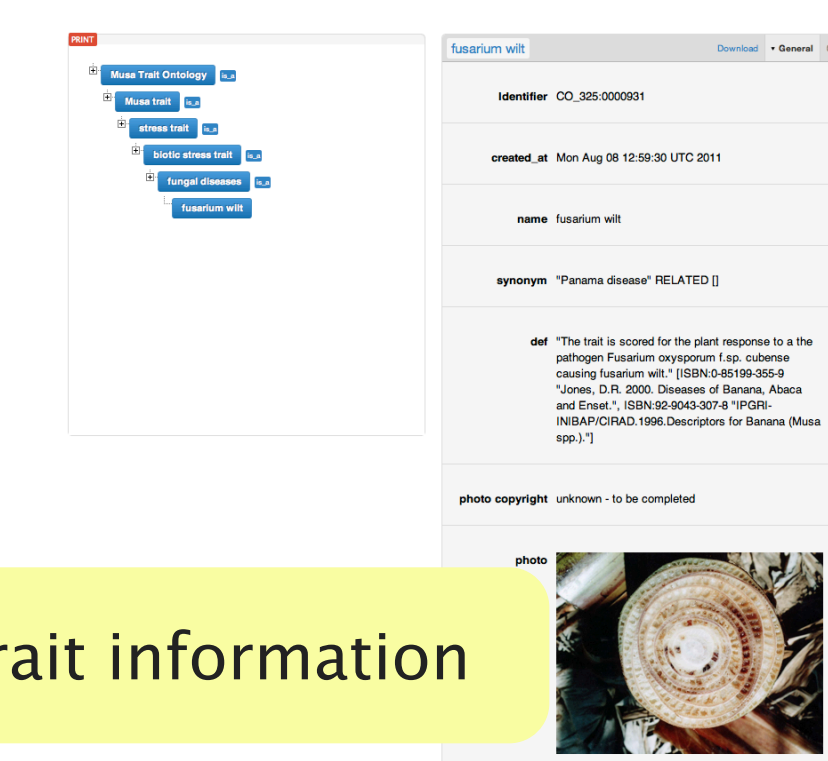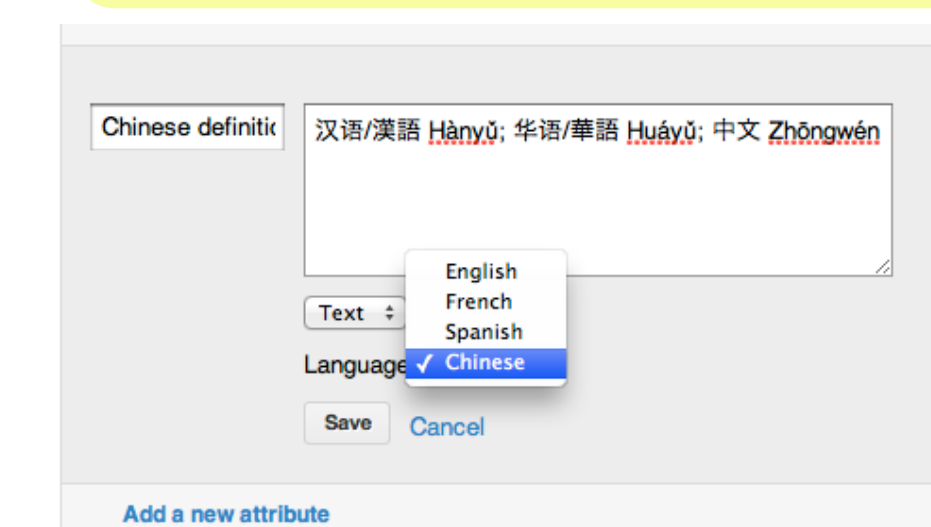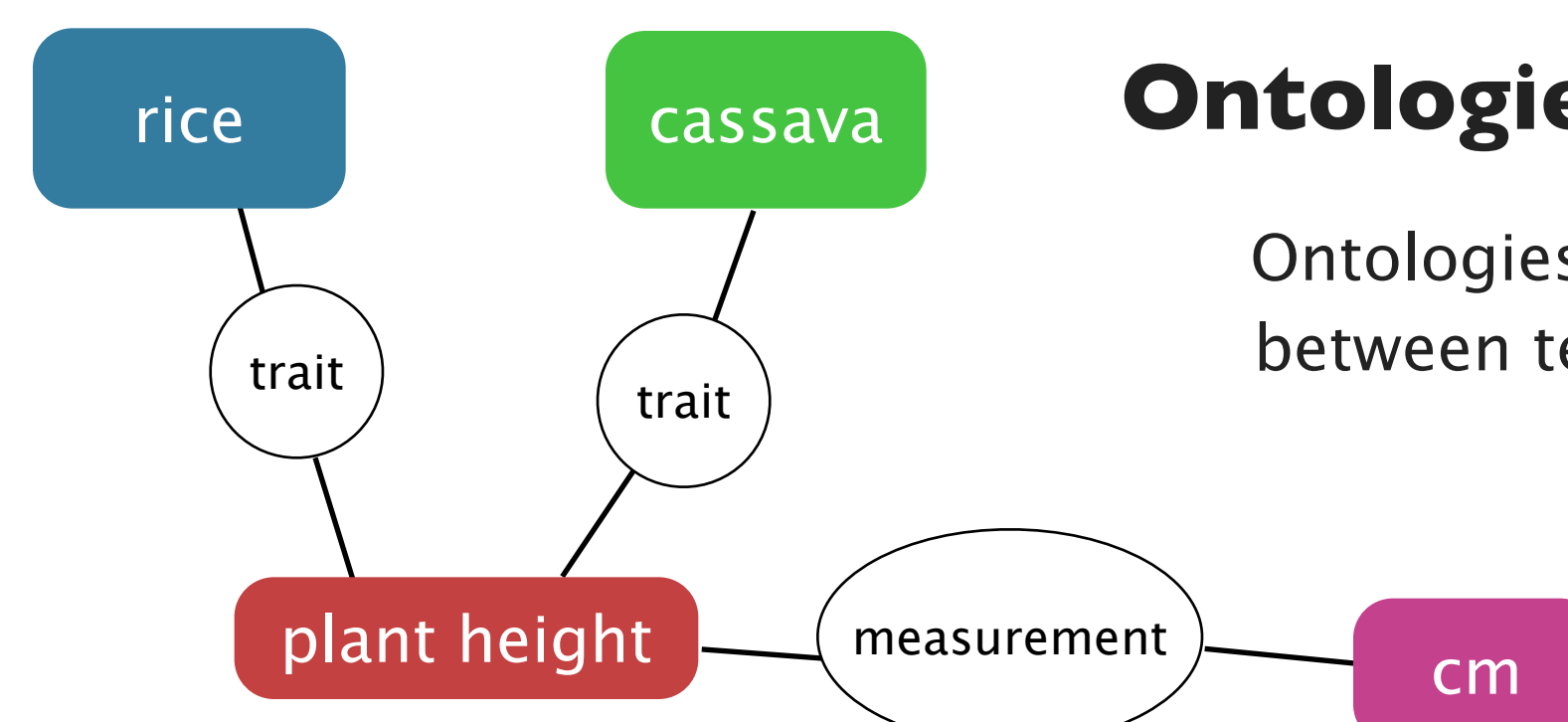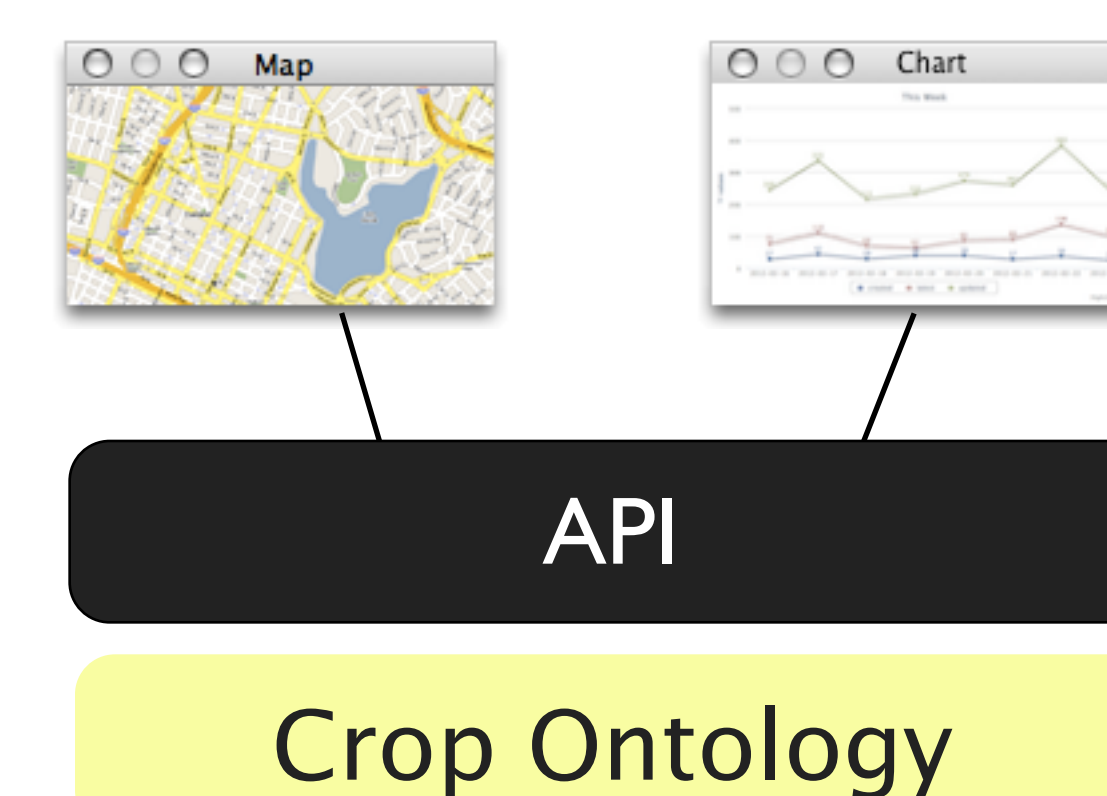
Consult trait information
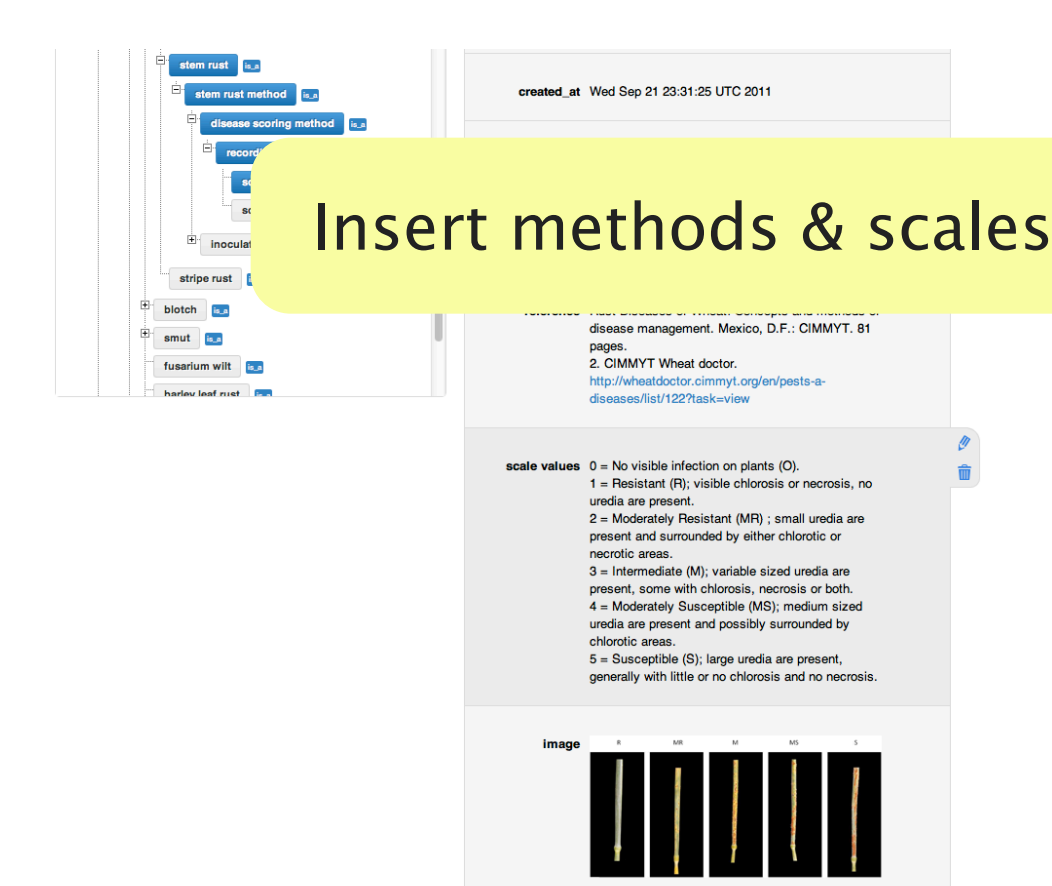
Insert methods & scales

Submit new traits through the web-interface or as OBO files

Annotate your dataset

Provide translations of traits directly from the website

Conclusion

The Semantic Web is all about structuring data so that humans and computers can more easily interpret the Web and discover relevant data for a wide variety of purposes.

Unlike Wikipedia, which is a free form database, Crop Ontology is structured, where concepts and relationships are interlinked into a gigantic network or graph. Another important difference is that Crop Ontology is all about its API. Any information contained inside the database is accessible and can be retrieved via queries.

When it comes to defining the meanings of terms, Crop Ontology is focused on community, with collective editing, attribution, and collaboratively built semantics.

In conclusion we think that all these factors will allow us to build a truly open and accessible platform where people from all over the world can collaborate and benefit from the crop ontology.