Ontology Of Plant Stress (OOPS)

Reminder: **EVERYTHING** subject to change, focus on big picture, not fine details of definitions, or descriptions.

Goal: Automate construction of a plant stress ontology using design patterns.

Plant stress as a process: "a biological process of some plant (PO whole plant, or NCBI viridiplantae) caused by exposure to an environment containing some stressor agent."

Background (Samara)

Jorrit Poelen was hired to write a web-scraping script to gather publicly available data from both GRIN (germplasm annotations) and plant diseases from APS.

These diseases consist of:

-name

-host

-pathogen

Results

Name: scraped name, often odd (subject to change.)

Host: NCBI:foo

Pathogen: NCBI:bar

Converting old PDO terms/diseases

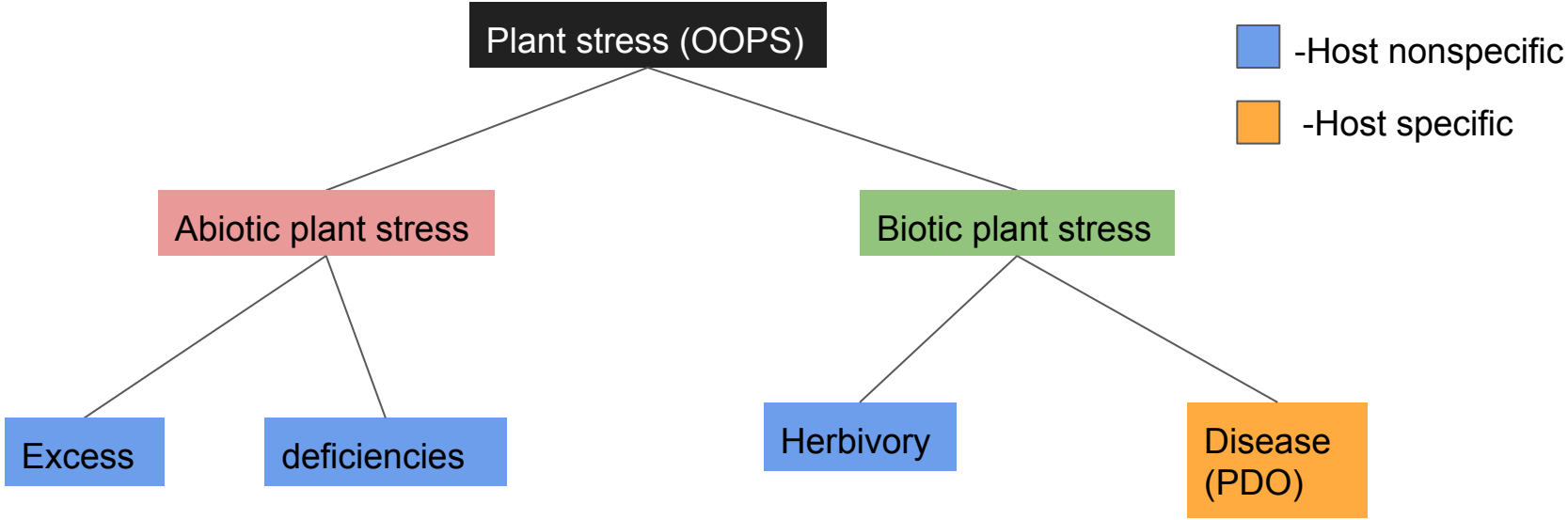
Step 1: Marie uses SPARQL queries, to identify old PDO classes that contain “caused by”, and extracts the host, and pathogen.

Step2: OOPS pattern is applied to these terms

Step 3: Terms not identified using SPARQL query are sent to a tabular file

Step 4: Manually identify host and pathogen (where applicable)

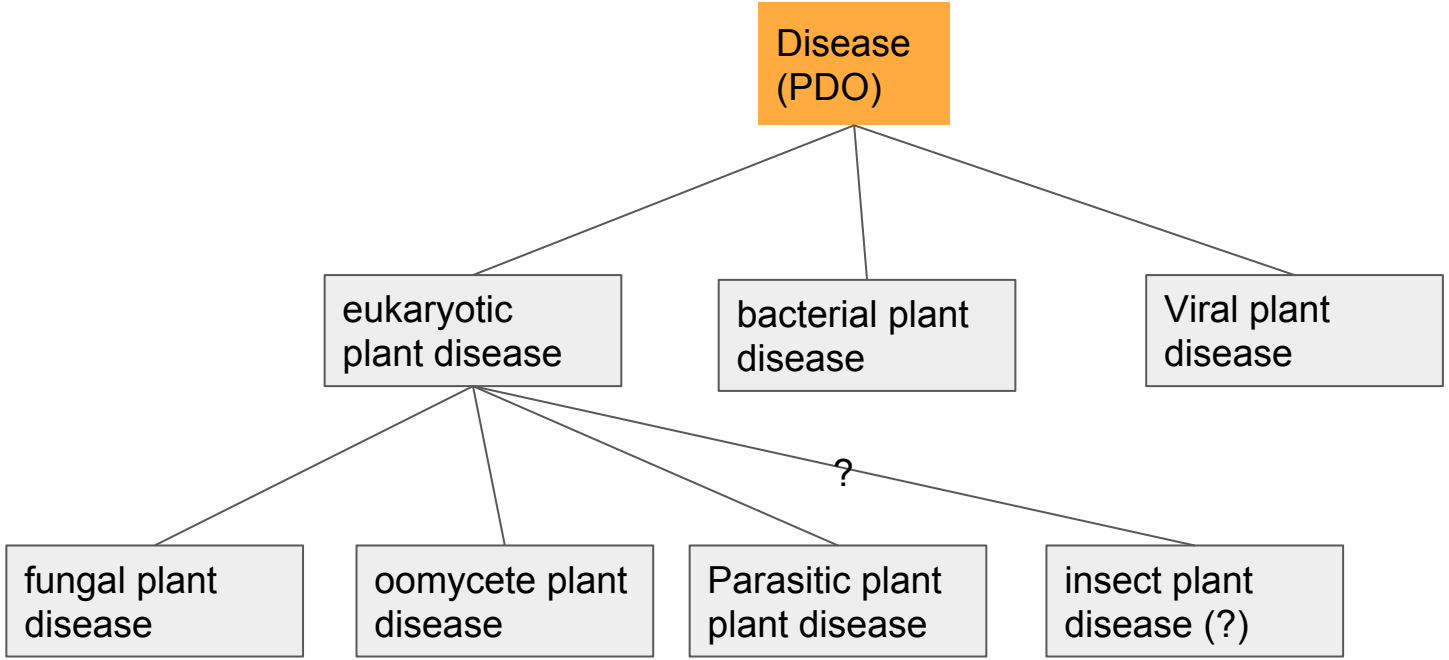
Step 5: Decide what to do with oddball classes (more on this later)



Disease pattern: 'plant disease process' and ('has participant' some host) and 'causally downstream of' some ('exposure event' and 'has exposure stressor' some pathogen)"

Abiotic stress pattern: ‘plant stress’ and ('has participant' some host) and 'causally downstream of' some ('exposure event' and 'has exposure stressor' some ChEBI)"

PDO hierarchy (upper level)



REMEMBER: Nothing here is final. Because this hierarchy is created via automatic script, everything can be adjusted quite readily.

Defining the diseases

Current method:

“A maize fungal disease (PDO:0000012) caused by Dictyochaeta fertilis (PDO:xxx)”

Parent term

Causal agent (was PDO, is now NCBI.)

Pattern_apply method:

“A HOST disease process caused by exposure to a

plant experimental condition containing PATHOGEN”

EO term

Naming the diseases:

Current method:

HOST + CAUSAL AGENT + COMMON NAME + DISEASE TYPE + ‘disease’

Eg: “rice Pythium water-mold fungal disease”

Issue: diseases with the same Host, and causal agent, but different names.

Eg: “Rice pythium root rot fungal disease”

& “rice pythium leaf-spot fungal disease”

Options: These two diseases would be equivilant, so the second name becomes a synonym…

Next steps/potential hurdles

- Ability to add additional environmental factors (disease triangle- environment containing PATHOGEN and environment containing HUMIDITY-X)
- Can we add “symptoms” to processes?
- Diseases caused by multiple species?
  - This can be easily handled by the NCBI hierarchy, but won’t work if a disease is caused by more than one genus. (eg: "A rice fungal disease (PDO:0000081) caused by one or more of Achlya conspicua (PDO:0000104), A. klebsiana (PDO:0000105), Fusarium spp. (PDO:0000076), Pythium spp. (PDO:0000063), P. dissotocum (PDO:0000066), P. spinosum (PDO:0000072).")