Phenome: Interactive Visualizations

Users are presented with three kinds of interactive visualization, in the phenomics section of SCIPDb.

1) Interactive stress matrix:
a) The user will be able to access an interactive stress matrix by clicking on the highlighted tab as shown below.

b) The user can choose between the stress combination categories by clicking on any of the 3 tabs which is highlighted below, namely Abiotic-Abiotic, Biotic-Biotic or Abiotic-Biotic.

c) Once the user chooses any of the three stress combinations categories (here Abiotic-Abiotic) corresponding interactive stress matrix will be displayed.

d) The size of each box is directly proportional to the number of studies reported for that particular stress combination.

e) On cursor hover over each box, other information's like corresponding name of stress combination, plant, outcome (whether positive or negative) and total no. of studies are presented.

f) Colour of each of the boxes in the stress matrix depicts whether the particular stress combination is detrimental to the plant or not (net impact, green: positive, red: negative and blue: when no inference was ascertained).
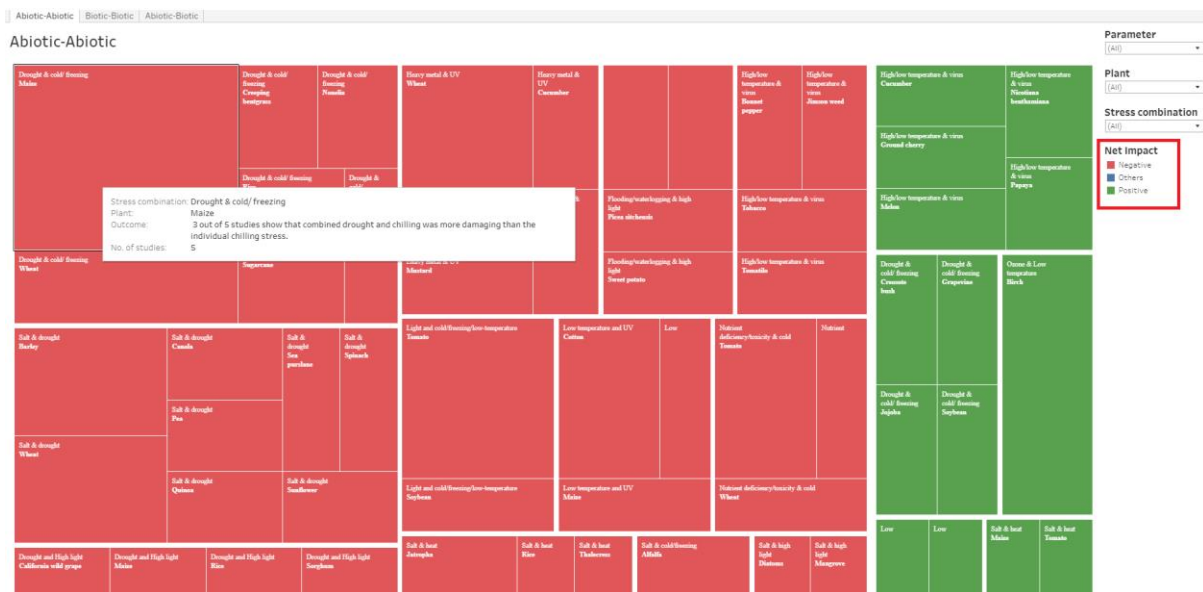
g) The interactive stress matrix can be filtered based on parameter, plant and also by selection of stress combination.

h) Based on the filter criteria, stress matrix pertaining to that specific selection criteria will be displayed.

i) The parameter selection can be done from the drop down shown in the highlighted section below.

j) The user can select the plant of their interest as shown below.

k) Finally, the user can select the stress combination in which they are interested, as depicted below.

2) Interactive radial tree diagram:

User can see the net impact of the combined stress by clicking the highlighted portion "View net impact (Based on stress combination)"

a) After clicking above highlighted tab, the user will be redirected to a page containing an interactive radial tree.

b) The radial tree visualization is presented as a three level, hierarchical depiction.

1. The first level (starting from inside, the node of tree), depicts the stress combinations.

2. Plant species whose study are available for respective stress combinations are depicted at level 2 of the radial tree.

3.   Level 3, shown in the form of stacked bar diagram, illustrates the percent reduction of specific parameters (here biomass), between the two individual and combined stress.

Percent reduction of biomass under individual and combined stresses

Filter:
All ▾

Stress Combination: Drought & heat
Plant: Chickpea
Treatment: Drought + heat
Percent reduction in biomass over control: 70.19
Parameter: Shoot weight

c) The tree has been colour coded based on stress combinations.

d) Each of the bar diagram is interactive and on hover other details are presented (highlighted below).

Percent reduction of biomass under individual and combined stresses

Filter:
All

Stress Combination: Drought & heat
Plant: Chickpea
Treatment: Drought + heat
Percent reduction in biomass over control: 70.19
Parameter: Shoot weight

e) If the user wants to visualize just a particular stress combination tree, on clicking the corresponding node data pertaining to that selection is only presented in the form of radial tree. For example, For Drought and Heat stress combination selection of corresponding node, is highlighted below.

Click Here

f) After clicking on the "Drought & Heat" node corresponding subtree will be generated like the one shown below.

g) The tree then will be again branched for different plant species in which the corresponding studies have been done.

h) In the depiction shown below, for "Drought & Heat", studies were available for Wheat, Chickpea, Barley and Thale cress, hence four sub nodes are shown in the visualizations.
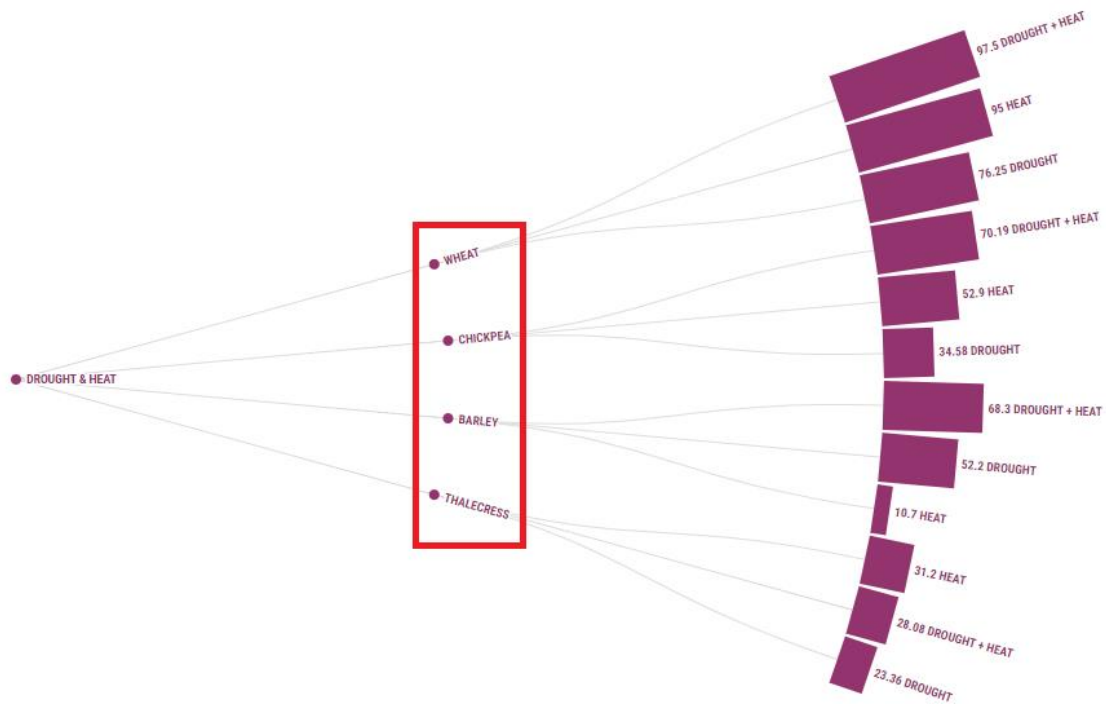
i) Each of the species will be having 3 bar graphs as highlighted below. The user can select the species in which they are interested in and the corresponding tree for that species will be displayed (For eg. wheat).

j) Each of the bar graphs represents the individual stresses (**Heat, Drought**) and the combined stress (**Drought + Heat**)

k) A net impact score (in the form of percent reduction over control) is displayed for individual and combined stress for easy comparison.

h) The height of the bar graph depends on the value of the net impact.

i) **Here it can be inferred that the combined stress was more detrimental for wheat yield and productivity, since the percent reduction in biomass was greater in case when wheat was exposed to combined drought and heat stress combinations when compared to individual drought and heat stresses.**
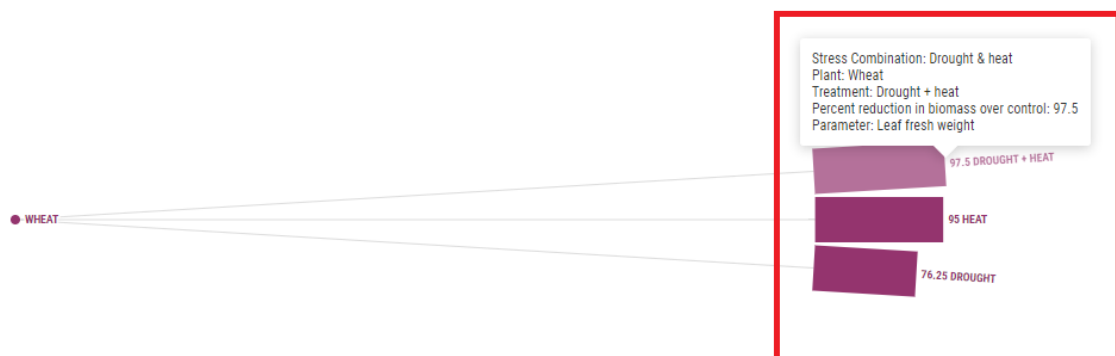
3) Geographical distribution:

a) Users can see the global geographical distribution of the combined stress studies conducted across the world by clicking the highlighted portion "View geographical distribution"

Combined stress: Simultaneous and Sequential stress data
(Morphological, physiological and biochemical data)

STEP I : CATEGORY:

Choose a Category: [Select Category ▽]

STEP II: SUBCATEGORY:

Choose a Subcategory: [Please select Subcategory ▽]

STEP III: PLANT SPECIES:

Choose a Plant: [Please select Plant ▽]

- This section of the SCIP database hosts comprehensive literature information for various stress combinations.
- The phenome depicts the net impact of individual and combined stress on a plant in comparison with non-stressed control, and also the interaction between the stresses at plant interface.
- The phenomic data represented here include a) growth and yield attributing traits directly showing the impact of combined stress on plants. E.g., yield, biomass, plant height etc, b) physiological and virulence-associated/immunity related/ pathogen defence-related traits indirectly showing the net impact of stress on plants. E.g., photosynthetic rate, stomatal conductance, bacterial number, cell death etc, and c) biochemical parameters showing the net impact of stress E.g., RUBISCO content, proline content etc.
- The net impact of stress was assessed by calculating the percentage reduction in the values of different growth and physiological parameters measured under combined and individual stresses over their non-stressed control plants
- Information can be accessed directly by choosing desired stress combination and crop of interest from the drop down menu on the left side.
- Order within stress combination is based on the dominant stress.
- Based on methodology followed for combined stress imposition, articles categorized into simultaneous stress (both the stresses imposed together) articles and sequential stress (stress imposed one after another in a sequential manner with overlap of one stress over other stress) articles.
- This section also includes the studies where more than two stresses were imposed simultaneously/sequentially during the experiment.
- Individual data page for each stress combination has two parts, first part depicts the...
  View more

Reset Submit

The phenomics data visualization links can aid users to decipher a holistic view and trends in a large number of stress combinations represented in the database as compared to individual stresses. Also provides information on the geographical distribution of stress combinations.
View stress matrix   View net impact (Based on stress combination)   **View geographical distribution** ← Click Here
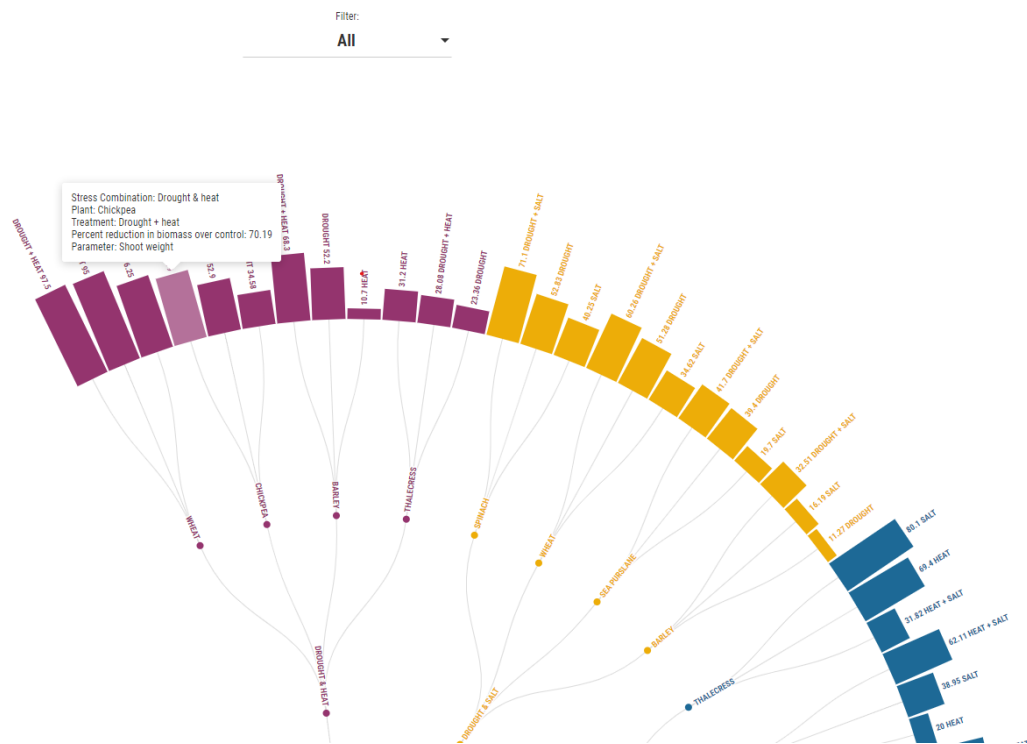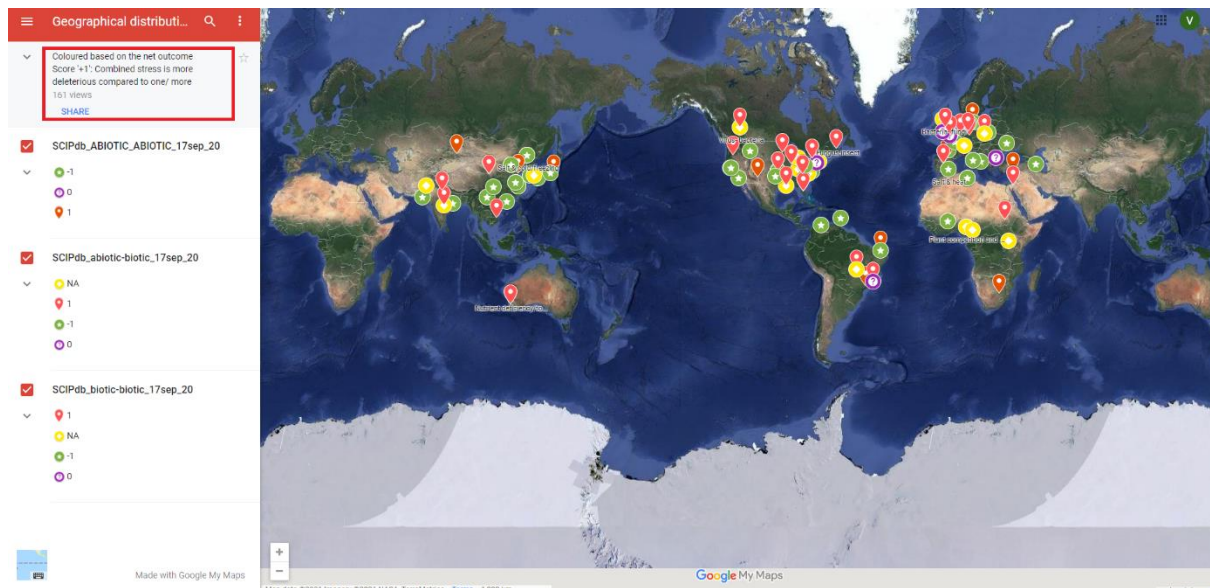
b) After clicking the "view geographical distribution" the corresponding interactive geographical map will be displayed which can be zoomed.

Combined stress world map

c) The geographical map has been organised and layered based on three major categories, Abiotic-Abiotic, Abiotic-Biotic, and Biotic-Biotic (See screenshot below).

d) The corresponding locations are coloured based on the net outcome score.

1. If the score is "+1", then the combined stress is deleterious compared to the individual stresses.
2. If the score is " -1" then the combined stress is less deleterious compared to the individual stresses.

e) On clicking the mapped location, corresponding details can be fetched.
- the stress combination studied,
- country and place in which the study was conducted,
- latitude,
- year in which the study was conducted,
- parameter considered in the study,
- net outcome

f) This information is displayed in the highlighted portion towards the left side of the map. Illustration for Bacteria and Fungi and Drought & Cold/Freezing are illustrated in depictions below.

g) Here for stress combination "Bacteria-Fungi" studied in Ceara, Brazil, the net outcome is "-1", which means bacterial and fungal stress combination is less detrimental compared to the individual stresses (see screenshot below).
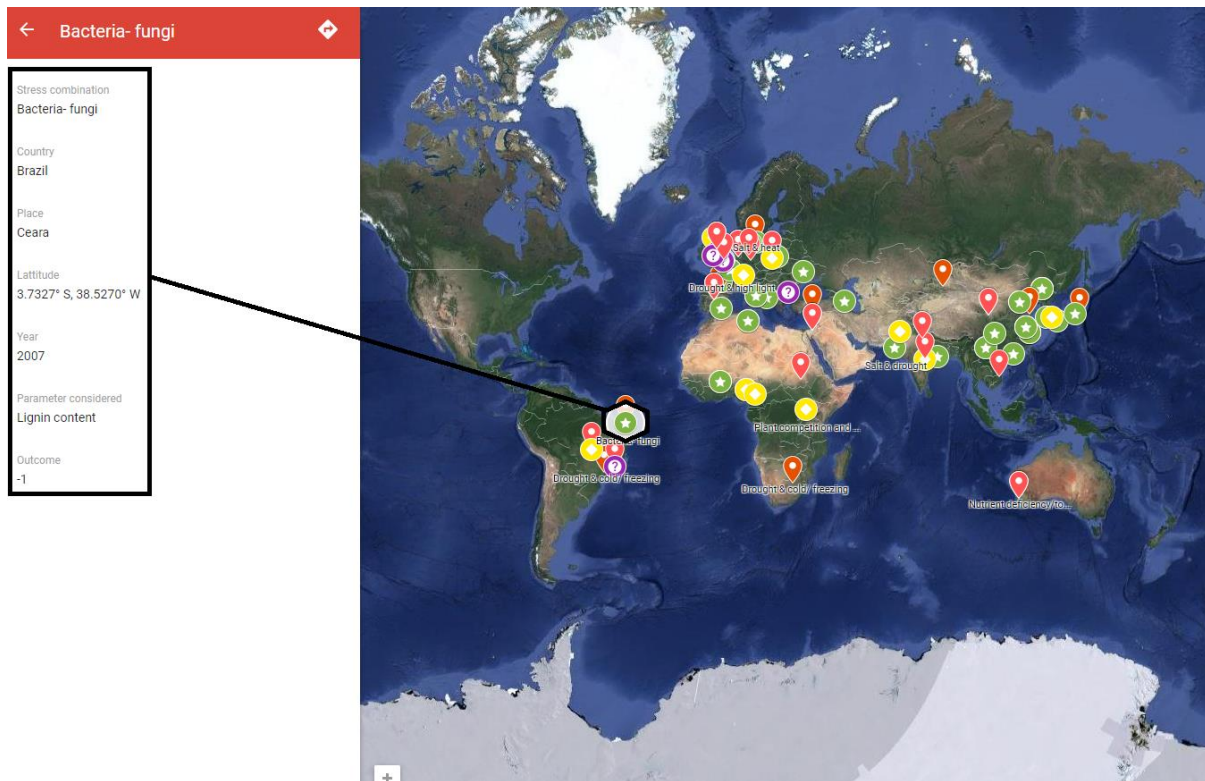
h) Here stress combination studied is "Drought & Cold/Freezing" in Potchefstroorm, South Africa, the net outcome is "1", which means the stress combination is more detrimental compared to the individual stresses (see screenshots below).

← Drought & cold/ freezing

Stress combination
Drought & cold/ freezing

Country
South Africa

Place
Potchefstroom

Lattitude
26.7145° S, 27.0970° E

Year
2002

Parameter considered
CO2 assimilation rate

Parameter value
5.9 µmol/m2/s

Outcome
1