May 20, 2020

Find Proteins of Unknown Function (PUFs) using Plantannot - Protocol E

Forked from Find Proteins of Unknown Function (PUFs) using Plantannot - Protocol B

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Marcos Viana[1], Mauricio Mudadu[1], Adhemar Zerlotini[1]

[1]EMBRAPA

Marcos Viana

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External link: https://www.machado.cnptia.embrapa.br/plantannot

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Protocol status: Working
It is working

Created: May 13, 2020

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Protocol Integer ID: 37003

Abstract

The Plant annot softw are provi des sever al filters and a text searc h box that allow s searc hing for mole cules by its desir ed annot ation featur es. Thes e filters are need ed to obtai n PUFs and to try to relate them to abioti c stress es using RNA-seq expre ssion data and co-expre ssion netw orks.

The Filters menu is separated in 8 fields, of those we are going to use only five: “Organism”, “Feature type”, “Orthology”, “Orthologs_coexpression” and “Analyses”. The “Feature Type” filter has three molecule types, from those the polypeptide box is the only that is going to be always checked and the others

blank. By using the other 4 remaining filters, 6 protocols were created as examples of different ways to selecting PUFs. Protocol A: using lack of both homology and protein domain signatures. Protocol B: using lack of homology, presence of domain signatures - trying to select Domains of Unknown Function

(DUF) from PFAM, and the text search “Unknown function”.Protocol C: using homology, lack of protein domain signatures and the text search “Unknown function”. Protocol D-F: same protocols of A-C but using ortholog groups to find homolog proteins with co-expression data related to abiotic stress.

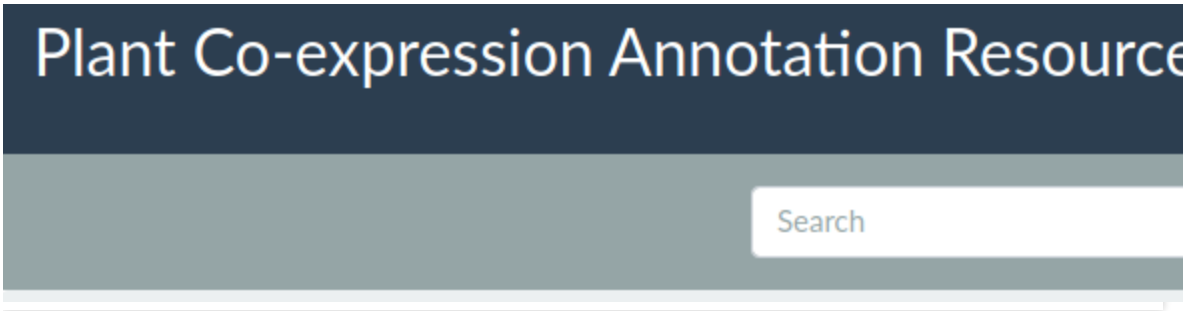
Protocol E is intended to find PUFs from organisms whose proteins are not yet in the NCBI “nr” database and have DUF domains found by InterproScan. Proteins will be selected using the text search "Unknown function". Also, ortholog groups and co-expression networks will be used to relate protei

ns to abioti c stress es.

Entering application

1 Enter the Plantannot Result's page, with empty filters and text box search:
https://www.machado.cnptia.embrapa.br/plantannot/find/?q=

Or you can enter the **https://www.machado.cnptia.embrapa.br/plantannot** initial page and click on the magnifying glass with the text box empty as well.



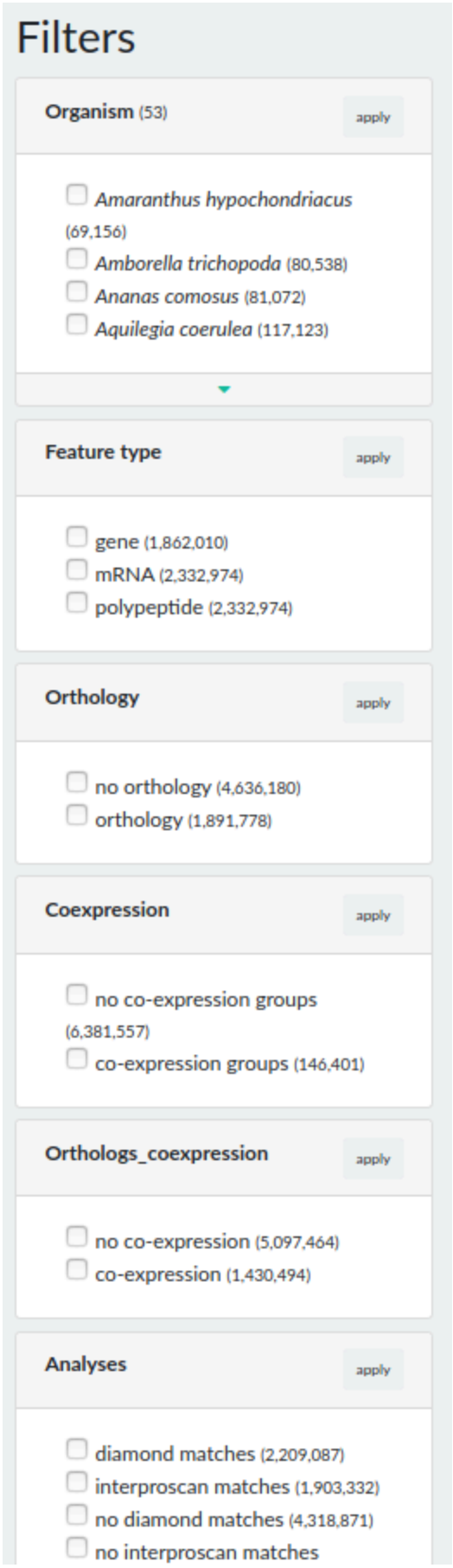
https://www.machado.cnptia.embrapa.br/plantannot

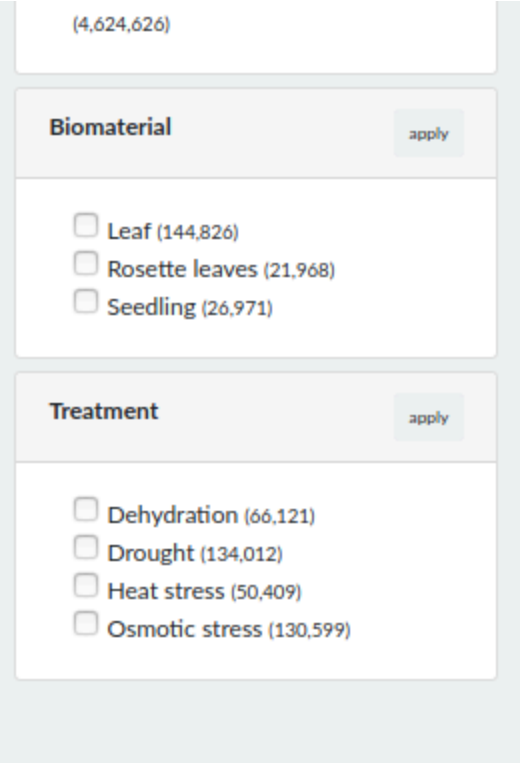
Filtering

2

Find PUFs from organisms whose proteins are not yet in the NCBI “nr” database and have DUF domains from PFAM found by InterproScan. Proteins will be selected using the text search "Unknown function". Also, ortholog groups and co-expression networks will be used to relate proteins to abiotic stresses.

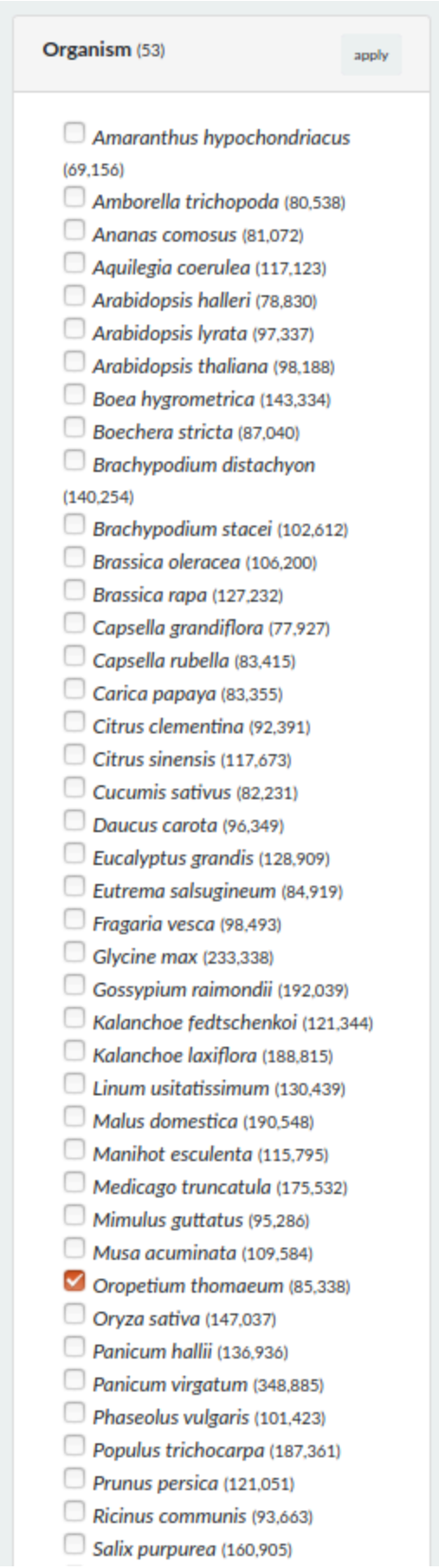
Visualize the "Filters" card on the left of the page from step1:

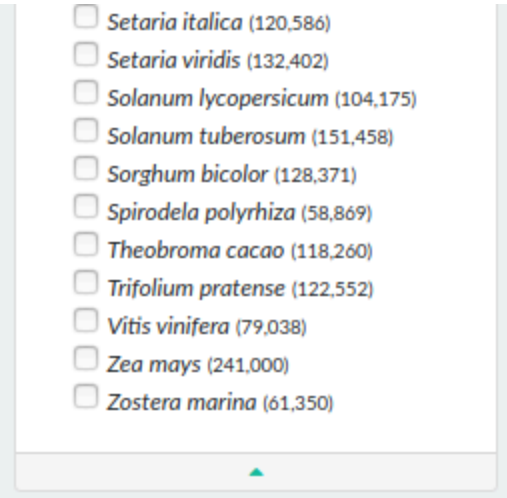

Filters
Organism (53)
apply
Amaranthus hypochondriacus (69,156)
Amborella trichopoda (80,538)
Ananas comosus (81,072)
Aquilegia coerulea (117,123)
Feature type
apply
gene (1,862,010)
mRNA (2,332,974)
polypeptide (2,332,974)
Orthology
apply
no orthology (4,636,180)
orthology (1,891,778)
Coexpression
apply
no co-expression groups (6,381,557)
co-expression groups (146,401)
Orthologs_coexpression
apply
no co-expression (5,097,464)
co-expression (1,430,494)
Analyses
apply
diamond matches (2,209,087)
interproscan matches (1,903,332)
no diamond matches (4,318,871)
no interproscan matches



https://www.machado.cnptia.embrapa.br/plantannot/find/?q=

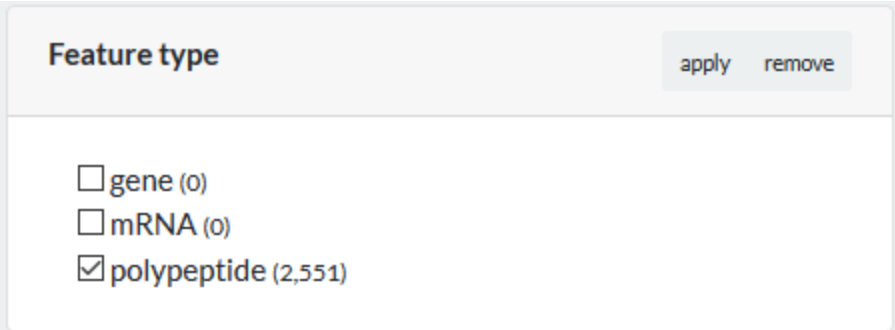
2.1 In the "Organisms" filter, select any organisms (expand the organism's list using the green arrow) or select all by leaving all boxes empty. We will use *Oropetium tomaeum* as example. Click "apply" to execute the filter:


Organism (53)
apply
Amaranthus hypochondriacus (69,156)
Amborella trichopoda (80,538)
Ananas comosus (81,072)
Aquilegia coerulea (117,123)
Arabidopsis halleri (78,830)
Arabidopsis lyrata (97,337)
Arabidopsis thaliana (98,188)
Boea hygrometrica (143,334)
Boechera stricta (87,040)
Brachypodium distachyon (140,254)
Brachypodium stacei (102,612)
Brassica oleracea (106,200)
Brassica rapa (127,232)
Capsella grandiflora (77,927)
Capsella rubella (83,415)
Carica papaya (83,355)
Citrus clementina (92,391)
Citrus sinensis (117,673)
Cucumis sativus (82,231)
Daucus carota (96,349)
Eucalyptus grandis (128,909)
Eutrema salsugineum (84,919)
Fragaria vesca (98,493)
Glycine max (233,338)
Gossypium raimondii (192,039)
Kalanchoe fedtschenkoi (121,344)
Kalanchoe laxiflora (188,815)
Linum usitatissimum (130,439)
Malus domestica (190,548)
Manihot esculenta (115,795)
Medicago truncatula (175,532)
Mimulus guttatus (95,286)
Musa acuminata (109,584)
Oropetium thomaeum (85,338)
Oryza sativa (147,037)
Panicum hallii (136,936)
Panicum virgatum (348,885)
Phaseolus vulgaris (101,423)
Populus trichocarpa (187,361)
Prunus persica (121,051)
Ricinus communis (93,663)
Salix purpurea (160,905)



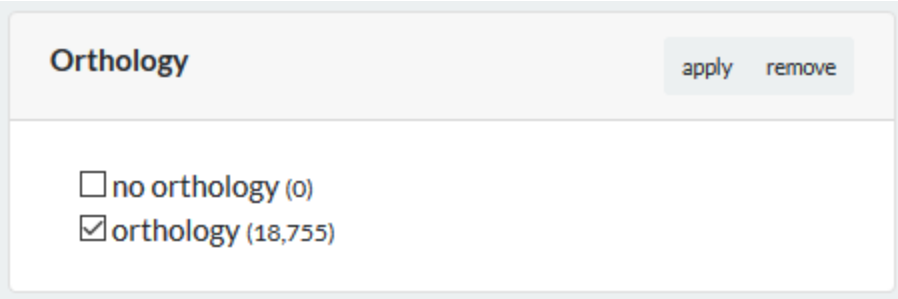
https://www.machado.cnptia.embrapa.br/plantannot/find/?q=&selected_facets=organism%3AOropetium+thomaeum

2.2 In the "Feature type" filter, select "polypeptide", and click "apply" to execute the filter:



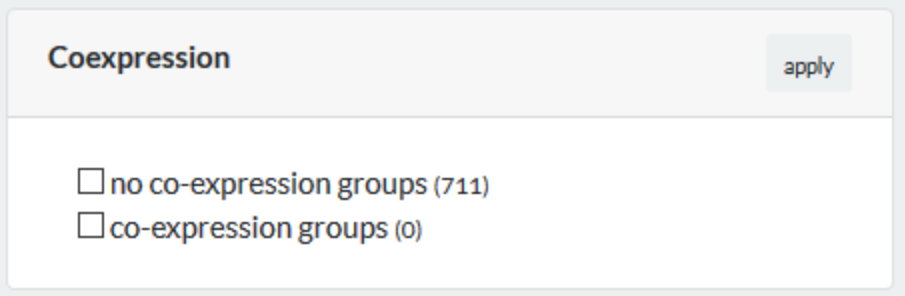
https://www.machado.cnptia.embrapa.br/plantannot/find/?q=&selected_facets=organism%3AOropetium+thomaeum&selected_facets=so_term%3Apolypeptide

2.3 In the Orthology filter, select "orthology", and click "apply" to execute the filter:



https://www.machado.cnptia.embrapa.br/plantannot/find/?q=&selected_facets=organism%3AOropetium+thomaeum&selected_facets=so_term%3Apolypeptide&selected_facets=orthology%3A1

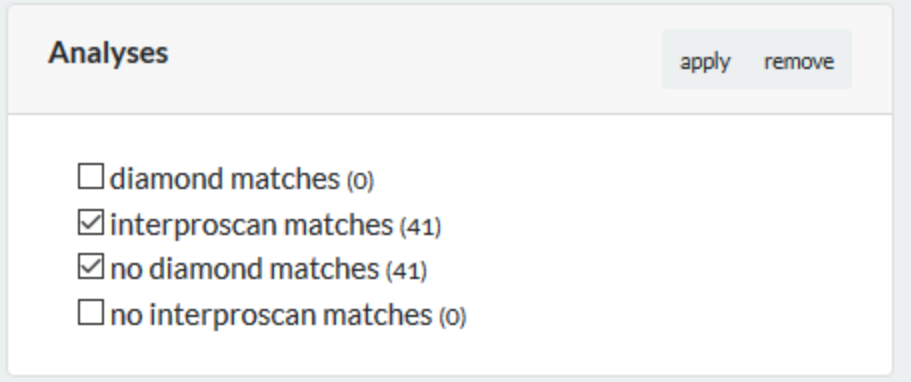
2.4 Leave the "Coexpression" filter empty:



2.5 In the "Orthologs_coexpression" filter, select "co-expression", and click "apply" to execute the filter:

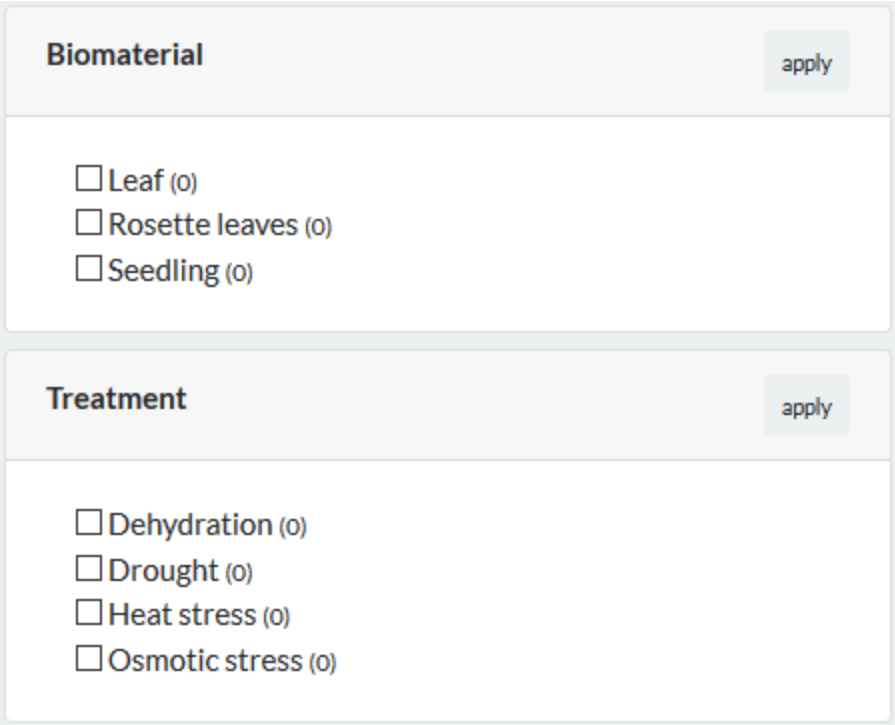
https://www.machado.cnptia.embrapa.br/plantannot/find/?q=&selected_facets=organism%3AOropetium+thomaeum&selected_facets=so_term%3Apolypeptide&selected_facets=orthology%3A1&selected_facets=orthologs_coexpression%3Atrue

2.6 In the "Analyses" filter, select both "no diamond matches" and "interproscan matches", and click "apply" to execute the filter:

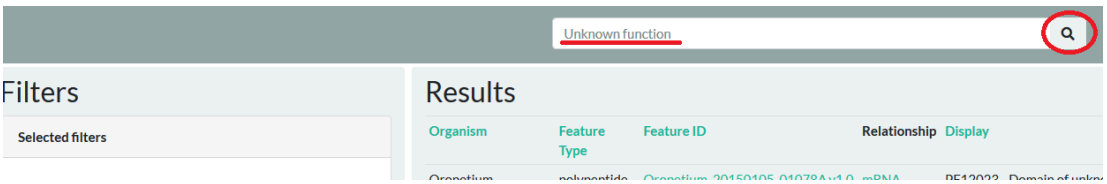


https://www.machado.cnptia.embrapa.br/plantannot/find/?q=&selected_facets=organism%3AOropetium+thomaeum&selected_facets=so_term%3Apolypeptide&selected_facets=orthology%3A1&selected_facets=orthologs_coexpression%3Atrue&selected_facets=analyses%3Ainterproscan+matches&selected_facets=analyses%3Ano+diamond+matches

2.7 Leave the "Biomaterial" and "Treatment" filters empty:



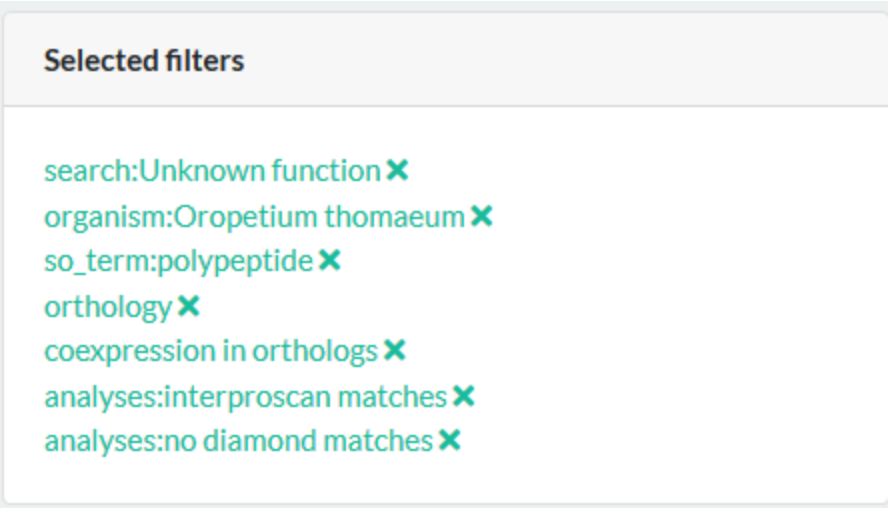
2.8 In addition to the applied filters, text search for "Unknown function" in the search box. After entering the text click on the magnifying glass icon to apply the search.



https://www.machado.cnptia.embrapa.br/plantannot/find/?q=Unknown+function&selected_facets=organism%3AOropetium+thomaeum&selected_facets=so_term%3Apolypeptide&selected_facets=orthology%3A1&selected_facets=orthologs_coexpression%3Atrue&selected_facets=analyses%3Ainterproscan+matches&selected_facets=analyses%3Ano+diamond+matches

Filters

3 After execution of all filters we will have the following list of filters:



https://www.machado.cnptia.embrapa.br/plantannot/find/?q=Unknown+function&selected_facets=organism%3AOropetium+thomaeum&selected_facets=so_term%3Apolypeptide&selected_facets=orthology%3A1&selected_facets=orthologs_coexpression%3Atrue&selected_facets=analyses%3Ainterproscan+matches&selected_facets=analyses%3Ano+diamond+matches

Viewing results

4 Visualize the "Results" card on the center-right of the screen, we will have the resulting list of *Oropetium's* PUFs, 1 PUF were filtered: