PAKISTAN AGRICULTURE INFORMATION SYSTEM

CROP Information Portal

Crop Information Portal Admin Manual

Release 1.0.x

GeoSolutions

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CONTENTS

CHAPTER

ONE

OVERVIEW

Crop Information Portal is a web portal with reliable data and information on historical and current crop data anda agro-metereological condition in Pakistan. It allows users to extract statistics and detect conditions affecting production of major Rabi and Kharif crops.

This document is an extension for the system administrators to explain how to use the **Crop Information Portal's admin interface**. If you need want to learn something about the user interface, please, use the `User Manual` instead this document.

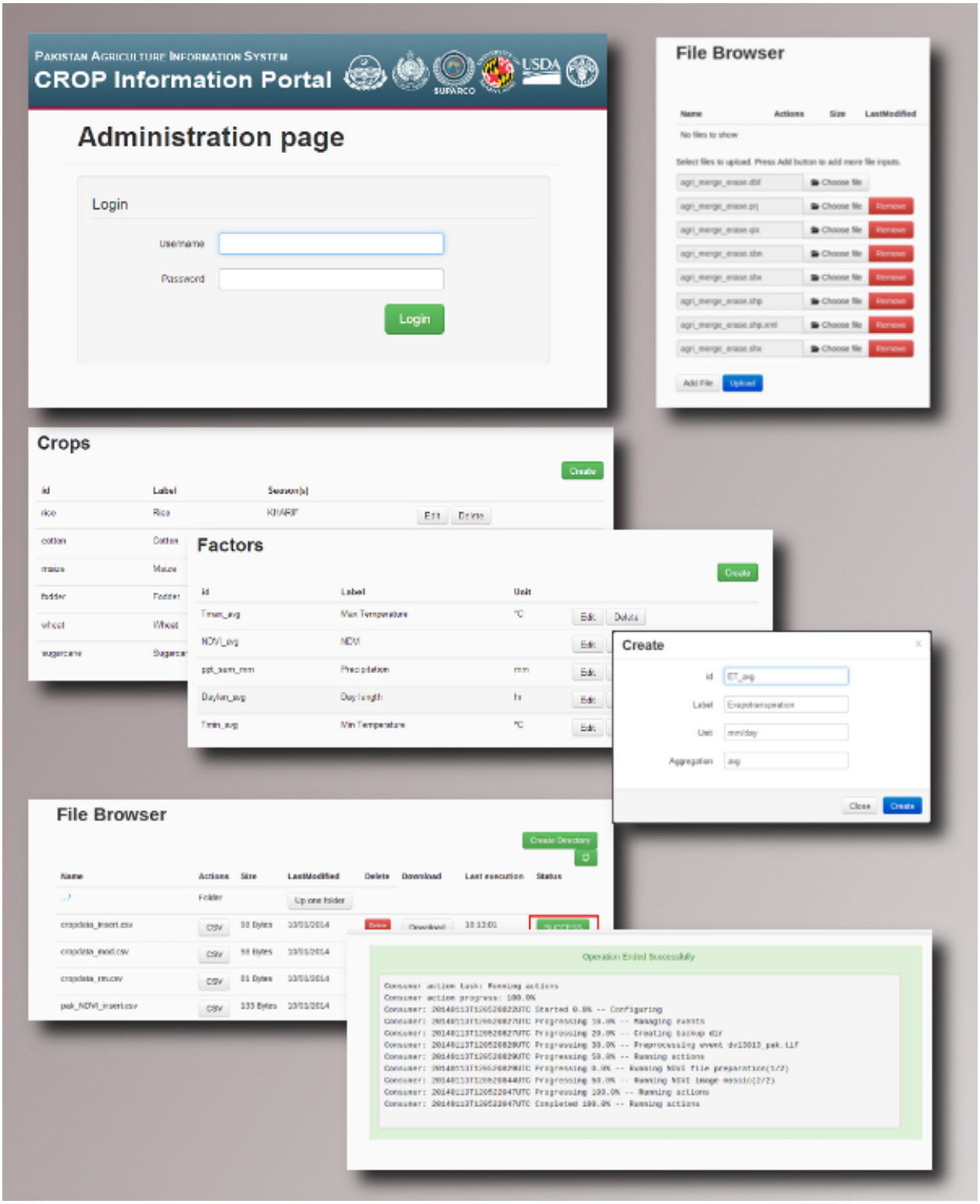

Figure 1.1: The administration interface.

CHAPTER

TWO

ADMINISTATION OF CROP INFORMATION PORTAL

2.1 The Administration Interface

The portal provides a lot of data to facilitate the analysis of the state of the crops in Pakistan.These data must be continuously updated, and, where possible, automatically. To allow mantainence operations, the portal has an administration interface for admin users:

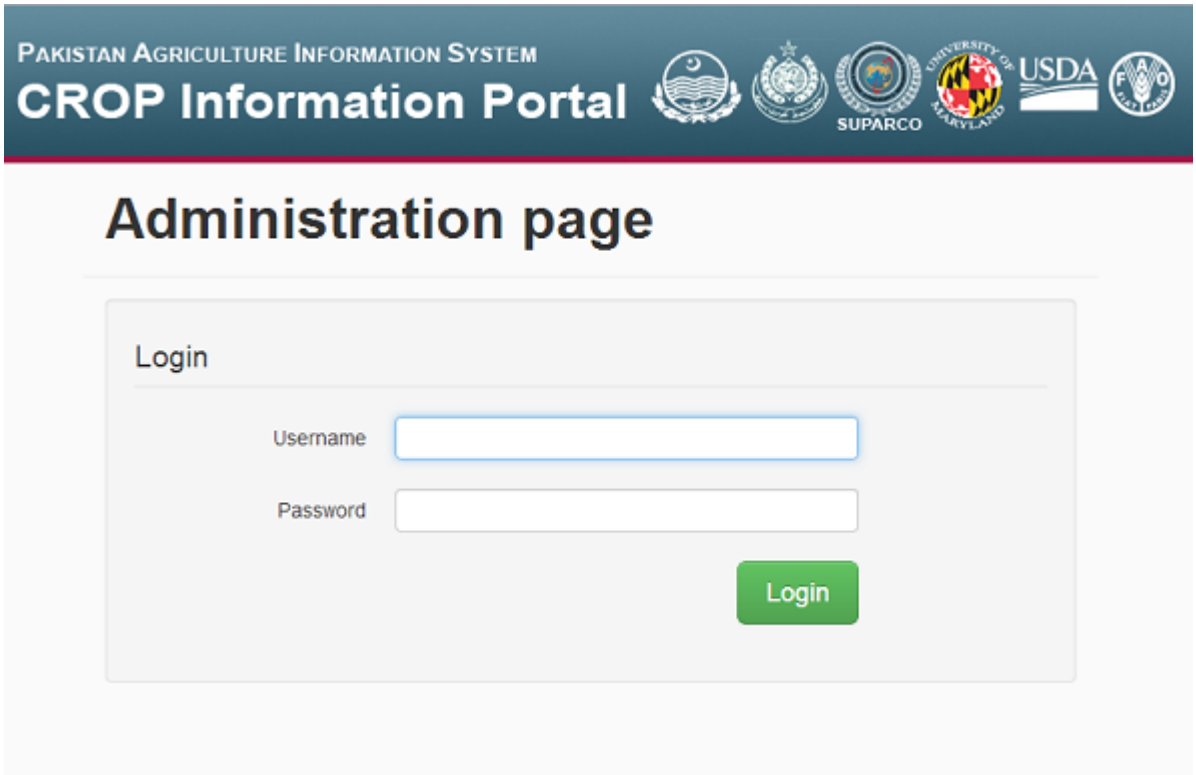

Figure 2.1: Login Page.

The default credentials for this application are

- **user**:admin

- **password**:admin

Note: Only the users with the ADMIN role can access to the administration interface.

Once you login you will be automatically redirected to the Users List.

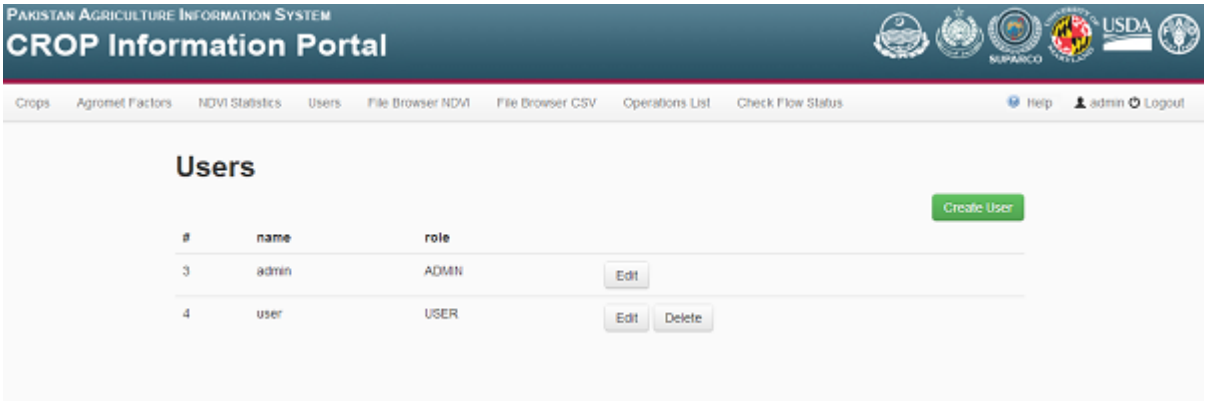

Figure 2.2: The page on first access.

Below the banner, the Navigation bar provides links to the available sections of the administration interface. The available links are:

- **Crops** : allows to create/edit/delete the crops available in the portal.
- **Agromet Factors** : allows to create/edit/delete the factors available in the portal.
- **NDVI Statistics** : allows to generate statistics for the NDVI from the raster data published on the portal.
- **Users** : Allow to add/edit/delete users. is the default landing page after login.
- **File Browser NDVI** : allows you to upload images of NDVI and publishing it on the portal.
- **File Browser CSV** : allows you to upload CSV files and use them to update the database of crop data, agrometeorological conditions and thresholds. Allow also to download CSV files generated by the statistics module.
- **Operations List** : A list of available operations for this installation of the administration interface.
- **Check Flow Status** : Allow to monitor the status of the execution of process launched in geobatch.
- **Help** : a dummy link for help. Can be customized.
- **Logout** : logout from the administration interface.

To better understand what these sections does, you should do a deeper look to the global architecture.

2.2 Architecture

The portal is composed of several web applications that interact with each other. Some of them are used directly by the users (MapStore, Administration Interface).

2.2.1 Components

The following are the components of the architecture of the Crop Information Portal.

- **MapStore**: The main front-end to generate charts, maps and reports inferring agro-metereological data. Interacts with GeoServer to allow this kind of processing.
- **Administration Interface**: The administrator front-end to update published data and generate statistics from raster images interacting with GeoBatch. Provides also user management functionalities.
- **GeoStore**: a non-sql REST access database used to store users data and to log their operations.
- **GeoServer** is an open source software server that allows users to share and edit geospatial data. Designed for interoperability, it publishes data from any major spatial data source using open standards.
- **GeoBatch** is an Open Source application for the collection, processing and publication of geospatial data in real time.

2.2.2 General Architecture

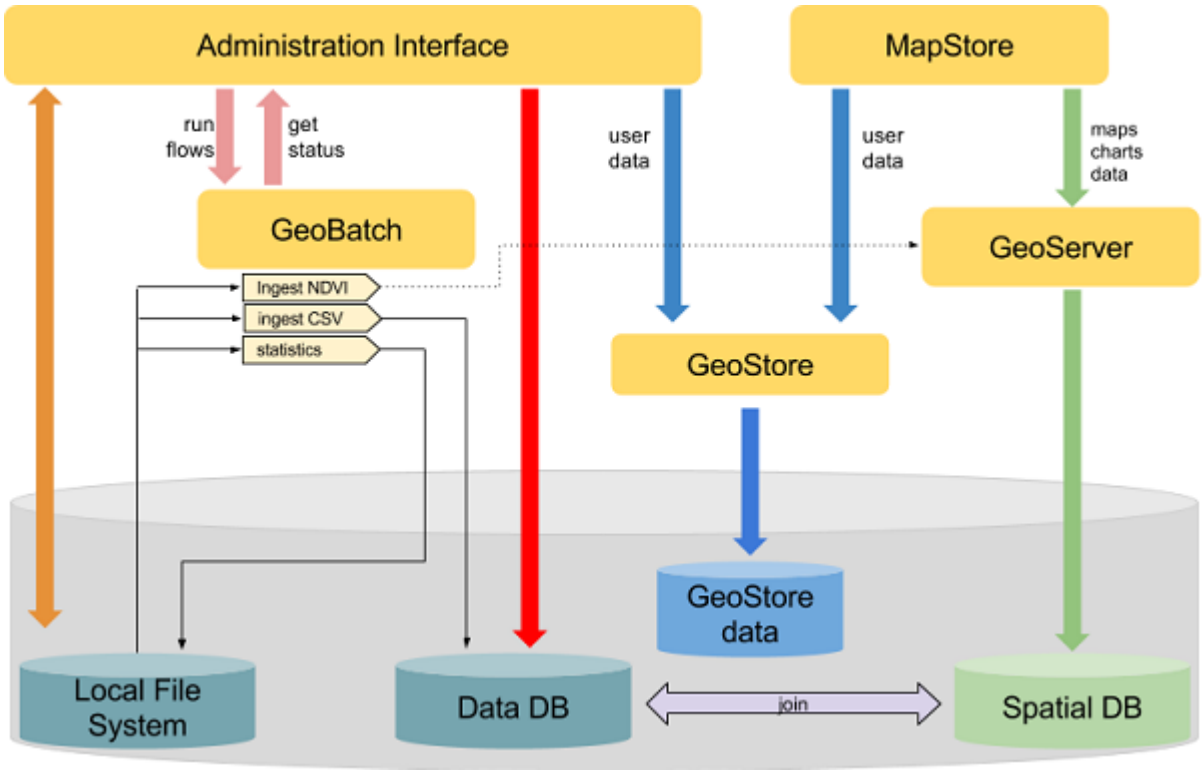

Figure 2.3: Architecture of Crop Information Portal.

The *administrator interface* interacts directly with the file system, with the database and with *GeoBatch*. Allows to upload and download files and launch some *GeoBatch* flows on them. Provides also a direct interaction with the database to customize the agrometeorological factors and crops to show inside *MapStore*.

GeoBatch runs flows using files from the filesystem. Depending on the type of flow geobatch interacts with the other components (publish data in geoserver, update database, create csv files...).

MapStore uses the capabilities of *GeoServer* to show aggregated data and maps. The filtering and aggregation functionalities are implemented as parametric views on *GeoServer*. All the parametric views in *GeoServer* are optimized to aggregate and filter the data in the fastest way. MapStore requires the proper output format to geoserver in order to show tabular data, maps, charts or download CSV files.

GeoStore is used to manage user data that are not directly connected with the model.

There are other small web applications non present in the schema:

- **highcharts-export**: An application that allows to rasterize charts in various formats (*pdf, svg, png, jpeg*).
- **http_proxy** : A secure proxy that can allow *MapStore* to get maps from other qualified WMS sources.
- **xmlJsonTranslate** : a container of services required by *MapStore* grouped in a separated application.

A more detailed description about the model is available here:

Model

The NRL database contains the main model

Name	Description
agromet	data about agrometeorological factors
agrometdescriptor	information about specific factors
cropdata	data about crops (area,production,yield)
cropdescriptor	information about specific crop
cropstatus	thresholds for factor values related to a specific period of the year and crop
district_boundary	districts in Pakistan
district_crop	districts in Pakistan with some differences in districts that matches with provided data about crops.
national_boundary	national boundary Pakistan.
province_boundary	provinces in Pakistan
province_crop	provinces in Pakistan to generate crop maps.

List of relations

cropdescriptor Contains informations about specific crops.

schema

Column	Description
id	the identifier for the crop
label	the label to display for this crop
seasons	the season(s) of this crop

Sample Content here some sample rows from the *cropdescriptor* table

id	label	seasons
rice	Rice	KHARIF
cotton	Cotton	KHARIF
maize	Maize	KHARIF
fodder	Fodder	RABI,KHARIF
wheat	Wheat	RABI
sugarcane	Sugarcane	KHARIF

cropdata Contains the data about production, cultivated area and yield of every year. This table can be populated ingesting the csv files.

Sample Content here some sample rows from the **cropdata** table

crop	district	province	year	years	area	production	yield
rice	Bahawalnagar	PUNJAB	2010	2010-11	63.13	127.35	2017
rice	Bahawalpur	PUNJAB	2010	2010-11	6.07	10.34	1703
rice	Bhakkar	PUNJAB	2010	2010-11	1.21	1.83	1512
rice	Chiniot	PUNJAB	2010	2010-11	32.37	63.55	1963

The crop column have to be the same of the id in **cropdescriptor** table. *district* and *province* columns must match with district and province fields in the **district_crop** and **province_crop** tables. Yield column is redoundant for compatibility reasons. the yield is calculated at runtime getting values from *area* and *production* fields.

Note: Unit of measure are not uniform to mantain the original format of the CSV files.

- **production** is expressed in thousands of tons for all crops except cotton which is expressed in thousands of bales.
- **area** is always expressed in thousands of hectares (ha)
- **yield** is always expressed in kg/ha.

---

agrometdescriptor The agrometdescriptor is a table that contains the list of the available factors.

schema

Column	Description
factor	this is the string that identify the factor.
label	this is the label that represents the factor in the application
aggregation	this is the kind of aggregation method to apply. can be avg (average) or sum.
unit	the unit of measure for the factor

Sample Content here some sample rows from the **agrometdescriptor** table

factor	label	aggregation	unit
Tmax_avg	Max Temperature	avg	°C
NDVI_avg	NDVI	avg	
ppt_sum_mm	Precipitation	avg	mm
Daylen_avg	Day length	avg	hr
Tmin_avg	Min Temperature	avg	°C

agromet Contains agro-metereological data for each district of Pakistan for each :term:dekad.

Column	Description
district	the district for this value
province	the province for this value
year	the year for this value
month	the month for this value
dec	the dekad for this value
factor	the factor for this value
value	the factor for this value
s_yr	the year of the start of the Rabi Season
s_dec	the dekad starting from the start of the Rabi Season

Sample Content here some sample rows from the *agromet* table

district	province	year	month	dec	factor	value	s_yr	s_dec
Malakand	KPK	2012	Oct	2	Tmin_avg	10.9563	2012	35
Mansehra	KPK	2012	Oct	2	Tmin_avg	10.999	2012	35
Mardan	KPK	2012	Oct	2	Tmin_avg	11.3221	2012	35
Nowshera	KPK	2012	Oct	2	Tmin_avg	11.3808	2012	35
Peshawar	KPK	2012	Oct	2	Tmin_avg	9.0622	2012	35
Shangla	KPK	2012	Oct	2	Tmin_avg	11.4006	2012	35
Swabi	KPK	2012	Oct	2	Tmin_avg	12.7756	2012	35
Swat	KPK	2012	Oct	2	Tmin_avg	10.5381	2012	35
Tank	KPK	2012	Oct	2	Tmin_avg	16.1516	2012	35

Note:

- The *factor* column have to be the same of the id in **agrometdescriptor** table.
- *district* and *province* columns must match with *district* and *province* columns in the **district_boundary** and **province_boundary** tables.
- s_dec and s_yr are redoundant field used to simplify queries to the database and make them faster.

2.3 User Management page

This section illustrates how manage users from the User management page.

By clicking on the section **Users** the administrators of the system can access to the User management page

Figure 2.4: Access to User Management page.

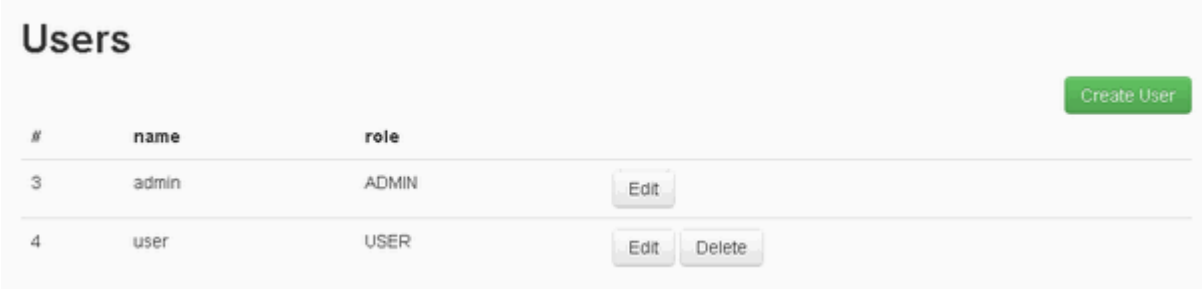

Figure 2.5: User Manage page.

From this page you can see the list of users and their **ROLE**. The users with ROLE **ADMIN** can access to the administration interface. The users with ROLE **USER** are only allowed to use `Data` output type in the tools in mapstore (See tabular data and download aggregated data in CSV format).

By clicking on **Create User** button you can create new users. From the form shown below you must insert an User Name, its ROLE (USER or ADMIN) and a password for the created user.

Figure 2.6: Create User button.

By clicking on **Create** button you submit the creation of new user. If ok an alert like shown below appears.

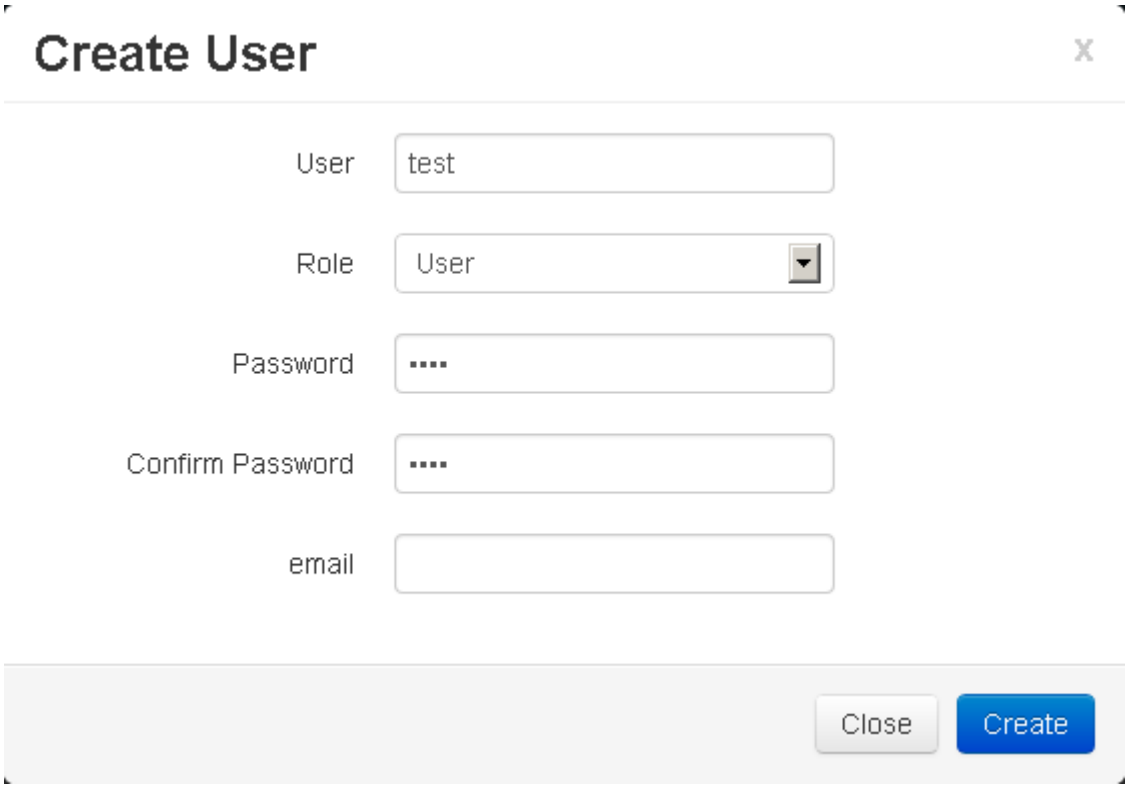

Figure 2.7: Create User form.

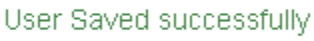

Figure 2.8: Success User creation alert.

Now the list of users shows the new user

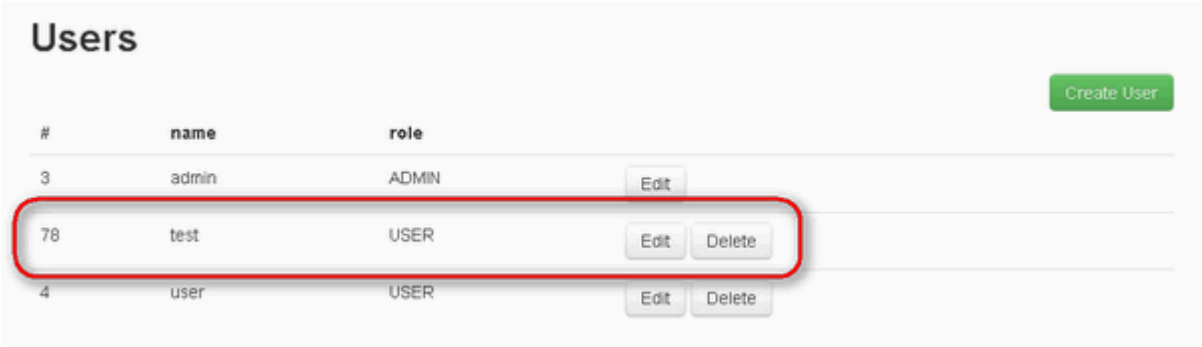

Figure 2.9: User added.

You can also edit or delete the users as shown by the forms below. From the Edit User form you can only change the ROLE and the password of the user.

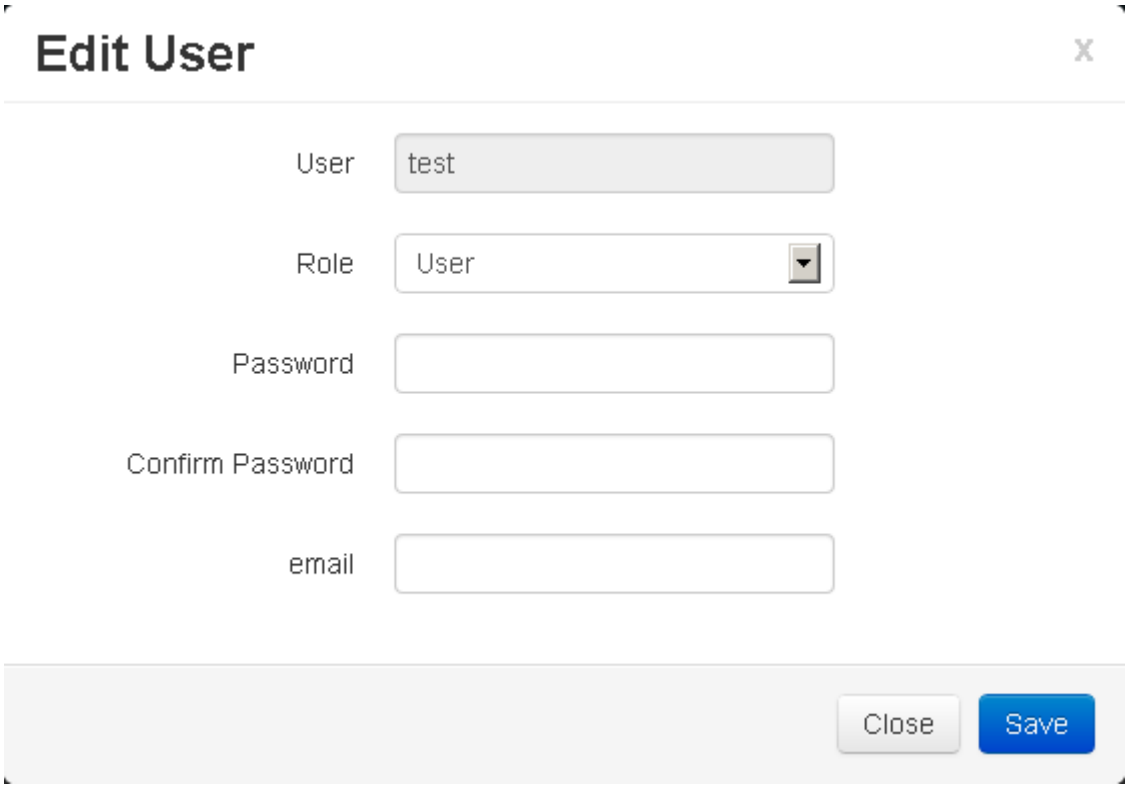

Figure 2.10: User edit.

You can remove the user clicking on the `Delete` button.

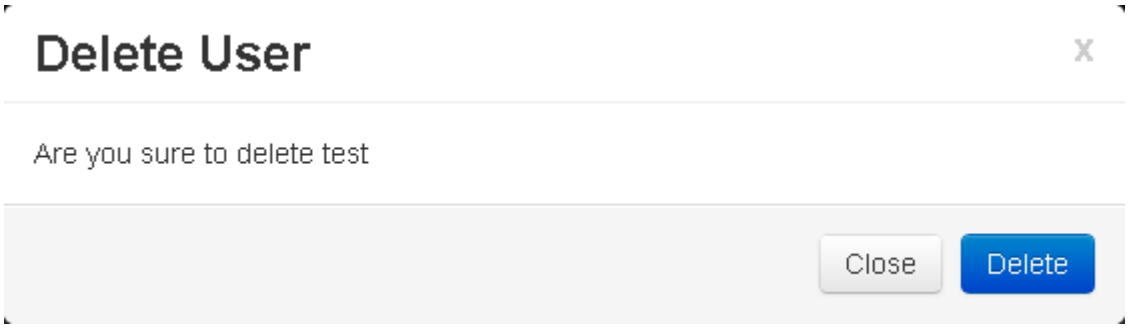

Figure 2.11: User delete.

A popup will appear to confirm the operation.

2.4 Crops and Agromet factors

2.4.1 Manage Crops

To manage Crops you must click on the **Crops** link in the navigation bar:

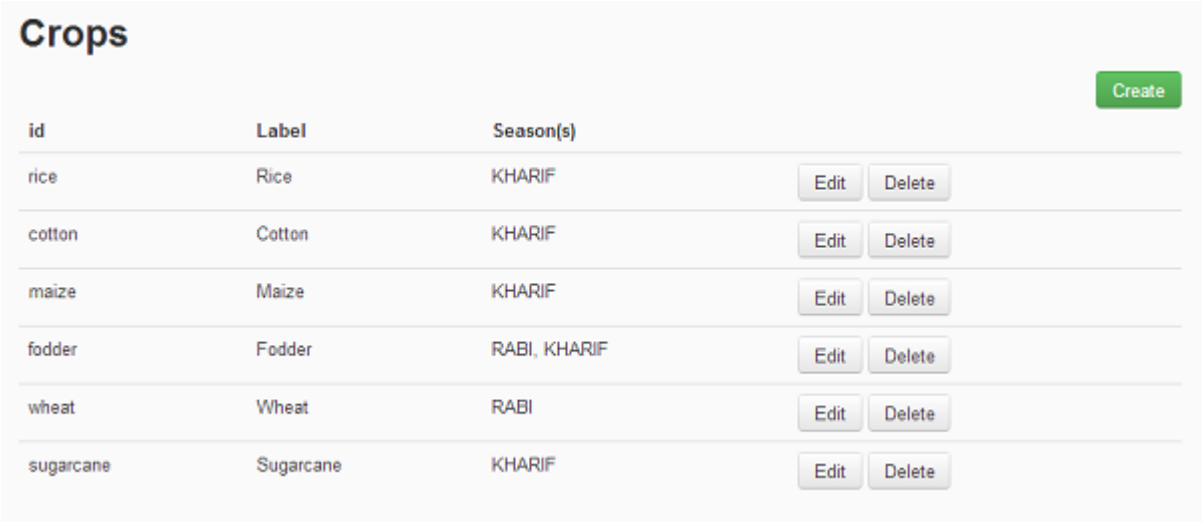

Figure 2.12: The list of available crops

Create a new Crop

To create a new crop, click on the **Create** button. A form with the information to set will be displayed. complete the form as follows:

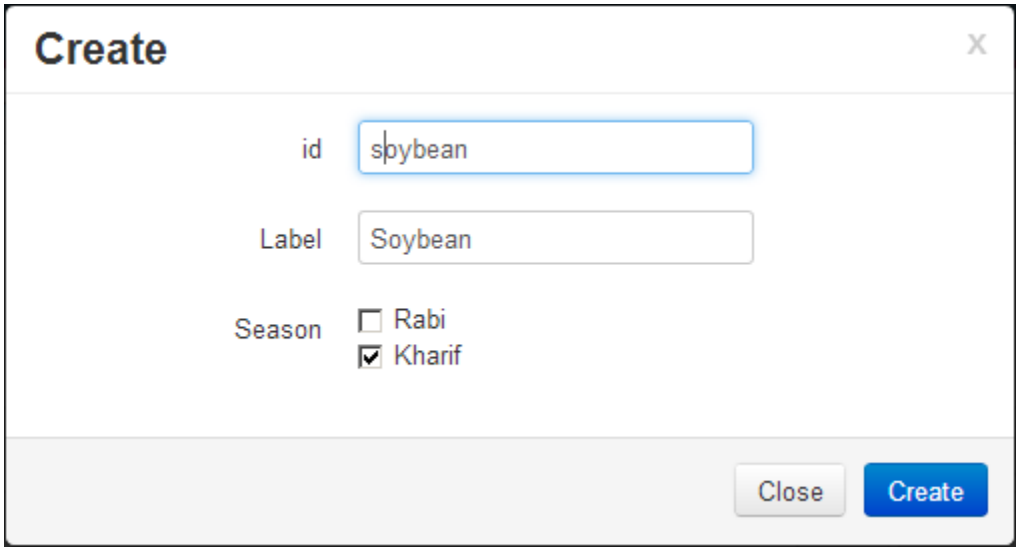

Figure 2.13: Sample Soybean crop

The new crop will be shown in the Crops list.

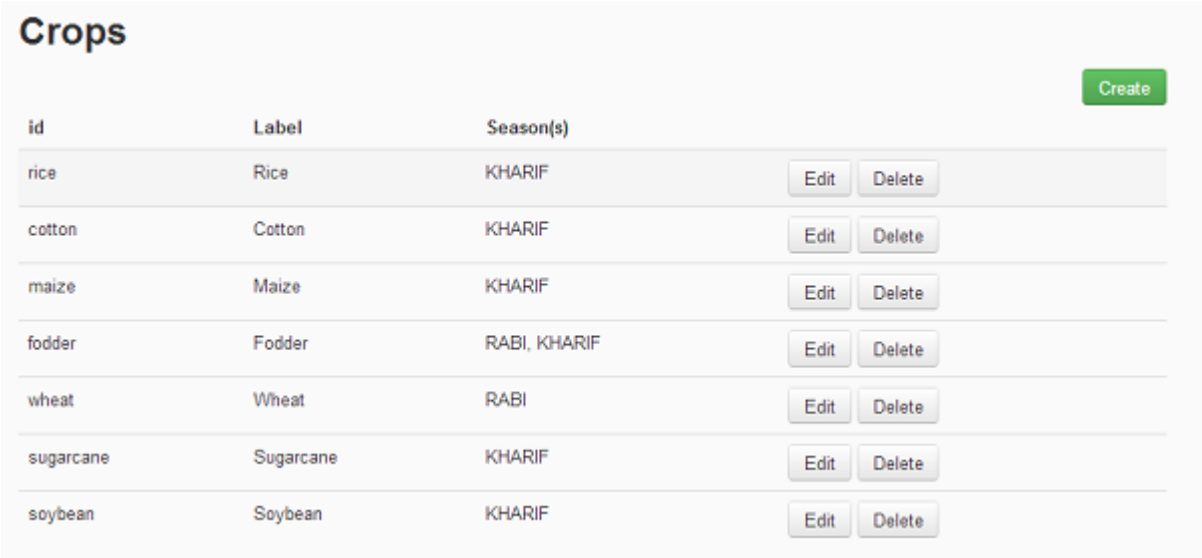

Figure 2.14: The new crop is added to the list

Anyway the new crop will not be available in MapStore until some data about the crop is ingested.

How to allow map generation for new Crops

To generate maps you **must** add 6 new styles to geoserver with a specific name:

`<province|district>_<crop_id_lower_case>_<area|prod|yield>_style`

In the case above the styles to add will have the following names:

- `province_soybean_area_style`
- `province_soybean_prod_style`
- `province_soybean_yield_style`
- `district_soybean_area_style`
- `district_soybean_prod_style`
- `district_soybean_yield_style`

Note: This styles are needed to generate maps in the *Crop Data* module of *MapStore*.

- **Area Type: National(Province)**
  - `province_soybean_area_style.xml`: style to generate maps for area.
  - `province_soybean_prod_style.xml`: style to generate maps for production.
  - `province_soybean_yield_style.xml`: style to generate maps for yield.
- **Area Type: National(District) or Province(District)**
  - `district_soybean_area_style.xml`: style to generate maps for area .
  - `district_soybean_prod_style.xml`: style to generate maps for production.
  - `district_soybean_yield_style.xml`: style to generate maps for yield.

Add a SLD style You can access to the style layer descriptor (SLD) definition page on GeoServer selecting *Styles* module on GeoServer:

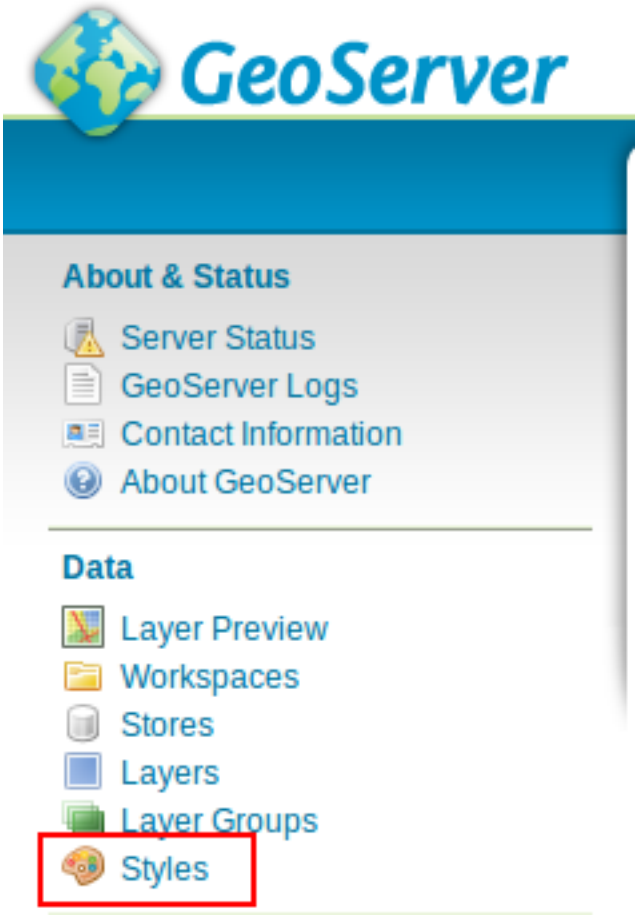

Figure 2.15: Styles module on GeoServer

and press on *add a new style*

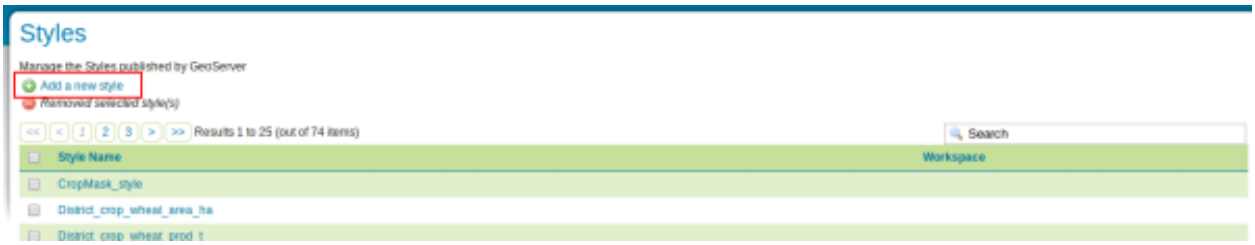

Figure 2.16: Add a new style button

Now, you have to fill the form with the new name,

for this exercise you can copy a style from the existing ones. :

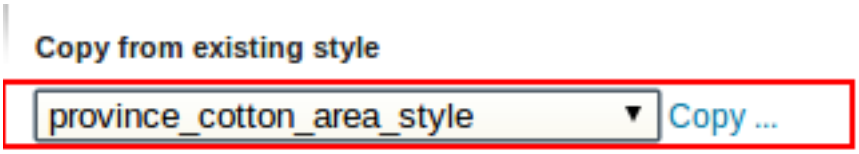

Figure 2.17: Copy *province_cotton_area_style*

change the style with the new name and modify filters as you want:

copy from one of the present one:

Figure 2.18: Edit the style

validate and submit the new style:

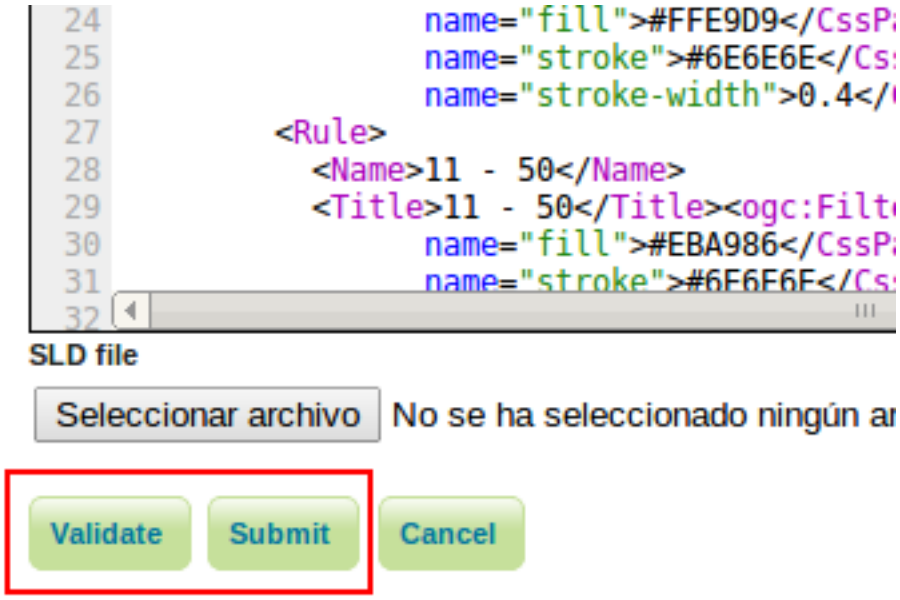

Figure 2.19: Styles submit

Edit/Delete Crops

You can edit/delete the crops clicking on the **Edit** and **Delete** buttons on the right of each row.

2.4.2 Manage Agrometeorological Factors

To manage Agrometeorological Factors you can click on the **Agromet Factors** link in the navigation bar.

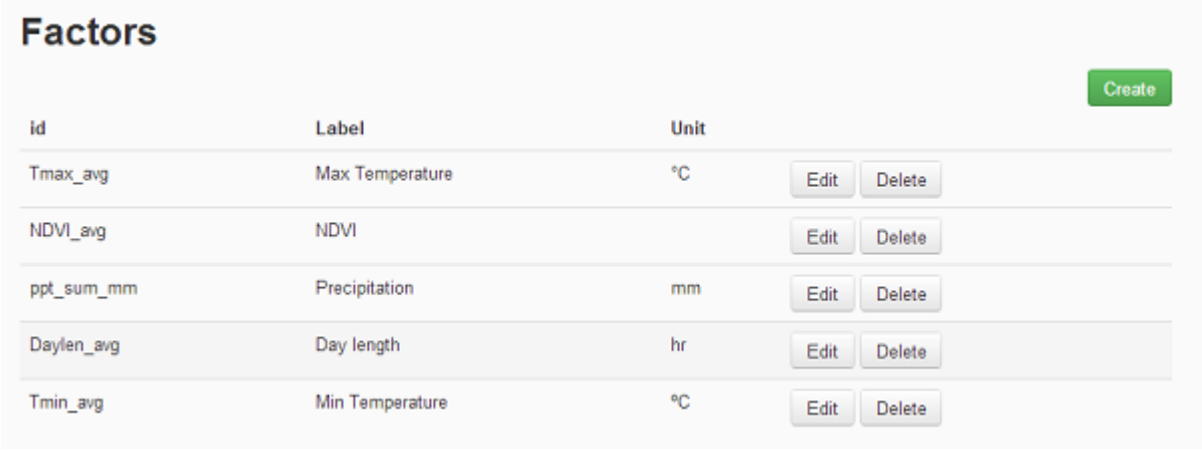

Figure 2.20: The list of available factors

Create a new Factor

To create a new factor, click on the **Create** button. A form with the information to set will be displayed. complete the form as follows:

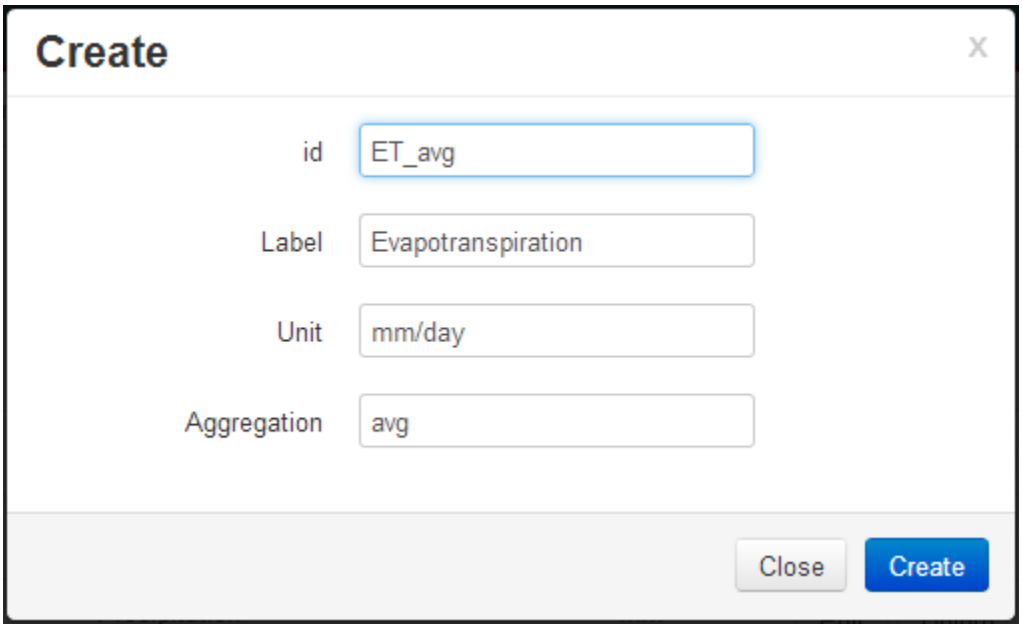

Figure 2.21: Sample Evapotranspiration factor

The new factor will be shown in the Crops list.

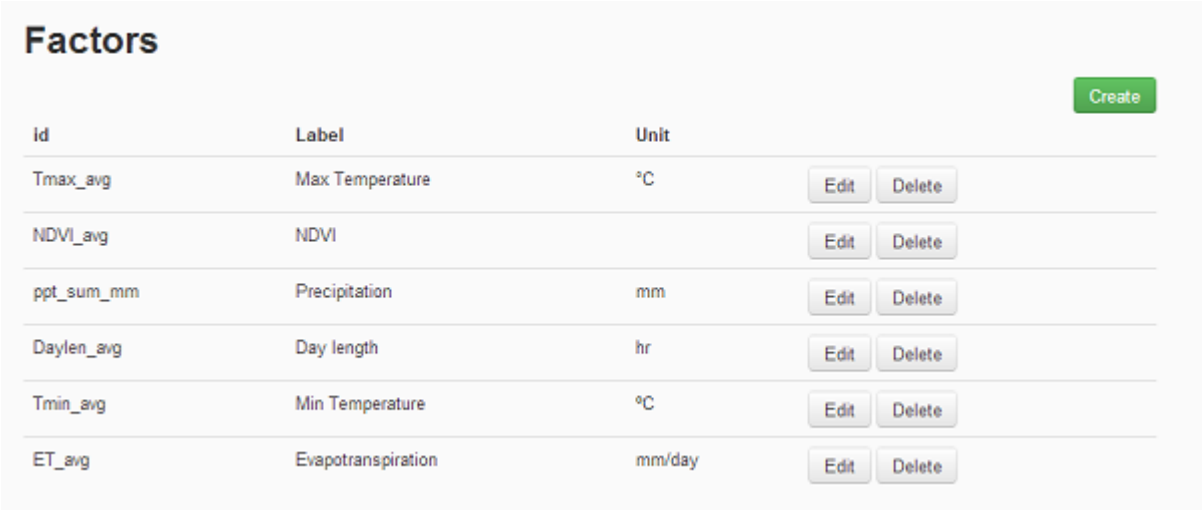

Figure 2.22: The new factor is added to the list

Anyway the new factor will not be available in MapStore until some data about the factor is ingested.

Edit/Delete Factors

You can edit/delete the factor clicking on the **Edit** and **Delete** buttons on the right of each row.

2.5 CSV Browser

This section explain how to use CSV Browser to allow:

- Create
- Update
- Delete

records on agromet, crop data and crop status tables. This allows to publish dekadal values for *Agromet* module, yearly values for *Crop Data* module and thresholds to use in the *Crop Status* module.

To access to this module you need to click on the navigation bar button 'File Browser CSV'

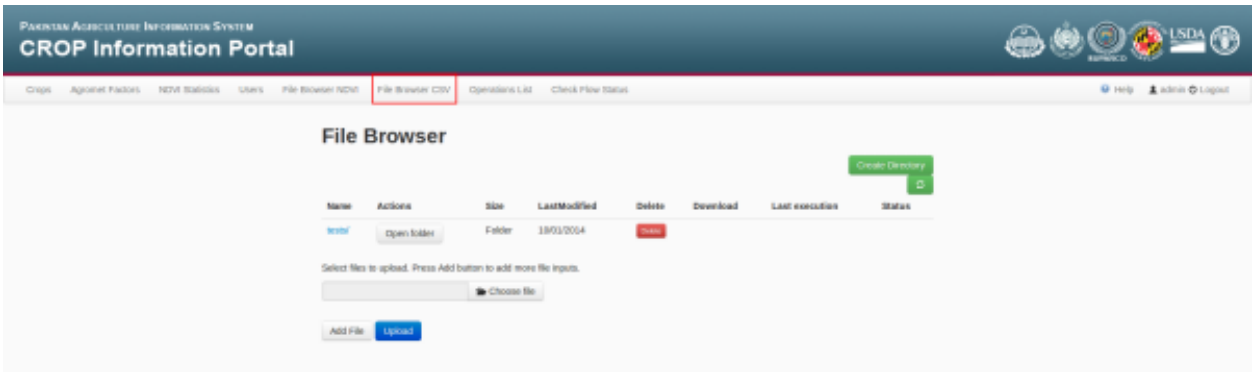

Figure 2.23: CSV Browser on navigation bar.

Now you can upload your files to launch the ingestion. The file operation and the target table depends on the CSV files you upload.

2.5.1 Known CSV formats

The target table depends on header row of the CSV file to be ingested and can be:

- Agromet
- Crop data
- Crop status

Agromet

The header for an agromet operation must be:

```
*,distr,prov,year,mon,dec,factor,*
```

and the values must be correct values for the database. For example:

```
rowId,distr,prov,year,mon,dec,factor,NDVI_avg
,Bolan,BALOCHISTAN,2013,Jan,1,fake_arg,100
2,Bolan,BALOCHISTAN,2013,Feb,1,fake_arg,200
```

Note: The **value** element is the measured value in that region during the period of time indicated expressed in the unit of measurement provided in the `agromet_descriptor`

The first column is ignored, the columns 'distr', 'prov', 'year', 'mon', 'dec' and 'factor' are the composed primary key of the database and the last column is the value of the agromet factor.

Crop Data

The header for a crop data operation must be:

```
*,crop,distr,prov,year,years,area,prod,yield
```

and the values must be correct values for the database. For example:

```
id,crop,distr,prov,year,years,area,prod,yield
dummy,rice,fake_dist,fake_prov,2000,2000-2005,1,1,1
```

Note:

- *area*: planted area for that region during the year and for the commodity indicated
- *prod*: production for that region during the year and for the commodity indicated
- *yield*: yield of the crop for that region during the year

The first column is ignored and the other columns are the cropdata table columns. The primary key is composed by columns: 'crop', 'district', 'province' and 'year'.

Crop status

The header for a crop status operation must be:

```
*,factor,crop,month,dec,max,min,opt,
```

and the values must be correct values for the database. For example:

```
rowid,factor,crop,month,dec,max,min,opt,
1,"Tmax_avg","fake_crop_2","Apr",1,16,42,15,20
1,"Tmax_avg","fake_crop_2","May",1,16,42,15,20
```

Note:

- *max*: the maximum value to show in Crop Status module for the dekad and the crop
- *min*: the minimum value to show in Crop Status module for the dekad and the crop
- *opt*: optimal value (dashed in Crop Status charts)

The first column is ignored and the other columns are the cropdata table columns. The primary key of this table is composed by: 'crop', 'month', 'factor' and 'dec' columns.

2.5.2 Operations

To apply changes to the data (insert, update, delete) you have do run the CSV operation to a csv file :

1). **Upload the file**: Select a file from your file system and click on *Upload*

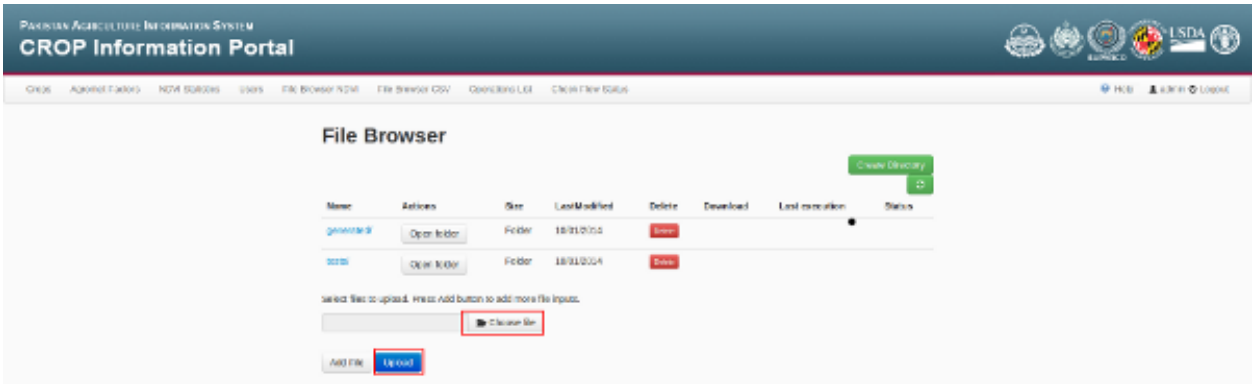

Figure 2.24: Upload a file.

2). **Execute the ingestion**: Click on *CSV* button.

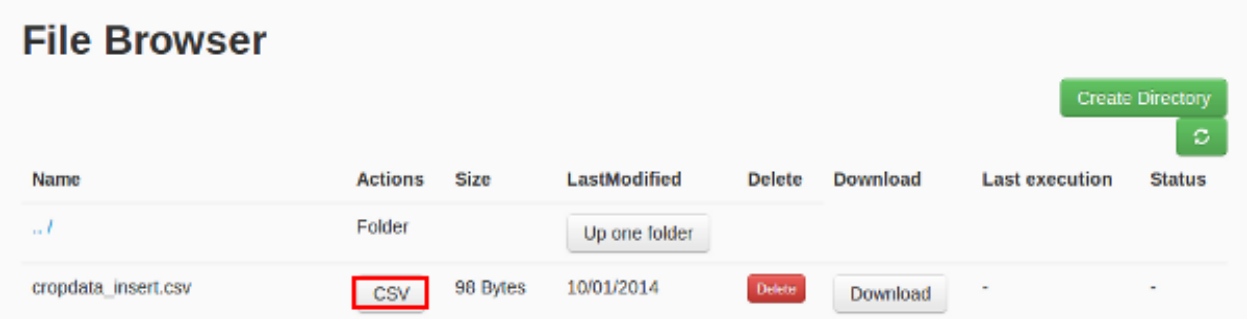

Figure 2.25: CSV button.

3). **Update the file browser status**: If you want, you can see the ingestion status, but if the file is big, you won't be able to view the resume before the ingestion will be finished. In this case, you will be able to update the file browser status and wait for a '*SUCCESS*' or '*FAIL*' message on the file.

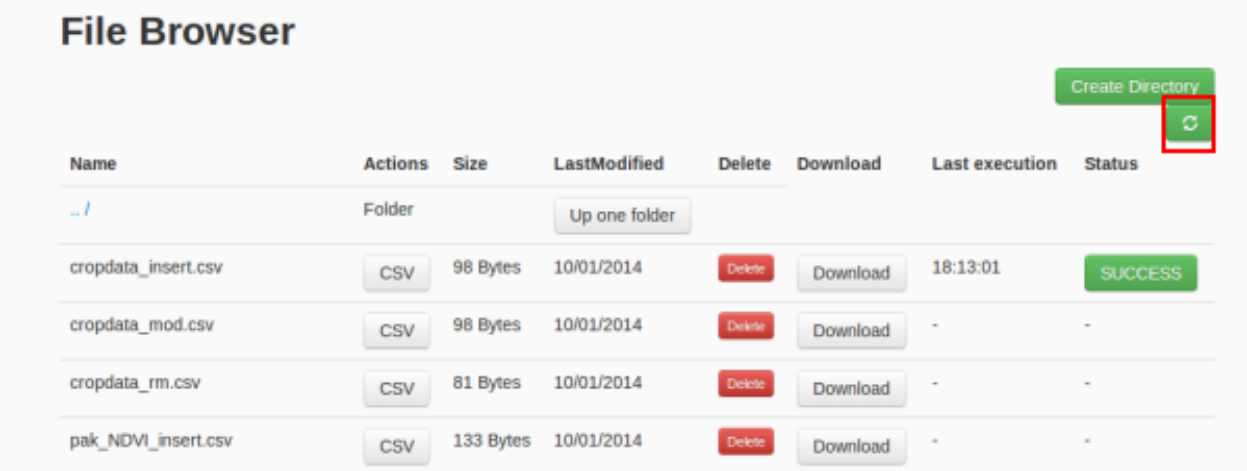

Figure 2.26: Update button.

4). **See the log**: Click on '*SUCCESS*' or '*FAIL*' message on the file

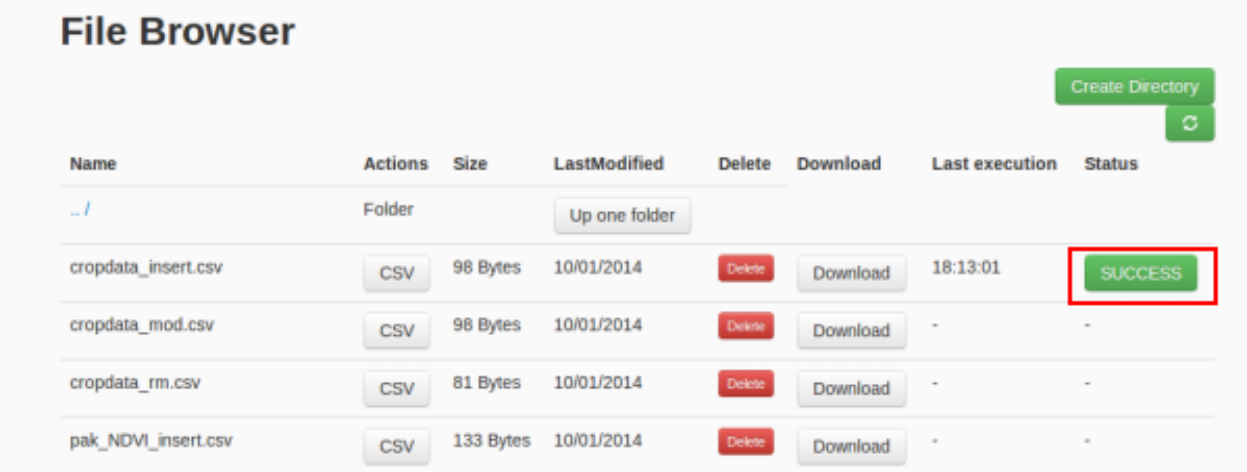

Figure 2.27: SUCCESS button.

and on '*Get status*' button on the next page.

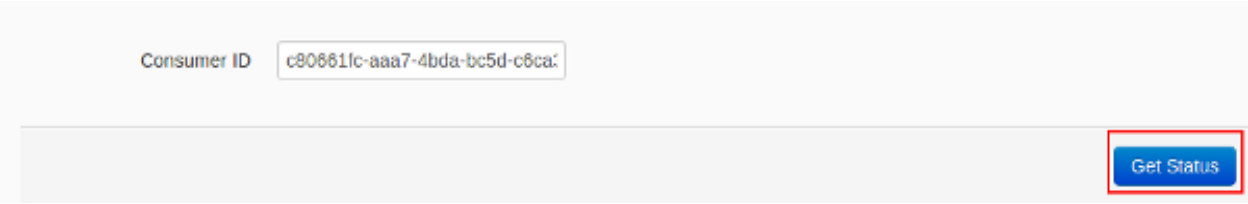

Figure 2.28: Get status button.

Then the log of the execution will be shown in the page. If the message is '*SUCCESS*' should appear a resume with the status of the CSV ingestion:

```
************************************************
********** SUCCESS: CSV ingestion resume **********
************************************************
* Records inserted: 1
* Records updated: 0
* Records removed: 0
* Failed records: 0
************************************************
```

We have attached examples for each operation and for each table.

Create

You need to create a CSV file with the new entry inside.

Examples:

- Agromet insert
- Crop data insert
- Crop status insert

Update

You need to create a CSV file with the primary key of the row to be updated and change the value to be updated.

Examples:

- Agromet update
- Crop data update
- Crop status update

Delete

You need to create a CSV file with the primary key of the row to be deleted and **leave all the other columns empty**.

Examples:

- Agromet delete
- Crop data delete
- Crop status delete

2.6 NDVI Browser

This module is designed to learn how to deploy new NDVI images on the server.

To access to this module you have to press the button on the navigation bar:

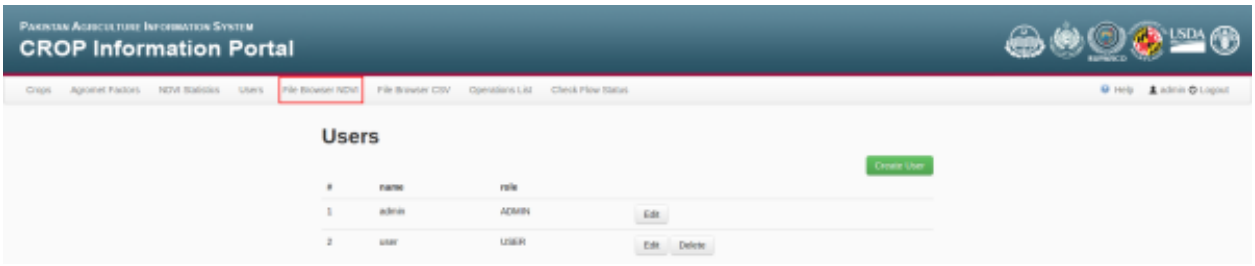

Figure 2.29: NDVI browser module link.

This operation publish a new Geotiff image for a date interval on the NDVI layer.

2.6.1 File format

The name of the Geotiff file must have this format: *dvYYMMD_*.tif* with:

- **YY**: Year of the image: two last digits of the year. *e.g.1998 becomes 98; 2000 becomes 00.*
- **MM**: Month of the image: between 01 (January) and 12 (December)
- **D**: Dekad of the image: 1, 2 or 3

2.6.2 Execution flow

The execution flow for this operation is:

1. **Upload the new NDVI**: Select the Geotiff file to upload.
2. **Execute the ingestion**: Press on *NDVI* button on the uploaded file.

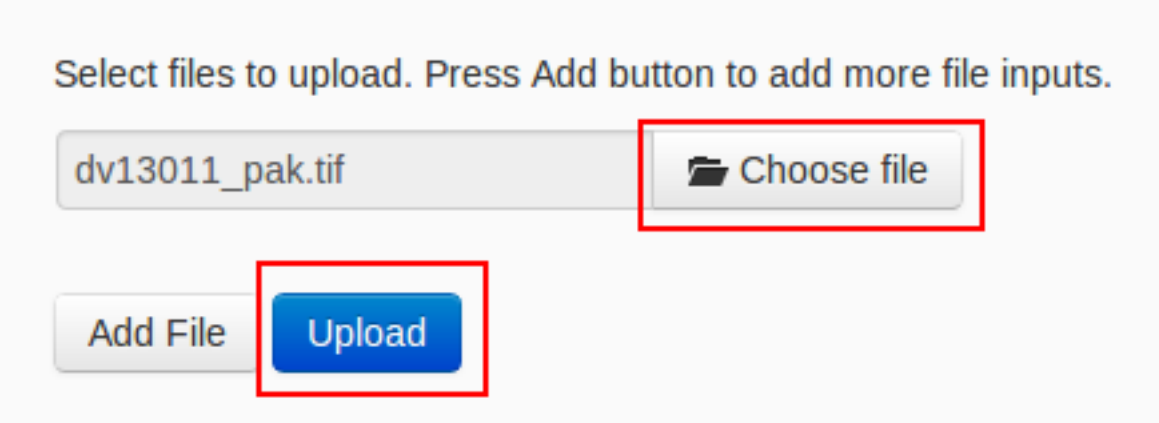

Figure 2.30: Upload button.

3. **Update the file browser status**: If you want, you can see the ingestion status,

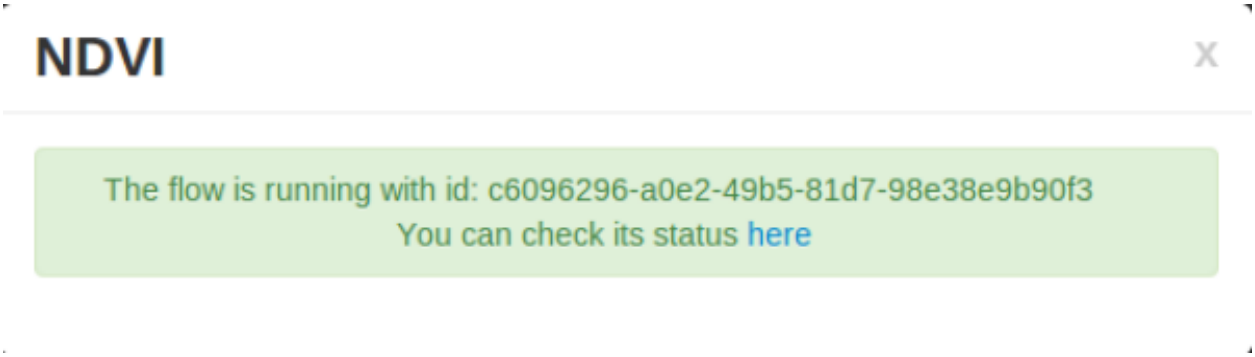

Figure 2.31: Get status after execution.

Note: If the file is too big, you will not be able to resume the status of the ingestion flow until the ingestion is finished. In this case, you will have to update the file browser status and wait for a '*SUCCESS*' or '*FAIL*' message about the ingested file.

Figure 2.32: Update button.

4. **See the log**: Click on '*SUCCESS*' or '*FAIL*' message on the file

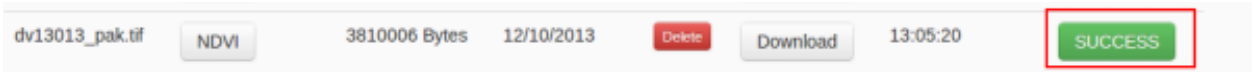

Figure 2.33: SUCCESS button.

and on '*Get status*' button on the next page.

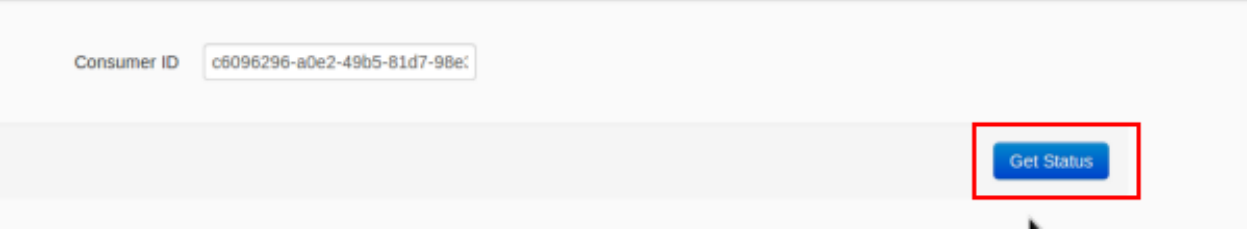

Figure 2.34: Get status button.

If the ingestion status is SUCCESS,

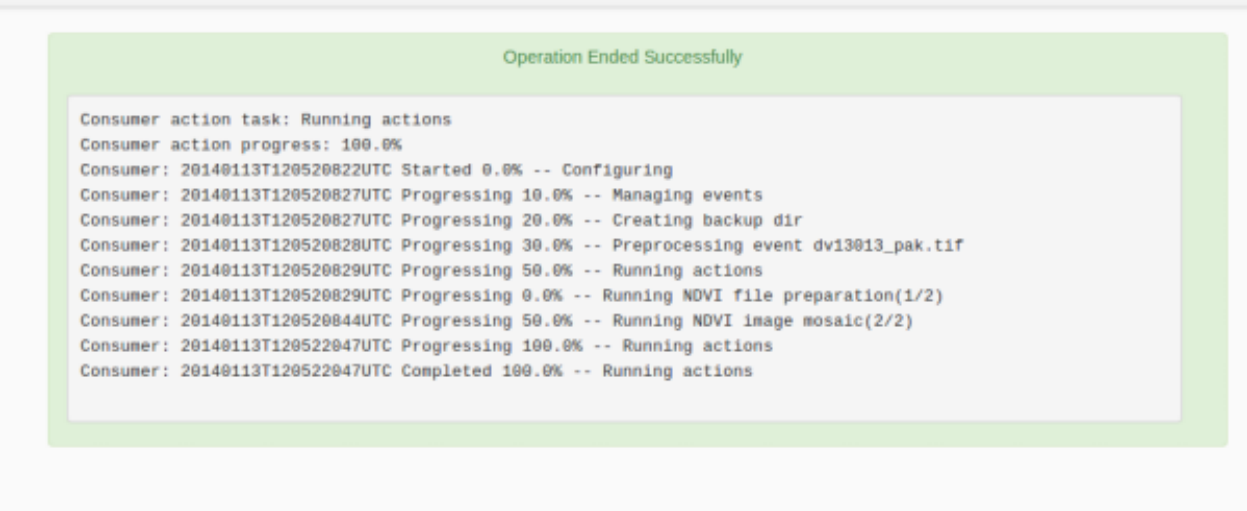

Figure 2.35: Status of the execution.

you can view the new granule on the different NDVI selectors:

- NDVI statistics
- NDVI tool (see user manual).

2.7 NDVI Statistics

This browser module allow you to generate a CSV with NDVI statistics.

To access it you have to press the button on the navigation bar:

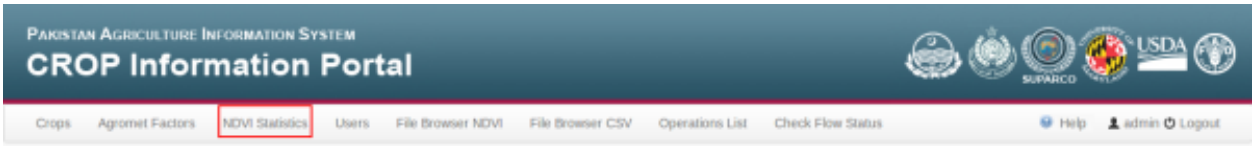

Figure 2.36: NDVI statistics module link.

Now you must complete the form:

Region: indicates if the statistics will be generated for each province or for each district. The default selection is `district boundary`

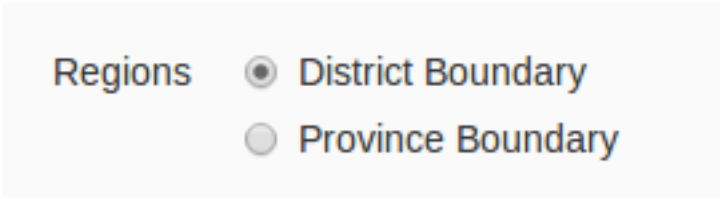

Figure 2.37: Regions selector

Mask: select a mask to be applied on the NDVI statistics generation. You can select the default `Crop Mask` (default), disable it or a `Custom` crop mask.

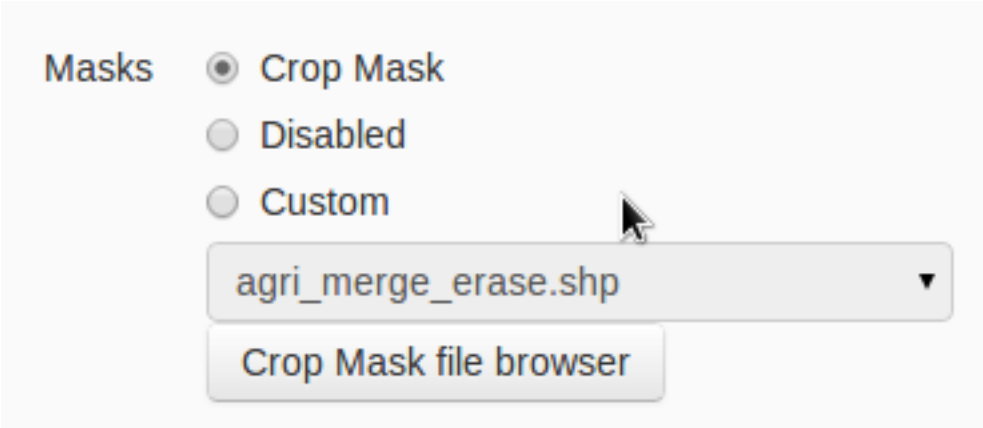

Figure 2.38: Masks selection.

Dekad: to select a dekad you must select the year, the month and the dekad of available dekads. As you know, avilable dekads are loaded from the NDVI layer on GeoServer. If you want to add a new dekad, you must follow the instructions of the NDVI file browser section.

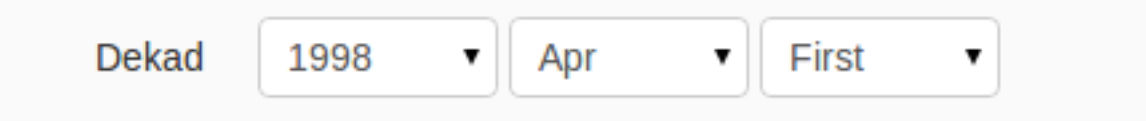

Figure 2.39: Dekad selection.

Then you must press on *Generate statistics*. When the the process will succeed, it will appear the generated CSV with the syntax on the CSV browser module on generated folder with the name linked to the selected form:

- *pak_NDVI_${region}_${crop mask}_${start date}_${end date}*

You can ingest as a CSV browser operation or simply download it to check the data.

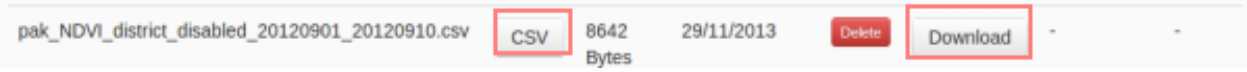

Figure 2.40: Generated CSV.

2.7.1 Crop mask file browser

If you want to use a custom crop mask, it's probably that you need to upload it before execute the NDVI statistics action. Please follow this instructions:

Open 'Crop Mask file browser': Press on this button

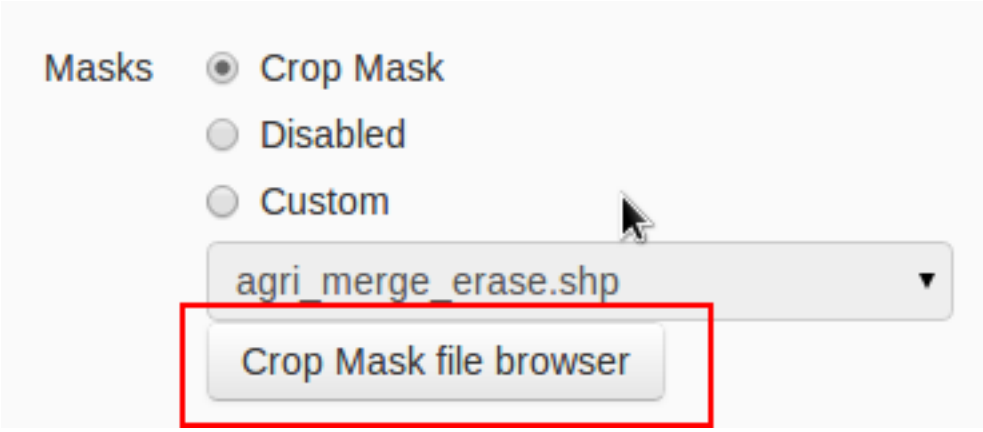

Figure 2.41: Crop mask file browser button.

Upload shp files: Upload the shape file and it dependencies one by one with the file uploader.

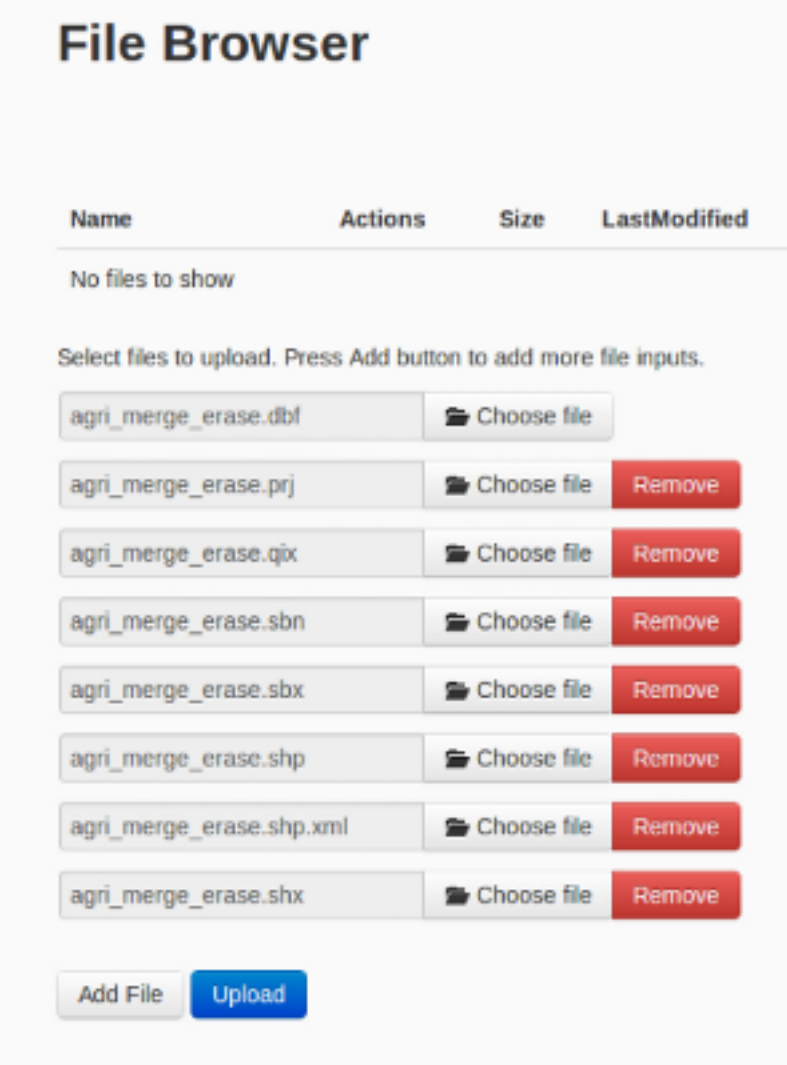

Figure 2.42: Crop mask file browser upload.

Now you can select the new crop mask as `custom mask` on the NDVI statistics form.

2.8 Flow Status

When you execute CSV ingestion, NDVI publishing or statistics generation, you start a flow execution on GeoBatch. Wile running, an identifier will be associated to that flow execution. We call this identifier the **Consumer ID**

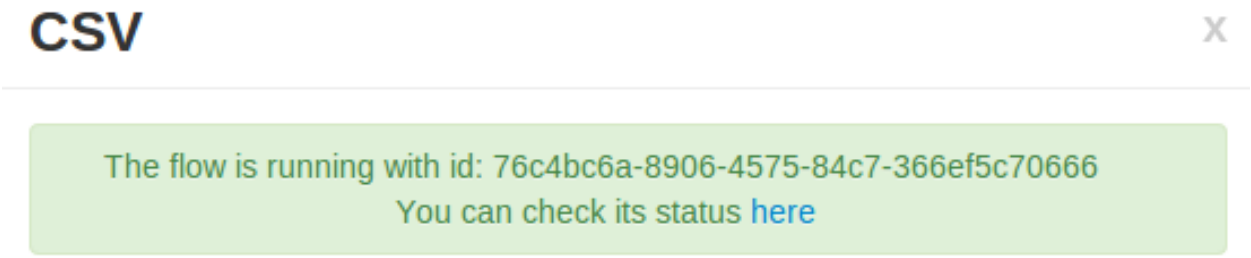

Figure 2.43: CSV execution. the *Consumer ID* is: *76c4bc6a-8906-4575-84c7-366ef5c70666*

Clicking on the link (*here*), you will be redirected to the *Flow Status* page. You can see the *Consumer ID* in the textbox and the *Get Status* button.

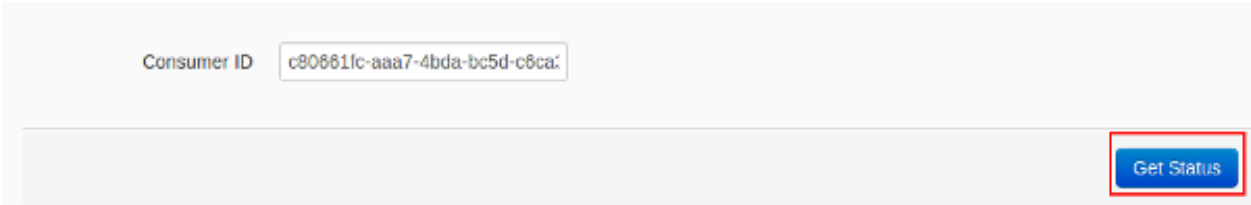

Figure 2.44: Get status button.

Clicking on the '*Get status*' button you will see the current log for the flow execution you started:

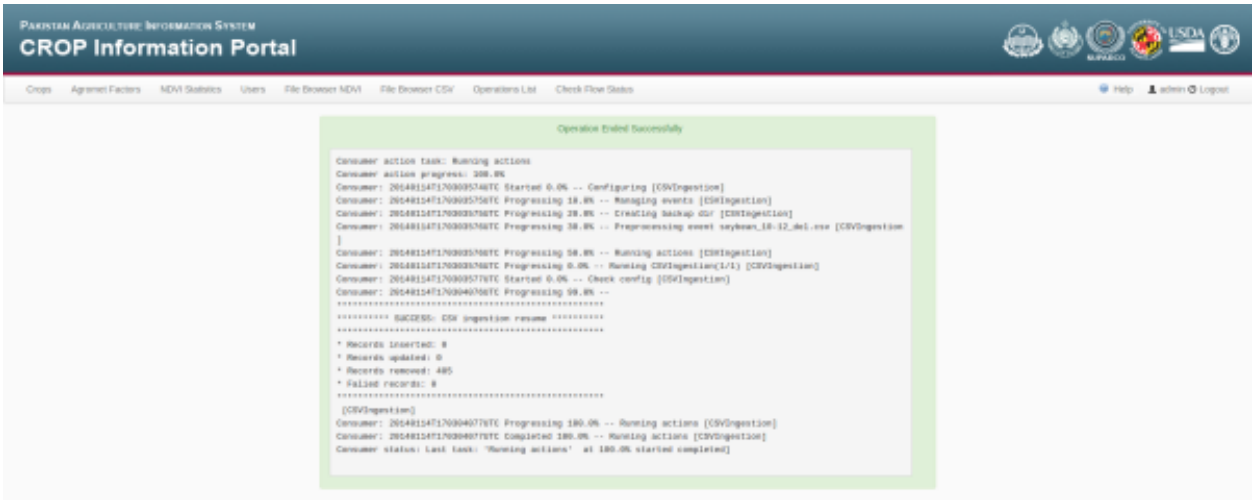

Figure 2.45: Message log.

The id of the flow is **volatile**. It means that if you switch the page after the execution, you must save the id if you want to access again to the log page for that flow execution.

Note: In the file browsers (CSV or NDVI), when you launch an operation for a file (e.g. CSV ingestion, NDVI publish), the application will save the last execution of a process for that file (last execution and Status columns). Than you can resume the log clicking on the status button. For more complex operations like NDVI Statistics you have to save the *Consumer ID* manually to recover the status of the process. Anyway, the full log for the operations execution is not stored forever.

If you have saved a *Consumer ID* and you want to see the log, you have to

1. press on `Check Flow Status` on the navigation bar,

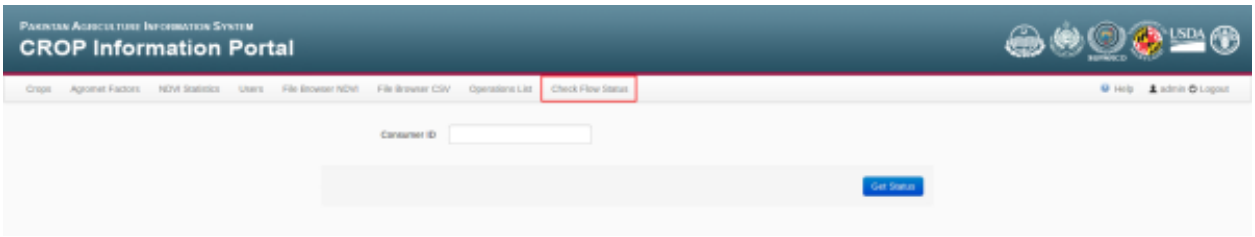

Figure 2.46: Get status module.

2. paste the *Consumer ID* in the textbox

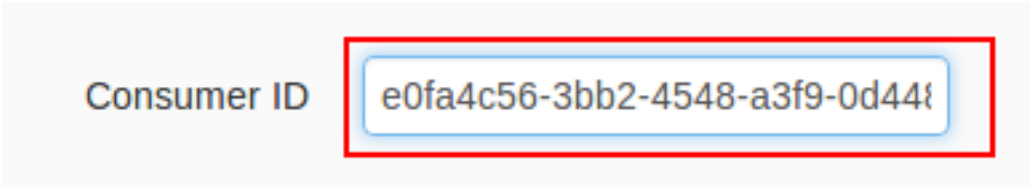

Figure 2.47: Consumer ID parameter.

3. Press on *Get Status* button.

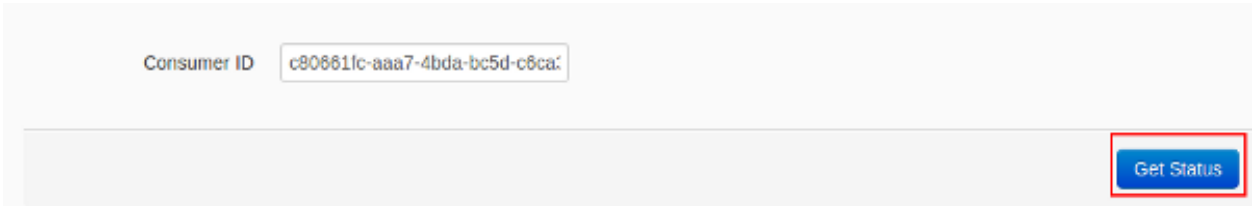

Figure 2.48: Get status button.

The log will appear again on your browser.

2.9 Operation List

The Operation List module is available clicking on *Operation List* in the navigation bar.

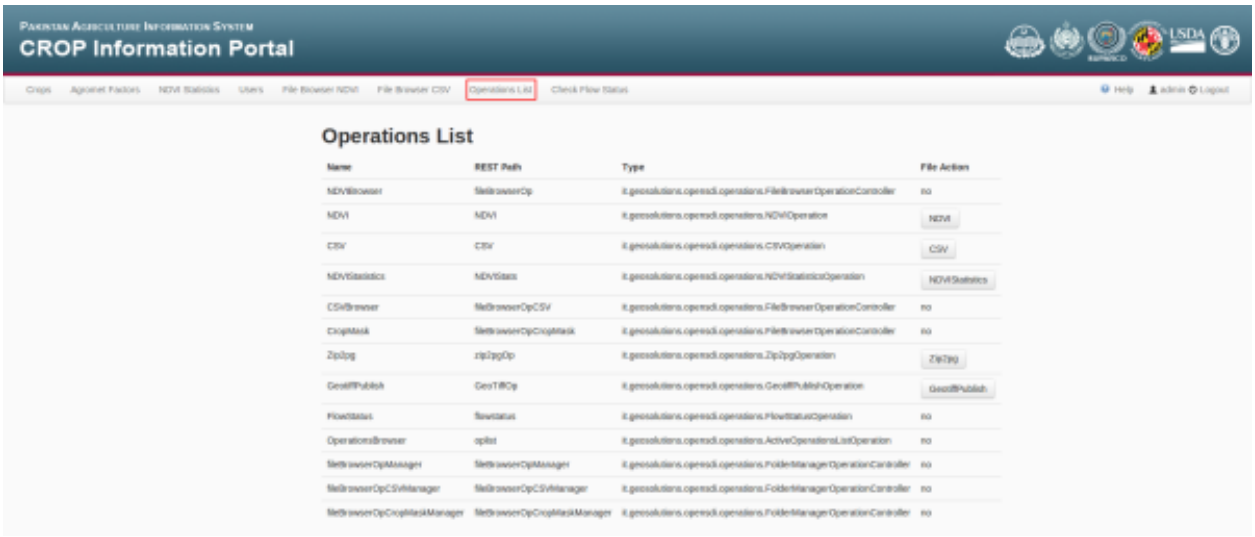

Figure 2.49: Operation list module.

This module show a resume of available operations on the application. For each available operation will show:

- **Name**: Name of the operation
- **REST path**: Used to access to the view of the operation and interact with this.
- **File Action**: Indicates if the file can be executed with a file.

PYTHON MODULE INDEX

C