

## AGROSTAC APIs

This document (version 2) gives an overview of the available AGROSTAC API services.

### Registration

To access the harmonized data in AGROSTAC a user first needs to register. For this purpose a registration form is available. The user is asked to register providing an email address, together with information on organization and function. By registering the user gives WUR the permission to store the email address, function and organisation with the purpose to send AGROSTAC related information.

#### REGISTRATION FORM:

<https://agrostac.wenr.wur.nl/register.html>

#### RESPONSE:

The response returns the following attributes:

- SUCCESS
- MESSAGE

The user will receive an email with a personal access token.

#### EXAMPLE:

```
{"success":true,"message":" API registration succeeded, please check your email"}
```

The user will receive an e-mail with the following content:

*Dear visitor,*

*Thank you for your registering for the Agrostac API.*

*Please use this access token for your API requests: xxx*

*Example: <https://agrostac.wenr.wur.nl/agrostac/crops?accesstoken=xxx>*

*Best regards*

*The agrostac team.*

In case the user would like to receive data via a download link, instead of a JSON-based API response, the email address is used to send such download link.

### Access token

One service (API request 3), providing general metadata of the available data sets, is fully public and does not need an access token.

Requests for retrieving available crops, available quantities per crop, available locations and requests for retrieving the data itself need a personal access token. See section registration.

Most data are open and made available under the original licenses (DATA\_ACCESS = OPEN). The data is accessible via the personal access token received after registration. Other data can only be shared within certain user groups (specific DATA\_ACCESS code). The AGROSTAC moderator can grant access on demand.

## 1. Retrieve crop codes

A list of available crop codes can be requested.

### REQUEST:

<https://agrostac.wenr.wur.nl/agrostac/crops?accesstoken=<youraccesstoken>>

### RESPONSE:

The response is an array of crops in JSON format, with the following attributes per crop:

- CROP\_CODE
- CROP\_NAME
- DATASET\_ACCESS

### EXAMPLE:

```
{"Crops":
[{"crop_code":"SBN","crop_name":"Soy bean (Glycine max)","dataset_access":"OPEN"}
,{"crop_code":"OAT","crop_name":"Oats (Avena sativa)","dataset_access":"OPEN"}
,{"crop_code":"RYE","crop_name":"Rye (Secale cereale)","dataset_access":"OPEN"}
,...
]}
```

## 2. Retrieve quantities per crop

For each crop the available quantities (variables) can be requested. The crop is indicated by parameter <CROP\_CODE>.

### REQUEST:

[https://agrostac.wenr.wur.nl/agrostac/cropquantities/<CROP\\_CODE>?accesstoken=<youraccesstoken>](https://agrostac.wenr.wur.nl/agrostac/cropquantities/<CROP_CODE>?accesstoken=<youraccesstoken>)

e.g. <https://agrostac.wenr.wur.nl/agrostac/cropquantities/MAZ?accesstoken=<youraccesstoken>>

### RESPONSE:

The response is an array of quantities in JSON format, with the following attributes (including time and data range coverage):

- CROP\_CODE
- QUANTITYCODE
- QUANTITYDESCRIPTIONUK
- QUANTITYDATATYPE
- QUANTITYID
- QUANTITYUNIT
- DATEMAX
- DATEMIN
- VALUEMIN
- VALUEMAX
- DATASET\_ACCESS

### EXAMPLE:

```
{"Cropquantities":
[{"quantitydatatype":"CISTRING","valuemax":null,"datemax":"2021-08-11","quantitycode":"CROP_CODE","valuemin":null,"datemin":"1980-04-16","crop_code":"MAZ","quantityid":2,"dataset_access":"OPEN","quantityunit":"-","quantitydescriptionuk":"Crop code"}
,{"quantitydatatype":"CISTRING","valuemax":null,"datemax":"2021-08-11","quantitycode":"CROP_DEV_BBCH","valuemin":null,"datemin":"1980-04-
```

```
16", "crop_code": "MAZ", "quantityid": 3, "dataset_access": "OPEN", "quantityunit": "-",
  "quantitydescriptionuk": "Crop phenological development according to BBCH scale"}
, ...
  ]}
```

### 3. Retrieve description of data sets

The description of one or all data sets can be requested. As this is general request no access token is required.

#### REQUEST:

<https://agrostac.wenr.wur.nl/agrostac/datasets/<datasetid>>

or

<https://agrostac.wenr.wur.nl/agrostac/datasets>

#### RESPONSE:

The response is an array of dataset codes in JSON format, with the following attributes per data set:

- DATASET\_CODE (a short meaningful unique code)
- DATASETID (unique code of data set)
- SOURCE\_URL (unique persistent identifier to the dataset)
- WIKI\_URL (reference to web page that explains data curation of the original dataset)
- TITLE (a short clear description of the dataset)
- LICENSE (license of the original dataset)
- RELATED\_PUBLICATION (how to cite the original dataset)
- ORGANIZATION\_NAME (name of organization and country of the original data set)
- ORGANIZATION\_WEB\_ADDRESS (URL of organization of the original data set)

#### EXAMPLE:

```
{ "license": "Creative Commons Attribution 4.0 International License; CC0 - Public Domain Dedicatation", "wiki_url": "http://wiki.agrostac.geodesk.nl/index.php/ODJAR_DE_WIT_ET_AL_2018", "related_publication": "De Wit et al., 2018, Open Data journal for Agricultural Research, vol. 4, pg. 22-27 (10.18174/odjar.v4i0.15925).", "organization_name": "Wageningen Environmental Research (WENR), The Netherlands", "title": "A dataset of spectral and biophysical measurements over Russian wheat fields", "dataset_code": "ODJAR_DE_WIT_ET_AL_2018", "source_url": "https://doi.org/10.7910/DVN/CG0UQB", "organization_web_address": "http://www.wur.nl/environmental-research" }
, ...
  ]}
```

### 4. Retrieve description of available crop locations

Get description of crop locations.

#### REQUEST:

[https://agrostac.wenr.wur.nl/agrostac/locations?objecttypecode=CROP\\_CULTIVATION&accesstoken=<youraccesstoken>](https://agrostac.wenr.wur.nl/agrostac/locations?objecttypecode=CROP_CULTIVATION&accesstoken=<youraccesstoken>)

#### OPTIONAL PARAMETERS:

- londd (decimal degrees)
- latdd (decimal degrees)
- distancedd (decimal degrees)
- email

The first three optional parameters enable selections for a certain user defined bounding box. The last parameter can be used to make the API response available as CSV-file via a download link sent to the specified e-mail address.

[https://agrostac.wenr.wur.nl/agrostac/locations2?objecttypecode=CROP\\_CULTIVATION&accesstoken=<youraccesstoken>&londd=32&latdd=-13&distancedd=1](https://agrostac.wenr.wur.nl/agrostac/locations2?objecttypecode=CROP_CULTIVATION&accesstoken=<youraccesstoken>&londd=32&latdd=-13&distancedd=1)

#### RESPONSE:

The response is an array of crop locations in JSON format, with the following attributes per crop location:

- OBJECTID (unique ID of location and its observations)
- NAMEORIG (unique name of location and its observations)
- LONGITUDEDD (decimal degrees)
- LATITUDEDD (decimal degrees)
- GEOM\_ACCURACY (indication of the spatial accuracy of a point location)
- ALTITUDEM (meters above sea level)
- DATEMIN
- DATEMAX
- NUMBEROFDATAROWS
- DATASET\_CODE (a short meaningful unique code)
- DATASET\_ACCESS
- FIELDMANAGEMENTTYPE (see Annex A)
- WATERMANAGEMENTTYPE (see Annex A)
- NUTRIENTSMANAGEMENTTYPE (see Annex A)
- NUTRIENTSNTYPE (see Annex A)
- NUTRIENTSPTYPE (see Annex A)
- NUTRIENTSKTYPE (see Annex A)
- PESTSDISEASESMANAGEMENTTYPE (see Annex A)
- OBJECTIVE (brief description of the objective of the experiment)

The OBJECTID is required to retrieve data for a certain crop location. The attribute NUMBEROFDATAROWS provides the total number of days available for a specific crop location.

#### EXAMPLE:

```
{"Locations":
[{"watermanagementtype":"NOT","datemin":"1995-12-03","numberofdatarows":20,"nutrientsntype":"NOT","dataset_access":"OPEN","nutrientsptype":"NOT","nutrientsktype":"NOT","fieldmanagementtype":"FIELD_TRIAL","pestsdiseasesmanagementtype":"UNKNOWN","nameorig":"CGIAR_CERES_HDL:1902.1\16308:hdl:1902.1\16308\Msekera\Expt91-3\Nofert","altitudem":null,"dataset_code":"CGIAR_CERES_HDL:1902.1\16308","geom_accuracy":1113.0,"nutrientsmanagementtype":"NOT","objective":"Integration of legume trees in maize-based cropping systems to improves yield stability","datemax":"2006-03-31","longitudedd":32.57,"objectid":5,"latitudedd":-13.65},...]}
```

## 5. Retrieve description of specific crop location

Get description of a crop location.

#### REQUEST:

<https://agrostac.wenr.wur.nl/agrostac/cropcultivationlocation/<OBJECTID>?accesstoken=<youraccesstoken>>

#### RESPONSE:

The response is an array of crop locations in JSON format, with the following attributes per crop location:

- OBJECTID (unique ID of location and its observations)

- NAMEORIG (unique name of location and its observations)
- LONGITUDEDD (decimal degrees)
- LATITUDEDD (decimal degrees)
- GEOM\_ACCURACY (indication of the spatial accuracy of a point location)
- ALTITUDEM (meters above sea level)
- DATEMIN
- DATEMAX
- NUMBEROFDATAROWS
- DATASET\_CODE (a short meaningful unique code)
- DATASET\_ACCESS
- FIELDMANAGEMENTTYPE (see Annex A)
- WATERMANAGEMENTTYPE (see Annex A)
- NUTRIENTSMANAGEMENTTYPE (see Annex A)
- NUTRIENTSNTYPE (see Annex A)
- NUTRIENTSPTYPE (see Annex A)
- NUTRIENTSKTYPE (see Annex A)
- PESTSDISEASESMANAGEMENTTYPE (see Annex A)
- OBJECTIVE (brief description of the objective of the experiment)

The OBJECTID is required to retrieve data for a certain crop location. The attribute NUMBEROFDATAROWS provides the total number of days available for a specific crop location.

**EXAMPLE:**

```
{ "CropCultivationLocation":
[{"watermanagementtype": "SUBOPTIMAL", "datemin": "1982-10-25", "numberofdatarows": 6, "nutrientsntype": "SUBOPTIMAL", "dataset_access": "OPEN", "nutrientsptype": "OPTIMAL", "nutrientsktype": "OPTIMAL", "fieldmanagementtype": "FIELD_TRIAL", "pestsdiseasesmanagementtype": "UNKNOWN", "nameorig": "ODJAR_KASSIE_ET_AL_2018:doi:10.7910/DVN/V4P6PU/PAGV8205/N3", "altitudem": null, "dataset_code": "ODJAR_KASSIE_ET_AL_2018", "geom_accuracy": 10000.0, "nutrientsmanagementtype": "SUBOPTIMAL", "objective": "Nitrogen application rate and timing at three locations", "datemax": "1983-08-02", "longitudedd": 5.5, "objectid": 1757, "latitudedd": 52.5}]}
```

## 6. Retrieve crop data for a specific crop location

Crop data can be retrieved for one crop location identified by the OBJECTID.

**REQUEST:**

[https://agrostac.wenr.wur.nl/agrostac/cropcultivationdata2/<OBJECTID>?access\\_token=<your\\_access\\_token>&pagenumber=<subsequent\\_value>&pagesize=<desired\\_number\\_of\\_records\\_per\\_page>](https://agrostac.wenr.wur.nl/agrostac/cropcultivationdata2/<OBJECTID>?access_token=<your_access_token>&pagenumber=<subsequent_value>&pagesize=<desired_number_of_records_per_page>)

For example:

[https://agrostac.wenr.wur.nl/agrostac/cropcultivationdata2/5?access\\_token=<your\\_access\\_token>&pagenumber=1&pagesize=50](https://agrostac.wenr.wur.nl/agrostac/cropcultivationdata2/5?access_token=<your_access_token>&pagenumber=1&pagesize=50)

**OPTIONAL PARAMETER:**

- pagenumber
- pagesize
- email

Retrieval can be organized in parts via paging. Paging works with the parameters pagenumber and pagesize. If both parameters are omitted all the records are returned. Parameter pagenumber activates

the paging (starting from 1 till a maximum value<sup>1</sup>). The default pagesize is 100 and can be changed by passing a different number.

The e-mail parameter can be used to make the API response available as CSV-file via a download link sent to the specified e-mail address.

## RESPONSE:

The response is an array with data in JSON format, with for each timestamp the following attributes:

- OBJECTID Unique identifier of crop location
- DATASET\_ACCESS Keyword on access
- DATEMIN First date of the observation period
- DATEMAX Last date of the observation period
- CANOPY\_HEIGHT\_M Canopy height in m
- CROP\_CODE Crop code
- CROP\_DEV\_BBCH Crop phenological development according to BBCH scale
- CUL\_NAME Cultivar name
- CUL\_NOTES Cultivar notes
- LAIG Leaf area index of green leaves (area leaves per surface area)
- LAIT Leaf area index of green and dead leaves (area leaves per surface area)
- PLANT\_DENSITY\_CNT\_M2 Planting density
- SO\_DWT\_KGHA Economic product (oven dry wt) in kg/ha, can be from intermediate harvest
- SO\_FWT\_KGHA Economic product (fresh wt) in kg/ha, can be from intermediate harvest
- SO\_MOISTURE\_FWT\_FR Moisture content of fresh yield (e.g., grain, fruit, leaves) in kg[water]/kg[harvest]
- TOPS\_DWT\_KGHA Above ground biomass (oven dry wt) in kg/ha, can be from intermediate harvest
- TOPS\_FWT\_KGHA Above ground biomass (fresh wt) in kg/ha, can be from intermediate harvest

## EXAMPLE :

```
{"CropCultivationData":
[{"laig":null,"tops_fwt_kgha":null,"so_fwt_kgha":null,"datemin":"1995-12-
03","crop_code":"MAZ","so_dwt_kgha":null,"tops_dwt_kgha":null,"dataset_access":"OPE
N","datemax":"1995-12-
03","lait":null,"so_moisture_fwt_fr":null,"canopy_height_m":null,"cul_name":"Hybrid
MM604","plant_density_cnt_m2":null,"crop_dev_bbch":"00","cul_notes":null,"objectid"
:5}
,{"laig":null,"tops_fwt_kgha":null,"so_fwt_kgha":null,"datemin":"1996-03-
01","crop_code":"MAZ","so_dwt_kgha":1975.0,"tops_dwt_kgha":null,"dataset_access":"O
PEN","datemax":"1996-03-
31","lait":null,"so_moisture_fwt_fr":null,"canopy_height_m":null,"cul_name":"Hybrid
MM604","plant_density_cnt_m2":null,"crop_dev_bbch":"99","cul_notes":null,"objectid"
:5}
,...
]}
```

## 7. Retrieve crop data for specific crop and quantity

To access data for a certain crop and quantity (see API request 2 for available quantities of crop of interest), the following request can be used.

---

<sup>1</sup> The maximum value can be calculated by dividing NUMBEROFDATAROWS of an OBJECTID (from request ../locations?objecttypecode=CROP\_CULTIVATION) by the pagesize

## REQUEST:

[https://agrostac.wenr.wur.nl/agrostac/cropdatabyarea/<CROP\\_CODE>?accessToken=<yourAccessToken>&cropQuantity=<QUANTITYCODE>](https://agrostac.wenr.wur.nl/agrostac/cropdatabyarea/<CROP_CODE>?accessToken=<yourAccessToken>&cropQuantity=<QUANTITYCODE>)

For example:

[https://agrostac.wenr.wur.nl/agrostac/cropdatabyarea/WHB?accessToken=<yourAccessToken>&cropQuantity=TOPS\\_DWT\\_KGHA&minlondd=4&maxlondd=6&minlatdd=51&maxlatdd=53&pagenumber=1&pagesize=500](https://agrostac.wenr.wur.nl/agrostac/cropdatabyarea/WHB?accessToken=<yourAccessToken>&cropQuantity=TOPS_DWT_KGHA&minlondd=4&maxlondd=6&minlatdd=51&maxlatdd=53&pagenumber=1&pagesize=500)

## OPTIONAL PARAMETERS:

- minlondd (decimal degrees)
- maxlondd (decimal degrees)
- minlatdd (decimal degrees)
- maxlatdd (decimal degrees)
- geom\_accuracy
- datasetid
- pagenumber
- pagesize
- email

The first four optional parameters enable selections for a certain user defined bounding box. Retrieval can be organized in parts via paging. Paging works with the parameters pagenumber and pagesize. If both parameters are omitted all the records are returned. Parameter pagenumber activates the paging (starting from 1 till a maximum value). The default pagesize is 100 and can be changed by passing a different number. The email parameter can be used to make the API response available as CSV-file via a download link sent to the specified e-mail address.

## RESPONSE:

The response is an array with data in JSON format, with for each timestamp the following attributes:

- OBJECTID Unique identifier of crop location
- LON Longitude (decimal degrees)
- LAT Latitude (decimal degrees)
- DATASETID Unique identifier of dataset
- DATEAVG Average<sup>2</sup> date
- CROP\_CODE Crop code
- <QUANTITYCODE> Value of selected quantity
- GEOM\_ACCURACY Indication of the spatial accuracy of a point location

## EXAMPLE :

```
{ "CropDataByArea":
  [ { "cropcode": "WHB", "dateavg": "1983-05-24", "tops_dwt_kgha": 4013.0, "datasetid": 19, "lon": 5.633, "lat": 51.967, "objectId": 7, "geom_accuracy": 100.0 }
    , { "cropcode": "WHB", "dateavg": "1983-06-13", "tops_dwt_kgha": 9230.0, "datasetid": 19, "lon": 5.633, "lat": 51.967, "objectId": 7, "geom_accuracy": 100.0 }
    , { "cropcode": "WHB", "dateavg": "1983-07-04", "tops_dwt_kgha": 13420.0, "datasetid": 19, "lon": 5.633, "lat": 51.967, "objectId": 7, "geom_accuracy": 100.0 }
    , { "cropcode": "WHB", "dateavg": "1983-07-18", "tops_dwt_kgha": 17134.0, "datasetid": 19, "lon": 5.633, "lat": 51.967, "objectId": 7, "geom_accuracy": 100.0 }
  ]
}
```

---

<sup>2</sup> Average date in case observed timestep spans a larger period than days

```
, {"cropcode": "WHB", "dateavg": "1983-08-01", "tops_dwt_kgha": 17183.0, "datasetid": 19, "lon": 5.633, "lat": 51.967, "objectid": 7, "geom_accuracy": 100.0}]}
```

## 8. Retrieve available observations (counts) for combinations of crop, quantity, and data set

This request provides the available observations (counts) for combinations of crop, quantity, and data set. This info combined with API request 3 provide all information (metadata) required to select a data set by the user.

### REQUEST:

[https://agrostac.wenr.wur.nl/agrostac/overview?access\\_token=<your\\_access\\_token>](https://agrostac.wenr.wur.nl/agrostac/overview?access_token=<your_access_token>)

### RESPONSE:

The response is an array with data in JSON format, with for each timestamp the following attributes:

- DATASET\_CODE (a short meaningful unique code)
- DATASET\_ACCESS
- DATASETID (unique code of data set)
- SOURCE\_URL (unique persistent identifier to the dataset)
- WIKI\_URL (reference to web page that explains data curation of the original dataset)
- TITLE (a short clear description of the dataset)
- LICENSE (license of the original dataset)
- RELATED\_PUBLICATION (how to cite the original dataset)
- ORGANIZATION\_NAME (name of organization and country of the original data set)
- ORGANIZATION\_WEB\_ADDRESS (URL of organization of the original data set)
- CROP\_CODE
- CROP\_NAME
- CUL\_NOTES\_COUNT
- CUL\_NAME\_COUNT
- CANOPY\_HEIGHT\_M\_COUNT
- LAIG\_COUNT
- LAIT\_COUNT
- CROP\_DEV\_BBCH\_COUNT
- PLANT\_DENSITY\_CNT\_M2\_COUNT
- TOPS\_FWT\_KGHA\_COUNT
- TOPS\_DWT\_KGHA\_COUNT
- SO\_FWT\_KGHA\_COUNT
- SO\_DWT\_KGHA\_COUNT
- SO\_MOISTURE\_FWT\_FR\_COUNT

### EXAMPLE:

```
{"Crops": [{"canopy_height_m_count": 0, "crop_code": "BAR", "wiki_url": "http://wiki.agrostac.odesk.nl/index.php/ZALF_1992_271", "crop_name": "Barley (Hordeum vulgare)", "dataset_access": "OPEN", "related_publication": "Mirschel et al. 2016, Open Data Journal for Agricultural Research, vol. 1, pg.6-15 (10.18174/odjar.v2i1.15412).", "laig_count": 0, "crop_dev_bbch_count": 100, "organization_name": "Leibniz Centre for Agricultural Landscape Research (ZALF), Germany", "lait_count": 0, "title": "Field trial data set for M\u00fcneberg experimental station, Germany.", "cul_name_count": 100, "dataset_code": "ZALF_1992_271", "source_url": "https://doi.org/10.4228/ZALF.1992.271", "organization_web_address": "http://www.zalf.de", "plant_density_cnt_m2_count": 36, "tops_fwt_kgha_count": 0, "license": "Creative Commons Attribution 4.0 International License; CC BY (Attribution)", "so_dwt_kgha_count": 32, "tops_dwt_kgha_count": 0, "so_fwt_kgha_count": 0, "datasetid": 14, "cul_notes_count": 0, "so_moisture_fwt_fr_count": 0}]}
```



## Annex A Management codes

During the harmonization of data, we made an assessment of the management in support of the use and interpretation.

The following management types are considered.

- FieldManagementType = UNKNOWN (or enter FARMER or FIELD\_TRIAL). Extra information on the context of the crop observation. Does the field management relate to a FARMER or a FIELD\_TRIAL? (if not specified, UNKNOWN will be set).
- WaterManagementType = UNKNOWN (or enter OPTIMAL or SUBOPTIMAL or EXT\_SERV\_RECOMM or NOT). Extra information on the context of the crop observation. Was the water management OPTIMAL or SUBOPTIMAL or EXT\_SERV\_RECOMM (extension service recommendations) or NOT (no management/irrigation)? (if not specified, UNKNOWN will be set).
- NutrientsManagementType = UNKNOWN (or enter OPTIMAL or SUBOPTIMAL or EXT\_SERV\_RECOMM or EXCESSIVE or NOT). Extra information on the context of the crop observation. Was the nutrients management OPTIMAL or SUBOPTIMAL or EXT\_SERV\_RECOMM (extension service recommendations) or EXCESSIVE (more than required by the crop) or NOT (no nutrients)? (if not specified, UNKNOWN will be set).
- NutrientsNType = UNKNOWN (or select OPTIMAL or SUBOPTIMAL or EXT\_SERV\_RECOMM or EXCESSIVE or NOT). Extra information on the context of the crop observation. Was the nutrients N-application OPTIMAL or SUBOPTIMAL or EXT\_SERV\_RECOMM (extension service recommendations) or EXCESSIVE (more than required by the crop) or NOT (no N-fertilization)? (if not specified, UNKNOWN will be set).
- NutrientsPType = UNKNOWN (or select OPTIMAL or SUBOPTIMAL or EXT\_SERV\_RECOMM or EXCESSIVE or NOT). Extra information on the context of the crop observation. Was the nutrients P-application OPTIMAL or SUBOPTIMAL or EXT\_SERV\_RECOMM (extension service recommendations) or EXCESSIVE (more than required by the crop) or NOT (no P-fertilization)? (if not specified, UNKNOWN will be set).
- NutrientsKType = UNKNOWN (or select OPTIMAL or SUBOPTIMAL or EXT\_SERV\_RECOMM or EXCESSIVE or NOT). Extra information on the context of the crop observation. Was the nutrients K-application OPTIMAL or SUBOPTIMAL or EXT\_SERV\_RECOMM (extension service recommendations) or EXCESSIVE (more than required by the crop) or NOT (no K-fertilization)? (if not specified, UNKNOWN will be set).
- PestsDiseasesManagementType = UNKNOWN (or select OPTIMAL or SUBOPTIMAL or EXT\_SERV\_RECOMM or NOT). Extra information on the context of the crop observation. Was the pest and disease management OPTIMAL or SUBOPTIMAL or EXT\_SERV\_RECOMM (extension service recommendations) or NOT (no pest and disease control)? (if not specified, UNKNOWN will be set).