GLTEN Help

Release 1.0

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Contents

Quick Start

These help pages are split into three sections:

Editing Experiment Metadata Provides support to GLTEN members for entering, submitting and editing Long-term Experiment metadata to https://glten.org.

Understanding the GLTEN Metadata Provides more information about the GLTEN metadata schema.

GLTEN API Provides help for users of the GLTEN API.

CHAPTER 2

Introduction to the GLTEN metadata editor

The GLTEN Metadata Editor is the part of the GLTEN Portal designed to collect information, or metadata, about long-term agricultural experiments.

2.1 Getting access

To submit LTE Metadata you need to be a GLTEN member and have a glten.org account. If you have an LTE that you would like to add, contact the GLTEN Coordinator at glten@rothamsted.ac.uk.

2.2 The Metadata Editor

The editor is organized into five main tabs:

1. Experiment overview
2. People/Organizations
3. Site
4. Design
5. Related publications

You must complete the mandatory fields for each tab before submitting your LTE Metadata to review.

2.2.1 How long does it take to create a metadata entry?

Long-term experiments can be complex. Before you start entering LTE Metadata you might want to spend some time considering what information you want to provide. Having this information at hand will make completing your LTE Metadata easier and quicker.

If you have the information at hand, it should take 1 to 2 hours to create a minimal metadata entry by completing all *mandatory fields*.

A lot more detailed information can be provided using the *optional fields* and it is up to you how much time you spend providing this information, but the more you provide, the more informative will be your LTE Metadata.

2.2.2 About Mandatory Fields

Mandatory fields must be answered. Providing data for these fields will provide other GLTEN users with enough information to have a basic understanding your LTE.

2.2.3 About Recommended Fields

You do not need to provide information for recommended fields, but doing so will give other GLTEN users a better understanding of your LTE.

2.2.4 About Controlled Vocabulary Fields

Many of the metadata editor fields use controlled vocabularies to recommend terms. Using a controlled vocabulary term improves the interoperability of your metadata as it means metadata is described using defined standard terms. Some controlled vocabulary fields will allow you to find terms using synonyms, for example, In the *crops* field, typing *alfalfa* or *lucerne* will both prompt for *Medicago sativa*. In this case *Medicago sativa* is the preferred name.

2.2.5 Can I save an incomplete metadata entry?

Yes, you can save your metadata and finish editing it at another time. You cannot submit the metadata for publication until all mandatory fields have been completed.

2.2.6 Validation Errors

Validation Errors are shown to help identify any mistakes in the LTE metadata, for example an end year is earlier than the start year. Validation errors will also highlight missing mandatory fields.

If your LTE Metadata record has validation errors you can save it and continue editing later, but you cannot submit it for review.

2.2.7 Submitting your metadata

Once you have finished editing your metadata you can use the *Publish* tab to request review and publication of your LTE Metadata. The GLTEN coordinator will review your LTE Metadata and publish it. If the GLTEN coordinator finds a mistake they will contact you to correct it.

2.2.8 Updating published metadata

Once you have published your metadata you can update it at any time, but you must follow the submission process as described above.

Experiment Overview

The Experiment Overview tab lets you provide basic metadata for your LTE.

3.1 Mandatory fields

You should complete the following fields:

Experiment Name A globaly-recognizable name for this LTE, which will – after publication – appear in the experiment list and map views.

Start Year The year the experiment started.

End Year If the experiment has ended, the year it ended. Either this field or the *Ongoing* field is required.

Ongoing If the experiment is still running, check this box.

Objective Use this text box to describe the primary scientific objectives of the LTE.

Data Access Statement The Data Access Statement provides information about how data from your LTE can be accessed. You can provide further details using the *Data Access Notes* text box.

Data Licence The Data Licence indicates the data license under which you normally provide data. If you do not have an agreed license for datasets, select the 'don't know' option.

Data Policy A data policy provides glten.org users with information about the conditions for accessing your LTE datasets. If you do not have a data policy select the 'No' option. If your data policy is online you should provide the web address in the 'Data Policy URL' text box.

3.2 Optional fields

These fields are not compulsory, but completing them will provide people with more information about your LTE.

Local Identifier An identifier which is commonly used to identify the LTE (if applicable)

Description Use this text box to provide additional descriptive information about the LTE.

Sample archive Check this box to indicate samples, for example, crops, fertilizers or soil are routinely collected and archived.

Samples available Check this box to indicate samples can be made available for research.

Data URL If data are available online, provide the URL for accessing the data.

People and Organizations

The People/Organizations tab is used to capture information about the people and organizations related to the LTE.

4.1 Organizations

Organizations can include the research institute or university managing the LTE; the farm where the experiment is located; organizations funding the LTE.

For each organisation you must provide a *Name* and select organizations the *Role* from the drop down list.

Optionally you can specify contact methods for the organization. You can add multiple contact methods using the *Add another contact method* button.

4.2 People

People can include the LTEs Principal Investigator; Data Manager; Farm Manager; a general contact email.

For each person you must provide a *Name*, *Affiliation* and *Role*.

You should make one of your persons a contact by checking the *Is contact person for this experiment* box. For this person, you must select at least one contact method. You can add multiple contact methods (e.g. email and phone) using the *Add another contact method* button.

If, instead of a named person, your main contact is a generic email (e.g. contact@my-lte.org) you should add this a person with a 'dummy' name e.g 'Contact us'.

Site

The site tab is used to capture metadata about your LTE's location and environment.

5.1 Site Location

5.1.1 Mandatory fields

Site Name This is the name by which your experiment site is commonly known. This can be the same as the experiment name.

Site Latitude and Site Longitude The site latitude and longitude provide a point location for your LTE site and are required for adding your LTE to the https://glten.org LTE map.

The site latitude and longitude must be provided in decimal degrees, not degrees, minutes and seconds. If you do not know your LTE site location coordinates as decimal degrees you can use https://www.latlong.net/ to find your site on a map then copy and paste a point coordinate.

> **Protecting farm privacy**. For LTEs sited on research institute or university farms, GLTEN recommends providing precise coordinates for the field site. However, if the LTE is located on a private farm you can provide less precise coordinates.

5.2 Soil Information

5.2.1 Mandatory fields

World Reference Base dominant soil type This is the World Reference Base dominant soil type for your site and provides a useful indicator of soil properties.

If you do not know the WRB soil type for your site, either use https://soilgrids.org to identify a predicated class for your location, or select the *Don't know* option from the drop down list.

5.2.2 Recommended fields

Soil description You can use the soil description text box to provide a text description of your soil. If you have measured properties, such as bulk density or SOC, use the *Soil Properties* list to add them.

Soil properties You can use the soil properties section to add more detailed soil physics and chemistry information such as sand content; soil organic carbon; Olsen P in soil. There is no limit to the number of soil properties you add.

For each soil property you can add the following information:

- Soil depth: provide a minimum and maximum range for the soil depth the property refers to. If you only have one depth value, enter it in the minimum depth field

- soil depth units.

- Is baseline: indicates whether the soil property was measured at baseline, i.e. before the LTE started.

- Reference year: the year when the soil property was sampled/measured.

- Is estimated: Check this box to indicate the property has been estimated i.e using a model. This may be the case for baseline values from older LTEs.

- Typical: this is an average value for the soil property.

- Minimum and Maximum: this is the range of values for the soil property.

- Units: the measurement units for the soil property.

5.3 Climate Information

5.3.1 Mandatory fields

Köppen climate classification This is the Köppen climate classification for your site and provides a useful indicator of climate poperties.

If you do not know the classification for your site, either use maps at Köppen Climate climate classification to identify the class or select the *Don't know* option from the drop down list.

5.3.2 Recommended fields

Climate Description You can use the climate description text box to provide a description of your climate. If you have measured properties, such as temperature or rainfall, use the *Climate Properties* list to add them.

Climate properties You can use the climate properties to add detailed climate information, for example rainfall or temperature. It is recommended to use averged annual properties (i.e. annual precipitation).

For each climate property you can add the following information:

- Start year and End year: to indicate the period of years the property refers to.

- Mean: value of the period.

- Minimum and Maximum values: for the period.

- Units: the measurement unit for the climate property.

Design Period

6.1 Experiment design

Every long-term experiment must have an experimental design. In the GLTEN metadata schema, the experiment design can include the following:

- Experiment design, including the number of replicates and plots.

- Crops and crop rotations.

- Factors, also known as treatments and interventions.

- Measurements and observations made.

Overtime LTEs modifications can be made to an experiment which change the overall design. The GLTEN metadata schema uses the Design Period concept to describe these significant changes. For example, in 1968 the [Broadbalk wheat experiment](https://www.glten.org/experiments/1) introduced crop rotations and modern short stem cultivars; in the GLTEN, this is treated as a separate design period to the preceding years.

Not every change needs to be documented as a different design period. The recommendation is to create a new design period for a significant change, such as introducing a new factor.

6.1.1 Recommended fields

Design Period Name The name given to the design period. If you only have one design period this can be left blank, but it is recommended to provide a name for experiments with two or more periods

Start Year, End Year & ongoing If the experiment only has one period this can be left blank. If your experiment has two or more design periods you should indicate the start and years for each period. Only the most recent period can be ongoing.

Design type Select an appropriate experiment design type from the list. If none matches, select *other* and provide a description in the *Design description* text box.

Design description Use this text box to provide a more detailed description of the experiment design.

Description Use this to provide comments about this design period, for example, minor changes.

Number of plots Use this to indicate the number of plots in the experiment. In the GLTEN schema, a plot is defined as the primary unit (area of land) of interest.

Number of replicates The number of replicates (i.e. plots receiving the same factor levels).

6.1.2 Optional fields

Harvests per year Indicates the maximum number of harvests per year.

Factorial Indicates whether or not the experiment is factorial, i.e all combinations of factor levels are present in the experiment.

6.2 Crops

Add the crops grown on your experiment here. In most cases you shouldn't specify cultivars or varieties here. If your LTE is evaluating different cultivars you should specify these as a *Factor*.

If crops are grown in rotation you can specify the rotation order in the next section.

6.3 Crop Rotations

The crop rotation section lets you describe the crop rotation(s) used in your experiment.

If you use crop rotation as a factor in your experiment you should still enter the rotations here and **not** in the *Factors* section. You should use the *Is factor?* option to indicate the crop rotation is a factor category.

For more detail on crop rotation terminology please review the *crop rotations help*.

6.3.1 Mandatory fields

Crop rotation name This is a meaningful name for the rotation and is especially helpful if you have several different rotations.

Is factor Check this box if crop rotations are used as an experimental factor.

Phasing Use this to state whether or not the rotation is fully phased (i.e. all phases of the rotation are present each year) or not.

Phases Add each crop as a phase. The drop down list is generated from the list of crops added to the previous *Crops* section, so make sure you have added all the crops cultivated in the LTE design period (if not you can easily go back and add them).

> If two crops occur in the same phase click the *same phase* button for the later crop. You now should see the two crops are now listed in the same phase.

6.3.2 Optional fields

Start Year and End Year If the crop rotations have changed during the design period, use these fields to state when a specific rotation was used.

6.4 Factors

For more detail on factors terminology please review the *factors help*.

6.4.1 Measured Variables

Related Resources

Use the related resources page to link to other online resources relevant to your LTE. Related resources can include:

- published papers e.g. key papers about your LTE

- websites, e.g. website for your LTE

- online documents such as plot maps for your LTE

For each resource you should provide the following three bits of information:

Title This is a descriptive name for the resource you are linking to e.g. *W.K. Kellogg Biological Station Publications website, 2012-present*.

DOI or URL Provide either the DOI (Domain Object Identifier) or URL for the online resource. e.g. *http://www.kbs.msu.edu/research/all-publications/publications/*

Language Indicate the language for the resource.

CHAPTER 8

Crop Rotations

This page will have more information about crop rotations.

Factors

Factors are the treatments or interventions which are manipulated on the LTE.

9.1 What is a factor?

9.2 Why do we use the term factor?

People use several different terms to describe factors, including treatments, variables and interventions. We use the term factor to be consistent with published formal controlled vocabularies and ontologies for statistics and agriculture. We have deliberately avoided the term *treatment* as this can be confused standard farm practice for an experiment.

For example, if nitrogen fertilizer is applied at different rates to different plots then nitrogen fertilization is the *factor* and each rate is a different *factor level*. Nitrogen **should** therefore be documented as a factor in the GLTEN metadata schema. If potassium is applied to the experiment plots but at the same rate for all plots then it is not considered a factor. In this example potassium is part of standard management practice for the experiment and **should not** be documented as a factor in the GLTEN metadata schema.

A factor can therefore be anything which is varied across the experiment by the researcher.

9.3 What is a factor level?

A factor level is one of the different interventions for a factor. For example, for the factor Nitrogen fertilization, rates of 50, 100, 150 and 200 kgN/ha would each be a factor level; the factor *Nitrogen fertilization* has 4 factor levels.

A factor level can also be categorical. For example, the factor *tillage process* can have 3 factor level categories: no tillage, minimum tillage and conventional tillage

9.4 What is a factor level combination?

In an experiment with two or more factors, a factor level combinations is a group of one factor level from some or all of the different factors.

For example, an experiment has two different factors with the following factor levels:

- **Nitrogen fertilizer exposure (factor)**

    1. 0 kgN/ha (factor level)

    2. 50 kgN/ha

    3. 100 kgN/ha

    4. 150 kgN/ha

    5. 200 kgN/ha

- **Tillage process**

    1. no tillage

    2. minimum tillage

    3. conventional tillage

An example of a factor level combination here would be 50 kgN/ha x minimum tillage. If this is a full factorial experiment, where every possible combination of factor levels are present there would be 15 factor level combinations in the study (5 Nitrogen levels x 3 tillage levels).

In the GLTEN metadata schema, for a full factorial experiment it is not necessary to describe every factor level combination. The factor level combination section is reserved instead for non-full factorial experiments. Using the factor level combinations section you can describe the combinations which are present.

CHAPTER 10

GLTEN and Vocabularies

Information about the GLTEN's use of controlled vocabularies will go here

CHAPTER 11

GLTEN API

Documentation for the API will appear here.