



# WWF Farm Loss Tool Guidance:

## Fruit, Vegetables & Tree Crops



Last update: 9 April 2024

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### **Acknowledgements**

This tool and the accompanying guidance have been developed in collaboration and with the support of numerous individuals and organisations. It builds on previous work by leading members of the Food Loss and Waste community including WRAP's Grower Guidance, WWF-US' SISC Food Loss Metric calculator and Dr. Lisa K. Johnson's measurement guidance and is guided by the *Food Loss and Waste Accounting and Reporting Standard*. We would like to extend our gratitude to all involved and especially our Advisory Committee for their time, support and expertise.

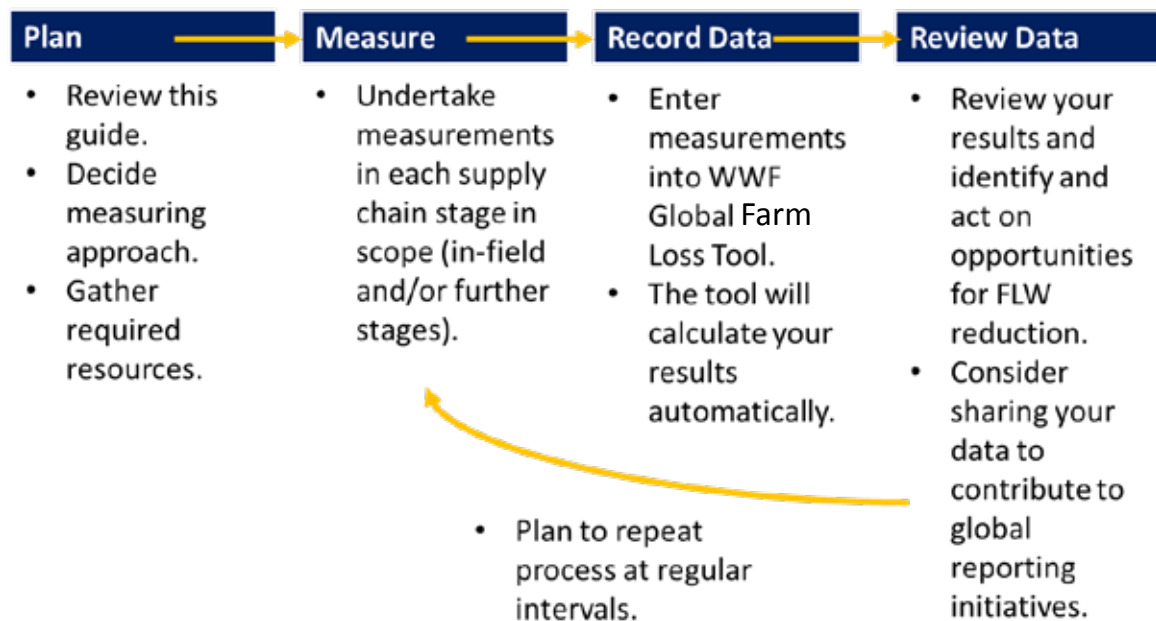
### **Disclaimer**

This tool is provided free of charge without any warranties as to its quality, accuracy or suitability for your purposes. The individuals and organisations which participated in the development of this tool accept no liability or responsibility for the accuracy of the data or outputs of this tool, or for any decisions or actions taken directly or indirectly as a result of using it.

## Overview

This guide is for farm businesses to help them assess the amount of crop that becomes surplus or waste instead of reaching its intended market. It covers the in-field stage of a grower's operation as well as other on-farm stages such as grading, storage, and processing. This document will help you to plan and undertake measurements, as well as assist you in entering your data into the WWF Farm Loss Tool so you can identify opportunities to reduce food loss and improve the volume of saleable produce and profitability.

Figure 1: Measuring and reporting food loss on farms process



This document builds on existing guidance and therefore should not require a substantial change in methodology for those already using the SISC tool and WRAP reporting templates. It covers the measurement and reporting of food loss on fruit, vegetables, and tree crop farms. (Future tool developments will expand the applicability of the tool to other products.) The WWF Farm Loss Tool allows data to be inputted from various stages of a farm operation. Users of the tool should select stages relevant to their operation.

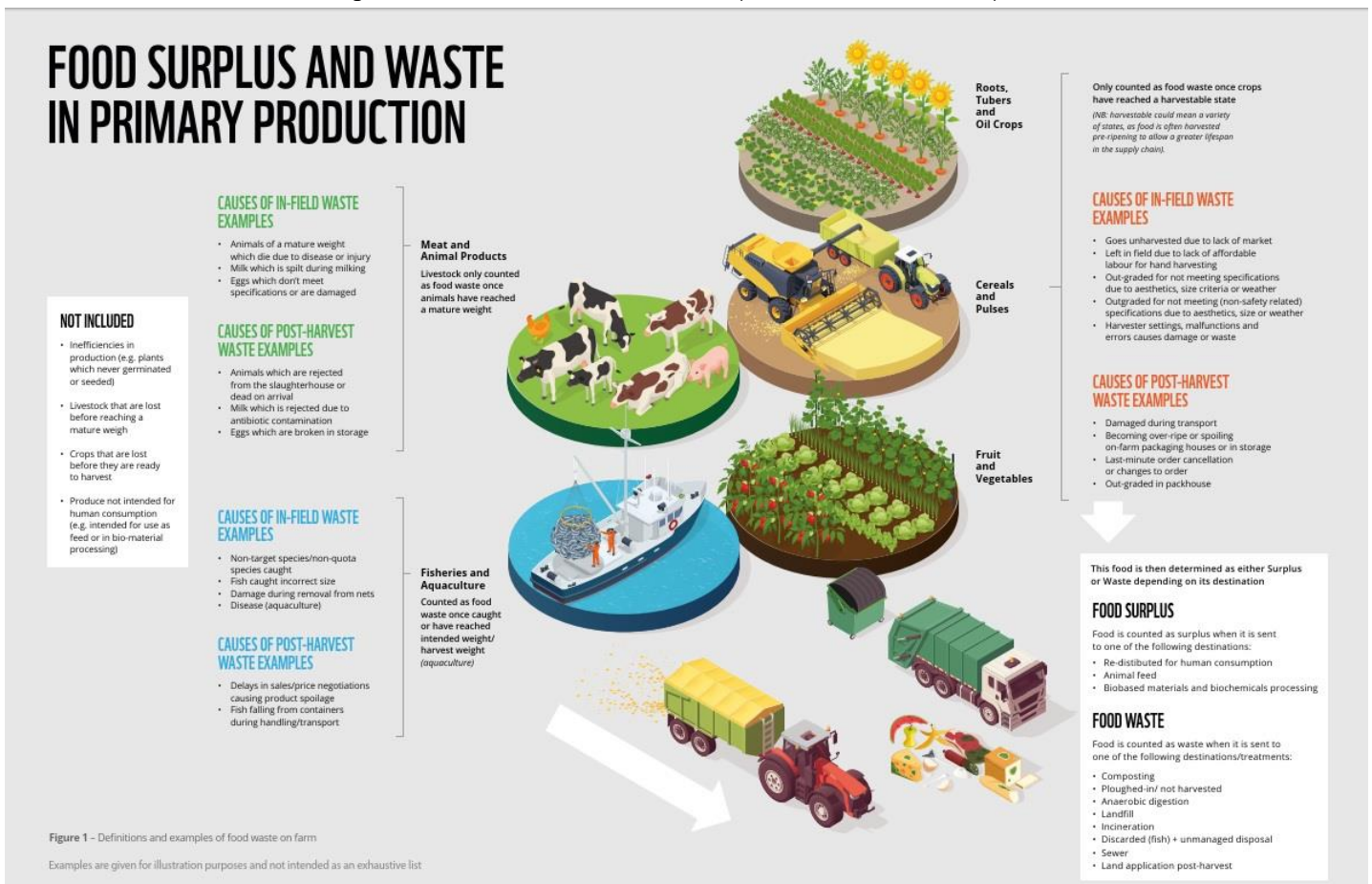
# Scope and Definitions

## Farm Food Loss

The focus of this tool is on-farm stage food loss. We are defining 'loss' as applying to any outputs from primary food production that are, or were at some point, intended for human consumption, but which end up not entering, or being removed from, the human food supply chain.

The scope of this tool starts from the point at which crops are "mature and ready for harvest." It enables growers and others to collect data on the amount of crop that is left in the field after harvest, is never harvested (i.e., "walked-by"), or is discarded in post-harvest undertakings on farms (for example: in storage or packhouses).

Figure 2: Food Loss on farm definitions (Hidden Waste, WWF-UK)



Please note that this tool is not relevant for crops grown for animal feed or biofuel. It is only relevant for measuring food which was intended for the human food supply chain, including food that has spoiled.

Associated inedible parts: 'Food' may include parts considered inedible in a particular supply chain, for example pits/stones, or outer leaves. Please note that this category should not be confused with food that has become spoilt and is no longer fit for human consumption. In order to understand what has been included in the data, if associated inedible parts were excluded from the measurement, it is best practice (but not a requirement) to report the inedible proportion- and specify what it is. What is considered 'inedible parts' can vary in different supply chains and

geographies. A list of inedible parts for crops commonly sold in the U.K. is available here <https://www.wrap.org.uk/sites/files/wrap/fresh-produce-sector-guidance.pdf> (see Appendix B). See the FAQ as well for additional guidance.

Figure 3: Stages of food loss for measurement



## In-Field Stage

Food loss includes any product left in the field once it is ready for harvest. Please note that losses that arise before a crop is ready to harvest are out of scope. For example, if a plant is lost during planting, maturation, or waste/removal of product due to pests these are considered outside of scope.

## Further Stages

As demonstrated in Figure 3, food surplus and waste can be measured at post-field stages as well and, where these arise within the farm, they should be reported as part of the farm's food surplus and waste. Any processes or activities which are within the farm's control or where the product is still owned by the farm can be included. The relevant stages vary among operations but may include:

<b>Packhouse</b>	Harvested product graded out or damaged during grading and sorting within the on-farm/ near farm packhouse (or relevant regional facilities when reporting across larger farm operations)
<b>Processing</b>	Any product removed from the human food chain (e.g., rejected) during pre-processing or processing on farm before the product is sent to market (again, this may include regional facilities that receive product). By-products such as shells are considered inedible parts and should be recorded as such.
<b>Storage</b>	Product lost in storage facilities on or belonging to the farm

# Planning for Measurement

## About In-Field Sampling

There is no obligation to follow any particular methodology to collect your data for the WWF Farm Loss Tool, but you may wish to follow the recommended process below. Once the harvest is complete, to populate the tool, an assessment can be done of the crop left in field. Please also include an assessment of whole blocks or fields that do not get harvested (e.g., ploughed in / walk-by).

Once the harvest is complete, to populate the tool, an assessment can be done of the crop left in field. Please also include an assessment of whole blocks or fields that do not get harvested (e.g., ploughed in / walked by).

## Planning for In-Field Sampling

1. **Assign roles:** Consider which of your colleagues will be responsible for undertaking the measurements and decide when to involve them in the planning process.
2. **Decide which crop(s) you will measure:** If you are measuring multiple crops, it is best practice to assess each crop separately. Where relevant, decide whether to measure all or only some varieties.
3. **Decide measuring and sampling timeframes:** Decide what time frame is relevant to the crop(s) that you will measure. Normally this would be a whole season, for example, the 2021 season. If the crop is harvested multiple times throughout the season, decide whether a better approach for your crop is to take sample measurements several times over the season instead of waiting until the harvest is complete.
4. **Decide sampling area/region:** Decide whether you will measure across all areas where you grow your crop(s) (i.e., across multiple blocks, fields, or farms) or only some. If the latter, decide which crop(s) are the most representative of your total area. The area/region will depend on specific circumstances including climate zones, soil types, and other factors which would affect the representativeness of your sampling strategy.
5. **Decide your sampling strategy for measuring after the harvesting team have finished:**
  - a. In-field measurements should be taken immediately after harvest, so decide when that will be.
  - b. Take measurements in at least three sampling areas across any field/block. This is done to take into account differences in field conditions and harvesting techniques

### Time Required

Previous experience suggests that following the approach outlined for in-field sampling takes two people about an hour to sample three rows and a further 1- 1½ hours to sort and weigh the sample by the three categories and input the data.

used by farm personnel. Taken together, the sampled areas should be representative of the field/block as a whole.

*Note: The beta tool can accept less than 3 samples – just enter 0s in the sample columns you are not filling in.*

- c. Consider what health and safety risks there may be.
6. **Gather equipment:** In advance, gather any equipment that will be needed to undertake the in-field measurements. This includes:
  - a. Measuring tape,
  - b. Flags/canes (at least 2) to mark out the sampling areas
  - c. Bags, or containers (at least three) to collect crops and keep the samples separate
  - d. Scales (for either weighing in field, or weighing in subsequent location),
  - e. The Farm Loss Tool Field Worksheet and pencil/pen to keep track of measurements, and
  - f. Harvesting tools (e.g., knife, gloves).
  - g. Other useful equipment can include safety clothing, a field map, and a camera (photographing what is collected helps with interpreting and sharing the results).



7. **Print Field Worksheet (optional):** Download or print off the Field Worksheet to help you record the in-field measurements.

### **Planning for Measurement of Further Stages (Post-Harvest Losses)**

You will measure the losses from each relevant further stage (e.g., packhouse, storage, processing) by weighing the crop received at the further stage in addition to the crop leaving the stage (a mass balance approach).

For further guidance on methods of collecting data, or guidance on the fresh produce sector, please see the links in the Appendix.

## Measuring In-Field Loss

This section outlines a recommended step-by-step process of how to sample and collect the appropriate input data to use the WWF Farm Loss Tool as a calculator.

For the in-field stage, data can be collected through either sampling or direct weighing. For further stages, a total amount can also be entered if all the crop lost at a further stage has been assessed.

### In-Field Sampling Method

**Step 1:** Identify three rows (or other areas) representative of the field.

**Step 2:** Go into the field, mark the rows to be sampled (or selected number of trees to measure around), and harvest all crop not picked (or dug up). For each row (or other area being sampled):

- Measure the length of row or area from which to remove (e.g., pull off, dig up) all the remaining product. For many crops, a length of 50 feet/15 meters is robust enough. Select a relevant length for your sampling to be representative. For tree crops, a recommendation is to measure a 10-foot by 10-foot plot under at least 3 representative trees.
- Mark the beginning and end of the row or area with a flag/cane or any marker that helps the measurer determine the sample area.
- Keep track of the width of the area sampled (e.g., row spacing) as this data will be important for extrapolating the sampled area to the entire field.
- Harvest each row or tree, harvesting all the product left on the plant (or rejected and in the furrow, or still underground), no matter the reason or condition. Even diseased, decayed, overly mature, sun-scalded, or damaged vegetables, fruits, or nuts that remain attached to the plant should be harvested for this measurement; that information will be important for calculations. Put samples from each row in a separate container. You may decide to also measure product that has dropped on the ground but indicate so in the Farm Loss tool and keep this data separate (see FAQ for further guidance).

The following photos show two examples of these steps.





Measuring and marking



Collecting unharvested



Product left after harvest



Measuring and marking rows



Collecting unharvested product



Product left after harvest

**Step 3:** Determine what qualifies as marketable, edible/not marketable, and spoiled for your operation (see definition of categories below and keep track of criteria you used).



**Left to right:** Marketable; edible not marketable; and spoiled.

**Step 4:** For each row (or other area), sort samples collected into separate containers according to each of these 3 categories: marketable; edible (but not marketable) and spoiled. This will allow you to determine the value of potentially saleable product.

### Definitions of Categories for sorting

**Marketable:** Crop left in the field that meets buyers' current quality specifications.

**Edible, not marketable:** Crop left in the field that does not meet buyers' current quality specifications but is still considered edible for human consumption. This refers to 'quality' issues, rather than edibility (e.g., too large or small, cosmetic blemishes, wrong colour).

**Spoiled:** Crop left in the field that is no longer considered fit for human consumption. This may be from damage (e.g., by pests, weather), disease, or decay.



**Left:** Measuring the size of tomatoes to check marketability. **Right:** Sorting tomatoes into 2 types of "Not marketable" (This further separation within the 3 categories is optional but can be useful).

**Step 5:** Weigh the sampled product as sorted by the 3 categories, keeping data from each row separate. When recording the weight, remember to subtract container weight.

**Step 6:** Try and utilise your samples (e.g. give away edible food)

**Where a whole field or block is never harvested** (a walk-by), you can calculate the food surplus and waste based on the size of the unharvested area (i.e., cropped area, not field size) and the average yield; note that there is no need to take sample measurements. If the crop is ploughed in before it reaches full weight, you may prefer to take in-field measurements.

## **In-Field Direct Weighing Method**

If all the crops eventually left in the field or lost have been harvested and weighed, a total amount can be entered into the tool.

With this method, you will similarly need to categorize the loss into the three categories: marketable; edible (but not marketable) and spoiled as explained above.

## **Measuring Further Stages Loss (Post-Harvest)**

As noted previously, the data needed for on-farm stages after crops are harvested (e.g., storage, packhouse) follows a mass balance approach where you will need to note that 'quantity received' at the stage as well as the 'quantity leaving' the stage.

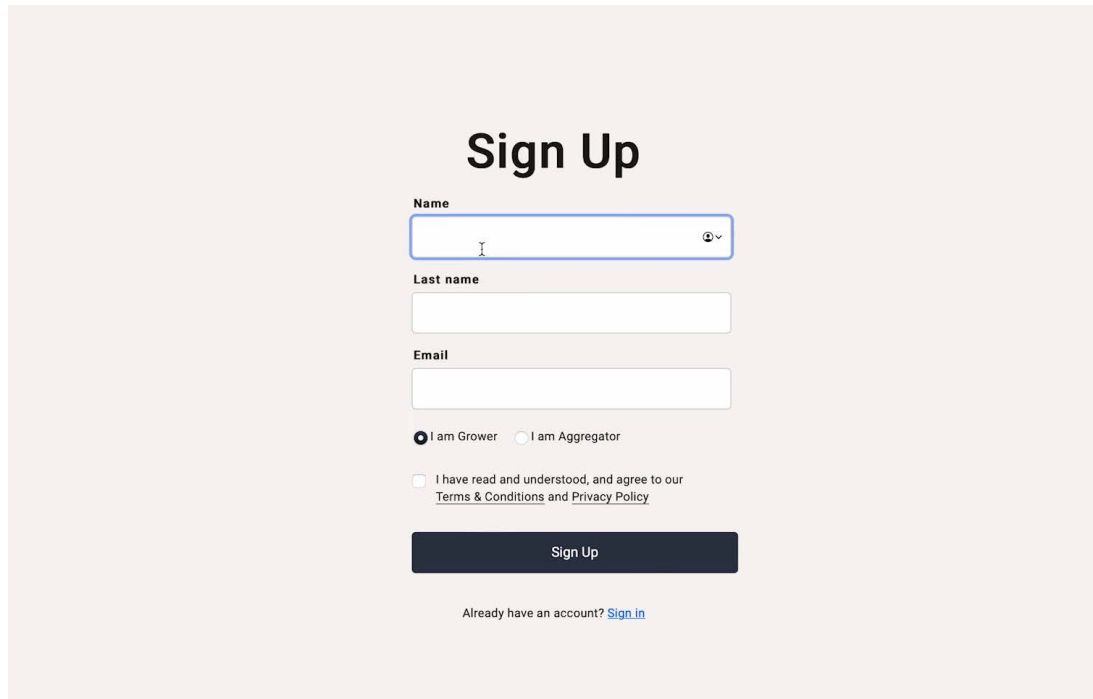
You will then need to categorize the loss into the three categories:

marketable; edible (but not marketable) and spoiled.

## Record Data (How to Enter Data into the WWF Farm Loss Tool)

This section outlines how to enter your data into the WWF Farm Loss Tool.

Begin by Signing Up on the home page and select where you are a grower or an aggregator. Growers are the users out in the field, on farm, measuring loss, whereas aggregators are often suppliers or buyers who are interested to review the loss data being submitted by their growers.



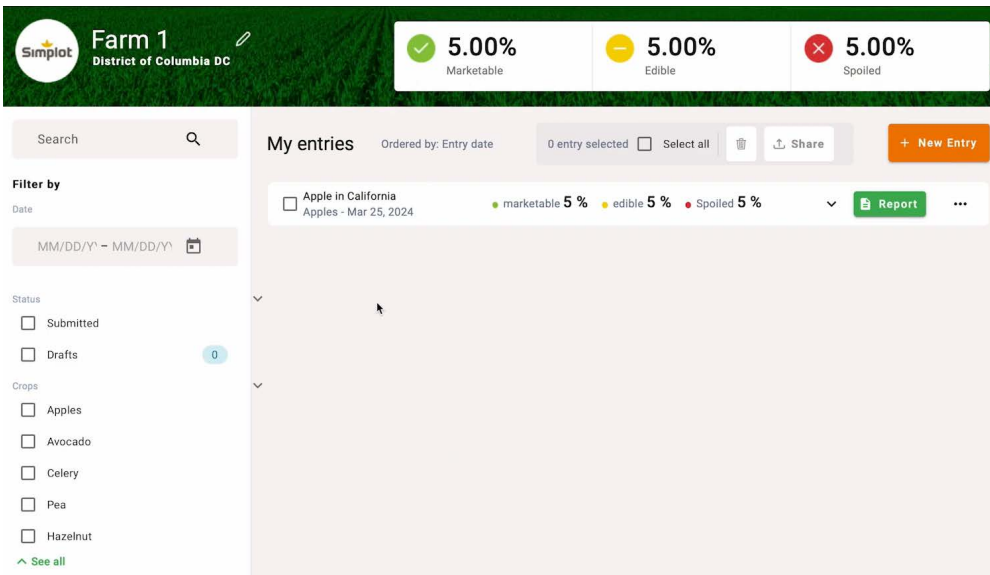
The screenshot shows a 'Sign Up' form on a light beige background. The form is centered and contains the following elements:

- Sign Up**: Large, bold, black text at the top of the form.
- Name**: A text input field with a blue border and a small eye icon on the right.
- Last name**: A text input field.
- Email**: A text input field.
- I am Grower**: A radio button that is selected.
- I am Aggregator**: A radio button that is not selected.
- I have read and understood, and agree to our Terms & Conditions and Privacy Policy**: A checkbox that is not checked.
- Sign Up**: A dark blue button with white text.
- Already have an account? [Sign in](#)**: A link in blue text below the button.

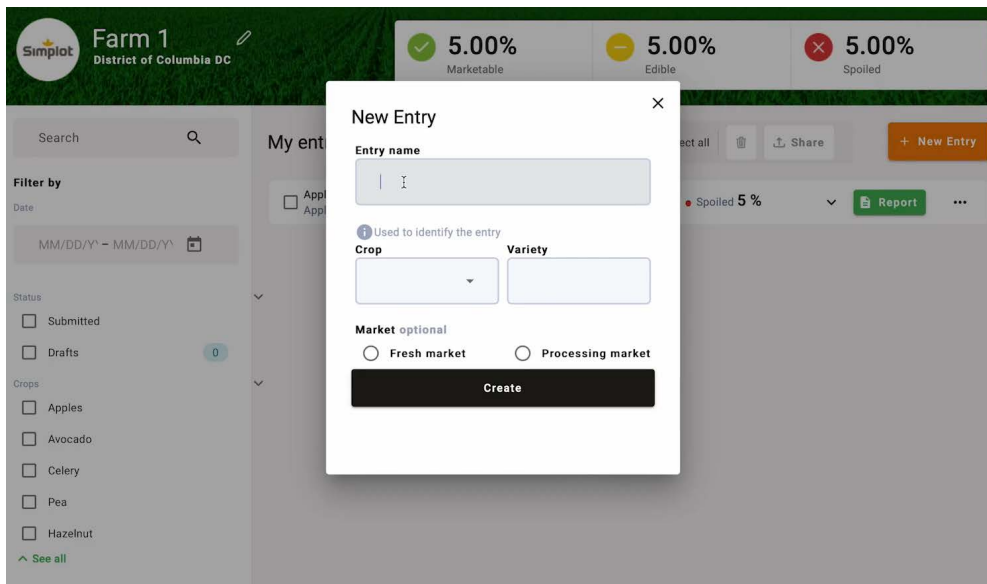
After signing in, you will also be able to enter some basic information about your farm, including the name, location, and your preferred units of measurement (which will auto-default based on your location, but which you can override at any point).

### GFLT Navigation Tips

- If the data field has the word optional next to it, you do NOT need to fill it out.
- There are “?” across the tool that can give you more information on data and definitions when you hover over them.
- When filling out an Entry, you can save your progress as you go through the tool and see your progress using the blue bar at the top right of the screen. You can save a draft of the Entry without submitting it by clicking the “Save Draft” button on the left side of the screen.



Next, fill out the Entry Name, Crop Type, and Crop Variety. Each entry only represents one crop type. When filling out your Entry Name, be sure to choose a name that will help you find the entry later.



Once you are done, click Create.

## 2) Fill in your Harvest Data

On this page, you can start filling out the Harvest Data. Note that the Harvest Data is the general information about your entire farm for the crop you are studying.

The information you are required to enter includes the Harvest end date, the Total Area Harvested (not just the sample size), the Total Yield, and the Average Yield. The Average Yield will auto-populate by dividing your total yield by the Total Area Harvested.

The screenshot shows a web interface for entering harvest data. At the top, it says 'Apple in California' with a date of 'Mar 25, 2024' and a 'Draft' status. A progress bar indicates 'Completed: 10%'. On the left, there is a sidebar with three sections: 'Harvest data' (Required), 'In-field data' (Required), and 'Further Stages' (Optional). Below these are 'Submit' and 'Save draft' buttons. The main content area is titled '< Harvest data' and is divided into three sections: 'General Information' with a 'Harvest end date' field; 'Area' with a description 'Total acres for this specific crop and crop variety (not just sample size)' and three input fields for 'Harvested', 'Immature' (Optional), and 'Walk by' (Optional), each with a unit of 'Ac'; and 'Yield' with a description 'From the entire crop type and variety at the farm at the time of the harvest date.' and two input fields for 'Total' (unit 'Lbs') and 'Average yield'. A 'Next' button is located in the bottom right corner.

Once you are done, click Next in the bottom right corner.

### 3) Fill in your In-Field Data

For In-Field Data, you have three options:

- Use an Area Sampling Method
  - Area Sampling information will be used to estimate the amount of crop not harvested based on field size, weight of samples and harvest yield.
- Use a Direct Weighing Method
  - Weighing total loss would involve weighing all the unharvested crop after finishing harvest of the field. This approach assumes that you are weighing all the crop that was not harvested/rejected and left in the field.
- Enter no data for this entry
  - You can skip this section and enter no data if you prefer.

The screenshot shows a web interface for entering data for 'Apples Fall 2024' (dated Mar 25, 2024). The page is in 'Draft' status and is 30% completed. On the left, a sidebar shows three sections: 'Harvest data' (Required, with a checkmark), 'In-field data' (Required), and 'Further Stages' (Optional). Below these are 'Submit' and 'Save draft' buttons. The main content area is titled 'In-field data' and contains the instruction: 'Choose a method to estimate your total In-field loss (you can always change this settings later)'. There are three radio button options: 1. 'Area sampling' (selected): 'Register your samples to calculate the marketable, edible and Spoiled percentages.' 2. 'Direct weighing': 'If you have already made your weighing you can enter the marketable, edible and Spoiled numbers.' 3. 'No In-field loss for this entry': 'If you do not have any data you can just skip this step'. A 'Next' button is located at the bottom right of the form.

When you have made your selection, click Next.

- If you are using an Area Sampling Approach
  - For the Area Sampling Approach, you can either sample your entire farm, or only one field or subsection of the farm. For example, you could measure a subsection of the farm where the crop is grown using regenerative agriculture. If you are measuring a subsection of the farm, you should write the total size of that subsection in the "Sample Area Size/Block" Section of the page. Otherwise, this field will auto-populate with the size of your entire farm for the crop type that you entered on the Harvest Data page.
  - The section on the Total Area Yield will auto-populate the Yield of your entire farm, but you can override this number.
  - Please use the Measuring Guidance at the beginning of the document for direction on how to measure out the rows you are sampling and also weigh the samples into Marketable, Edible, and Spoiled. You can also use [this video](#).

**Harvest data**  
Required

**In-field data**  
Required

**Further Stages**  
Optional

Submit

Save draft

### In-field data

[How to get this data](#)

Area sampling [Change method](#) + Add sample area

**Sample area 1**

Sample area name:

Sample area size/Block:

Total area yield:

Date sampled:   Harvest season

Rows sampled:

Samples (lbs)	Marketable	Edible	Spoiled
Sample 1	<input type="text" value=""/> Lbs	<input type="text" value=""/> Lbs	<input type="text" value=""/> Lbs
Sample 2	<input type="text" value=""/> Lbs	<input type="text" value=""/> Lbs	<input type="text" value=""/> Lbs
Sample 3	<input type="text" value=""/> Lbs	<input type="text" value=""/> Lbs	<input type="text" value=""/> Lbs
Totals	<input type="text" value=""/> Lbs	<input type="text" value=""/> Lbs	<input type="text" value=""/> Lbs
Total	<input type="text" value="0"/>		

[+ Add sample](#)

Please describe any uncertainty in your samples, if any

- Note that you should put a 0 into the weight of the samples rather than leaving them blank if there is no data.
- At the bottom of the page, you can describe if there is any uncertainty with your measurements. You can also write Reasons for Loss and the Destinations for Loss.
  - **PLEASE NOTE: if you or an aggregator you're working with or using this data for global major FLW initiatives such as 10x20kx30 or to estimate GHG emissions, you will need to fill out the section on Destinations for Loss.**

Please describe any uncertainty in your samples, if any

Optional data

**Destination for loss**

Anaerobic digestion

Composting

Landfill

Incineration

Land application

Sewer/wastewater treatment

Redistribution for human consumption/donation

Other

**Reasons for loss**

Cancelled order/contact

Surplus

Order/contact reduced

Lack of buyer

Insufficient storage

Insufficient labour

Other

[Next](#)



- If you are using a Direct Weighing approach
  - In this approach, you are weighing all the unharvested crop after finishing harvest of the field.
  - Separate all of the loss into Marketable, Edible, Spoiled.
  - Note that you should put a 0 into the weight field rather than leaving them blank if there is no data.
  - You can also write Reasons for Loss and the Destinations for Loss.
    - **PLEASE NOTE: if you or an aggregator you're working with or using this data for global major FLW initiatives such as 10x20x30 or to estimate GHG emissions, you will need to fill out the section on Destinations for Loss**

**Apples Fall 2024** Mar 25, 2024 Draft Completed: 30%

**Harvest data** Required

**In-field data** Required

**Further Stages** Optional

**Submit**

**Save draft**

**In-field data** [How to get this data](#)

Direct weighing [Change method](#)

Marketable  Lbs

Edible  Lbs

Inedible  Lbs

Optional data

**Destination for loss**  [?](#)

Anaerobic digestion

Composting

Landfill

Incineration

Land application

Sewer/wastewater treatment

Redistribution for human consumption/donation

Other

**Reasons for loss**  [?](#)

Cancelled order/contact

Surplus

Order/contact reduced

Lack of buyer

Insufficient storage

Insufficient labour

Other

**Next**

When you are done, click Next.

Note that you can change the method at any time by clicking the “Change Method” button on the top of the page.

#### 4) Fill in the Further Stages Data

Further stages are those that happen after the in-field stage. This section is optional.

To start, you need to name the Further Stage. There is a drop down menu with options, or you can click "Other" and write in your own name.

This section subtracts the Exit Weight by the Arrival Weight. This is a mass balance approach. This amount should be equal to the amount of loss that you separate into Marketable, Edible, and Spoiled categories.

Again, you can also add in information about Destinations for Loss and Reasons for Loss.

Further stages (optional) + Add Stage

First Stage

Stage name

Arrival weight Lbs Exit Weight Lbs

Total Loss at this Stage Lbs

Marketable Lbs

Edible Lbs

Spoiled Lbs

Optional data

Destination for loss

- Anaerobic digestion
- Composting
- Landfill
- Incineration
- Land application
- Sewer/wastewater treatment
- Redistribution for human consumption/donation
- Other

Reasons for loss

- Cancelled order/contact
- Surplus
- Order/contact reduced
- Lack of buyer
- Insufficient storage
- Insufficient labour
- Other

Submit

You can add more than one Further stage by clicking the "Add Stage" button in the upper right-hand corner.

Further stages (optional) + Add Stage

First Stage

Stage name

Arrival weight Lbs Exit Weight Lbs

Total Loss at this Stage Lbs

Marketable Lbs

Edible Lbs

Spoiled Lbs

Optional data

Destination for loss

- Anaerobic digestion
- Composting
- Landfill
- Incineration
- Land application
- Sewer/wastewater treatment
- Redistribution for human consumption/donation
- Other

Reasons for loss

- Cancelled order/contact
- Surplus
- Order/contact reduced
- Lack of buyer
- Insufficient storage
- Insufficient labour
- Other

Submit

When you are done entering data, press "Submit" on the bottom right-hand corner.

## 5) Navigate the My Entries Page and Generate a Report

Congrats! You have made an entry. This entry should now show up on the My Entries page. You can use the Filter bar on the left side to sort your entries.

When you click the arrow next to your Entry Name, you can see more information about the field and the data you entered.

To generate a report on a specific entry, you can click the “Report” button next to your entry name.

The screenshot displays the 'My entries' page for 'Farm 1 District of Columbia DC'. At the top, there are three progress indicators: Marketable (5.00%), Edible (5.00%), and Spoiled (5.00%). The main content area shows a list of entries. The first entry is 'Apple in California' with a date of 'Mar 25, 2024'. It has three status indicators: Marketable (5%), Edible (5%), and Spoiled (5%). A green 'Report' button is circled in red next to the entry. The left sidebar contains a search bar and filter options for Date, Status, and Crops.

After selecting one or more entries, you can click the Share button at the top to Share the entry with an aggregator, such as a retailer or manufacturer.

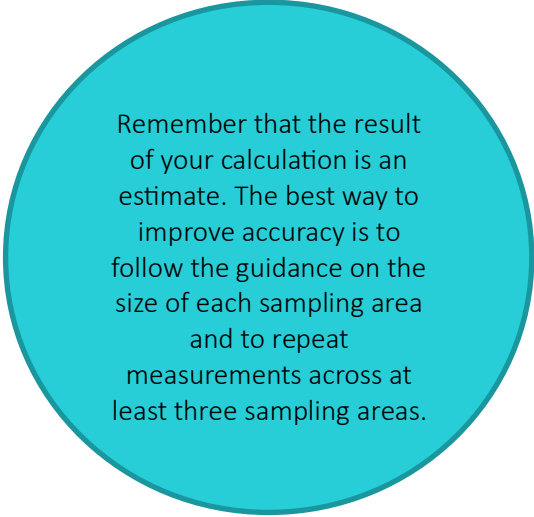
## Review Data

This section outlines how to utilise the information generated by the WWF Farm Loss Tool to maximize crop utilization and minimize loss.

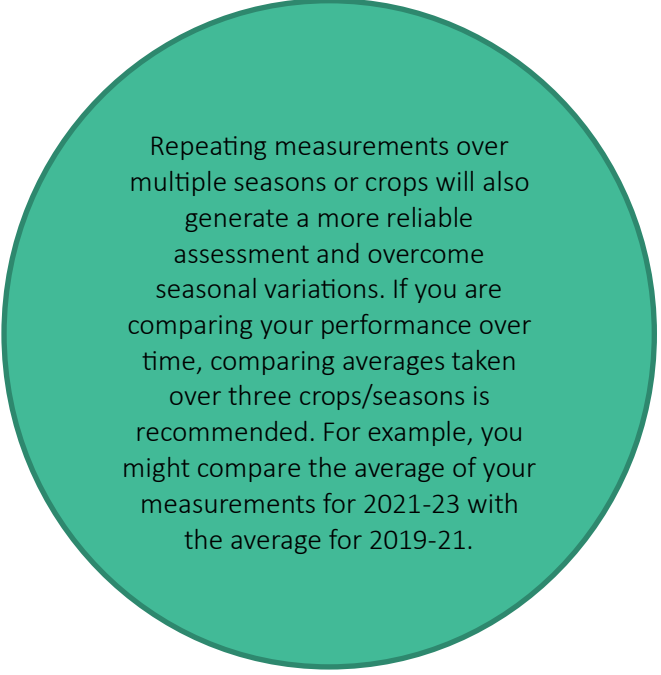
### Estimates of In-Field losses from Sampling

There are several ways in which you can review your data and identify opportunities to reduce surplus and waste, and improve productivity:

1. **Consider what your results are telling you:** Is your data similar to what you expected? Is there any variability in your measurements? Are there any waste hotspots? Would you like to improve your performance? If so, where's the best place to start? Are there any easy wins?"
2. **Share successes and learnings with other growers:** Collaboration and sharing knowledge with other growers can identify significant differences in performance and help identify solutions to improve. If you would like to collaborate with other growers, agree with them a consistent approach to taking measurements so that your data will be comparable. For example, would you include grading or not? Or is it useful to record additional data about damage from a new crop pest?
3. **Review any causes of food loss which require collaboration from the later supply chain:** Improving performance is normally best achieved through a whole chain approach, particularly as solutions for your business may lie with a supply chain partner, and vice versa. If you would like to do this, discuss it with your partners at the outset so that you can plan a joined-up approach. Collecting information on the causes of waste will help you identify solutions.
4. **Set a goal so you can monitor your progress:** Setting a food waste reduction target for your business is an effective step towards delivering improvements. Most businesses set targets that are consistent with (or which contribute to) the Courtauld Commitment 2025 and the UN's Sustainable Development Goal 12.3; to reduce food waste by 50% by 2030.



Remember that the result of your calculation is an estimate. The best way to improve accuracy is to follow the guidance on the size of each sampling area and to repeat measurements across at least three sampling areas.



Repeating measurements over multiple seasons or crops will also generate a more reliable assessment and overcome seasonal variations. If you are comparing your performance over time, comparing averages taken over three crops/seasons is recommended. For example, you might compare the average of your measurements for 2021-23 with the average for 2019-21.

# Frequently Asked Questions (FAQs)

## *About the Scope of the Tool*

### **How can growers use this tool to connect with buyers?**

Growers that measure what is left unharvested in the field and at further stages say it brings them new opportunities to identify innovation and profit. It also provides the evidence and confidence for conversations with buyers and others. <sup>1</sup>

For growers, supplying customers that are reporting on food loss and waste reduction goals (SDG Target 12.3), data from this tool can be used to automatically generate the requested reports. This information can also incentivize them to support efforts to reduce food loss on farms and therefore improve grower's food loss and waste, and scope 3 emissions figures.

### **Can the tool be used in any part of the world?**

Yes, the tool is designed for global use. Among other customizable features, it allows users to select the relevant unit (e.g., pounds, kilograms). Moreover, the sampling methods and calculations are suitable for global application.

### **Can this tool be used by any size of farm operations?**

Yes, this metric tool can be used to measure food loss in operations of any size. Tracking loss in-field can be done in fields less as small as one acre. Vertically integrated operations can use the tool as well since the tool offers options to track losses not just in-field but also in further farm-level stages (e.g., in packing, processing, storage).

### **Can the WWF Farm Loss Tool be used for all crops?**

The tool can be used to measure losses in all specialty crops, including fruit, vegetable, and tree crops.

The tool builds on the SISC food loss metric calculator and WRAP Roadmap Grower Guidance Field-Record Sheet which were originally designed for measurement of vegetable crops.

### **Can the tool be used for greenhouse or controlled environment agriculture operation?**

The Food Loss Tool can be adapted for use in a greenhouse or controlled environment operations.

Note: Careful thought should be given to the area calculations.

### **What “on-farm” stages can this tool be used for?**

This tool is designed for measuring in-field losses and those subsequent stages that are part of a particular farming operation. We recognize that there are many types of farming operations. The tool is not intended for use with stages (such as a packhouse) if it is not on-farm. If a packhouse that is on farm services an area larger than what's being supplied by the farm, the tool may be helpful.

### **Is the tool for hand- or machine-harvested crops?**

Any and all harvest methods are suitable for measurement using the tool.

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<sup>1</sup> *Growers' Perspective on Measuring Fresh Produce Left in the Field: A Summary Business Case, 2021*

**Can the tool be used to sample more than one field?**

Yes, the tool allows for measurements for multiple fields to be inputted with results for all fields available separately and aggregated.

**Are photos required?**

It is not required to take photos however it is encouraged as best practice in order to accurately record your methodology and criteria used to sort your crop into the 3 categories of marketable, edible/not marketable, and spoiled.

***About In-field Measurement*****How long will it take to measure product left in field?**

Sampling and data collection in the field takes about 1 hour for two people (on average). This includes time to gather the equipment and 15 - 20 minutes per row to harvest the samples. Sorting and weighing by the three categories, inputting the data takes approximately 1 – 1½ hours.

**What equipment is needed to sample in-field?**

In order to take samples in the field and weigh them (as opposed to estimating based on what's seen) staff will need (at a minimum): a long measuring tape, flags or another marker to mark out sample area, harvest containers, and a scale. Printing out the WWF Farm Loss Tool Field Worksheet for the metric tool is a useful option. *(Additional details on suggested equipment is included in the 'gathering equipment' section of the guidance).*

**When should the measurement be done in-field?**

It is recommended that measurement is undertaken immediately after harvesting has been completed ideally after the same harvest interval that has been used throughout the season. For example, if broccoli were harvested every four days, then four days after the final harvest would be ideal. For products that are continuously harvested and sorted out in field such as strawberries, samples should be taken at peak productivity for the crop.

**What criteria is used to determine what is marketable, edible but not marketable, and spoiled?**

Sorting what's left in the field by quality provides important insights. The suggestion is to sort by marketable, edible but not marketable, and spoiled. Marketability is unique to every grower based on its buyer's specifications. Criteria to make this determination include size, shape, defects, maturity, colour, insect/disease evidence, and decay.

The most subjective decision is about what's still potentially edible but not marketable. This would be product that could be eaten but falls outside of marketable range.

Growers may also find it provides useful insights to create more than one category for the 'edible not marketable' product. As an example, for fresh tomatoes that are still safe for human consumption but not marketable, one subcategory may be 'the right size but too mature' for the buyer (i.e., red) or slightly blemished, while a second category may be too small but the right maturity (i.e., green).

**Should dropped product be measured as well?**

If harvesting by hand, typically no. However, if you want information on the amount left on the ground for other reasons (e.g., shattered during harvest), or as a result of equipment deficiencies (if mechanical harvest), that could also be valuable but identifying the category of this loss (by

marketable, edible/not marketable, or spoiled) may not be feasible.

#### **How do you sample product that grows underground?**

For root vegetables and tubers, a rule of thumb is to dig through the sampling area to a depth of 15cm / 6 inches to gather the crop remaining beneath the soil surface.

#### **How would the tool extrapolate across perennial crops (e.g., apples) in different growth stages?**

**For example: small, young trees have less fruit to begin with per hectare, with likely less fruit left behind as well.**

The tool allows for narrative to be included about potential sources of uncertainty, which is where a user may need to make a note about this type of situation. The extrapolation is driven by the size of the field and current yield. If the crops in different growth stages are grouped in a distinct part of the field, a separate submission could be created for the different blocks (with the size and yield adjusted accordingly).

#### **Should I include crops not suitable for harvest due to crop failures caused by things like weather, pest, or disease?**

No. If the crop is not ready for harvest (i.e., has not yet met harvest parameters or specifications) but is damaged due to weather, pest, or disease then this should not be included. Practical guidance on how to decide whether a crop is damaged before or after it became ready to harvest is included in the 'grower record' and reporting template (see Appendix).

#### **Should I include unharvested material that is part of the plant? *For example, celery where outer petioles are left in the field, or the outer leaves of lettuce be treated (trimmed after harvesting)?***

If these are ready to harvest (i.e., at a stage where they would normally be harvested) then this material should ideally be included in your measurement. However, since these may be considered 'inedible parts' – i.e., not intended for human consumption in your supply chain – if you do decide to exclude them, indicate so in the tool with a description about what was not measured.

### ***About Various Growing Scenarios***

#### **What about where the product is mixed with mud and stones – e.g., potatoes?**

In this case the potatoes (food) would be measured but the mud and stones are not part of the product and therefore should be excluded. It is recognised that these may be mixed together. As such, the weight of the crop may be an estimate if that is more practical, but the calculations used should be included in the inventory narrative section.

#### **What about moisture loss – e.g., when produce is stored?**

While water lost through evaporation (or respiration) is natural, it is not a physical loss of food. As such, forthcoming versions of the tool will allow users to make an adjustment for moisture count so that just the physical weight of food counts as a loss..

*Note: For now, calculators for taking into account the moisture content of agricultural products when calculating or analyzing FLW are downloadable [here](#).*

**Some unharvested vegetables are left in the field and livestock can graze and eat the crop – should this be classified as animal feed?**

The proportion of the unharvested crop that has been eaten by animals through grazing should be classified as animal feed. If a significant amount of the crop remains in the field, then this should be classified as 'not harvested.' Recording the amount of the crop that is eaten by animals in the field (if significant) is valuable to get a full picture and help businesses make better informed decisions about how to optimize performance against financial and sustainability targets.

**Some unharvested vegetables are left in the field and gleaning is employed (e.g., volunteers and charities come onto the farm and pick the crops) – should this be classified as redistribution of surplus food?**

The proportion of the unharvested crop that has been gleaned should be classified as redistribution for human consumption and reported separately. Recording the amount of the crop that is gleaned (if significant) is valuable to get a full picture and help businesses make better informed decisions about how to optimize performance against financial and sustainability targets.

**Regrowth is harvested on some crops (e.g., rocket, mushrooms) and the number of re-cuts can vary. Sometimes waste can increase if you persist with an 'old' crop or, in some cases, it could be higher if you re-crop – how would a grower account for this?**

Where this is common practice, both scenarios would be in scope. The guidelines are to start measuring when a crop is deemed as 'ready for harvest' which could vary in this situation or be repeated in the case of a crop that is harvested multiple times due to re-growth.

**How should the sampling be undertaken for crops that produce continuously (e.g., have multiple cuts such as strawberries)?**

For crops that produce continuously and are harvested multiple times a week, data will be extrapolated from samples taken in any given week, from the beginning to the end of the harvest period. Over time, by sampling at various points across the growing season, the tool will help growers to calculate an average loss and track and monitor how that their loss levels fluctuate.



# Glossary

## Loss Categories

**Marketable:** Crop that meets buyers' current quality specifications, which may include crop that shattered.

**Edible, not marketable:** Crop that does not meet buyers' current quality specifications but is still considered edible for human consumption. This refers to 'quality' issues, rather than edibility issues.

**Spoiled:** Crop that is no longer considered fit for human consumption. This may be from damage (e.g., by pests, weather), disease, or decay.

## Destinations (Used to define food waste for the purpose of the global reporting template and programs focused on meeting SDG Target 12.3)

**Anaerobic digestion / Co-digestion:** Breaking down material via bacteria in the absence of oxygen, generating biogas and nutrient-rich matter that can be used as fertilizer.

**Composting / Aerobic processes:** Breaking down material via bacteria in oxygen-rich environments producing organic material (via aerobic processes) that can be used as a soil amendment.

**Incineration / Controlled combustion:** Sending material to a facility that is specifically designed for combustion in a controlled manner, which may include some form of energy recovery.

**Land application:** Spreading, spraying, injecting, or incorporating organic material onto or below the surface of the land to enhance soil quality.

**Landfill:** Sending material to an area of land or an excavated site that is specifically designed and built to receive wastes.

**Sewer / Wastewater treatment:** Sending material down the sewer (with or without prior treatment), including that which may go to a facility designed to treat wastewater.

**Not harvested / Plowed-in:** Leaving crops that were ready for harvest in the field or tilling them into the soil.

**Other (incl. unmanaged):** Might include the 'Refuse/discards/ litter' destination in the FLW Standard – which encompasses open dumps, open burn, and fish discards. This destination also includes the portion of harvested crops eaten by pests during further stages.

## Destinations (Defined as surplus for the global reporting template and programs focused on meeting SDG Target 12.3)

**Animal feed:** Diverting food and/or inedible parts, directly or after processing, to animals.

**Bio-based materials/ biochemical processing:** Converting material into industrial products. Examples include creating fibers for packaging material, creating bioplastics (e.g., polylactic acid), making "traditional" materials such as leather or feathers (e.g., for pillows), and rendering fat, oil, or grease into a raw material to make products such as soaps, or cosmetics. If the outputs from this destination are biofuel products (e.g., biodiesel, fuel pellets), or unknown, the material shall be included in the "Other" destination. "Biochemical processing" does not refer to anaerobic digestion or production of bioethanol through fermentation. "Biochemical processing" does not refer to anaerobic digestion or production of bioethanol through fermentation.

***Redistribution of food surplus:*** In the context of FLW prevention, only include redistributed surplus food where the food would otherwise have ended up as FLW, or would have been sent to one of the other destinations below. This may include food redistributed by both charitable organizations and commercial ones. Where surplus is sold, explain why this qualifies as FLW prevention.

Note: The distinction between what is considered food waste or surplus is only relevant to organizations that are tracking food loss and waste reduction using the global reporting template for food loss and waste reduction programs

### Other Terms

***Acres/hectares harvested:*** Total amount (in acres/harvested) of field(s) per crop that are harvested.

***Immature area:*** Area that is planted, but due to weather or pest damage during the growing period never reach maturity and therefore are never ready for harvest.

***Walk-by loss:*** Product that was planted and raised to the point of maturity but was never harvested.

Example: Product was planted and raised to the point of maturity in preparation for specific contractual agreements, or to make sure contracts were met in case of weather or pest damage but ended up not being needed and was therefore “walked-by”.

***Food waste:*** See destination definitions above.

***Food surplus:*** See destination definitions above.

***Crop utilization:*** Percent of a crop that was planted, raised to maturity, and harvested for its intended or alternative market. It is a proportion of absolute total loss plus total harvested yield where ‘absolute loss’ is the sum of marketable loss, edible not marketable loss, spoiled loss and walk by loss.

## Appendix

For further guidance on methods of collecting data, please see the **Food Loss and Waste Standard's Guidance on Quantification Methods**: [https://flwprotocol.org/wp-content/uploads/2017/06/FLW-Protocol\\_Guidance-on-FLW-Quantification-Methods.pdf](https://flwprotocol.org/wp-content/uploads/2017/06/FLW-Protocol_Guidance-on-FLW-Quantification-Methods.pdf)

For guidance on the fresh produce sector, please see **WRAP's Food Waste Roadmap Summary Report**: [https://wrap.org.uk/sites/default/files/2021-03/fresh-produce-sector-guidance\\_300321.pdf](https://wrap.org.uk/sites/default/files/2021-03/fresh-produce-sector-guidance_300321.pdf)