HarvestMaster™

BY JUNIPER SYSTEMS

mirus™

H2 Triple GrainGage

USER'S GUIDE

Mirus for H2 Triple GrainGage User's Guide

Part Number: 30441-01

Trademarks

Disclaimer

Information is subject to change without notice.

Cautions

CAUTION: This symbol indicates that failure to follow directions could result in damage to equipment or loss of information.

HarvestMaster Logan, Utah, USA
Phone: 435.753.1881
Email: agriculturesales@junipersys.com
www.harvestmaster.com

HarvestMaster Europe Wels, Austria
Phone: +43 7242219333
Email: office@harvestmaster.eu
www.harvestmaster.eu

Contents

mirus™

H2 Triple GrainGage

CHAPTER ONE

Mirus Installation

1 Mirus Installation

Mirus operates the H2 Triple GrainGage and runs on a Windows tablet. This section describes how to install Mirus and prep the GrainGage.

1.1 System Requirements

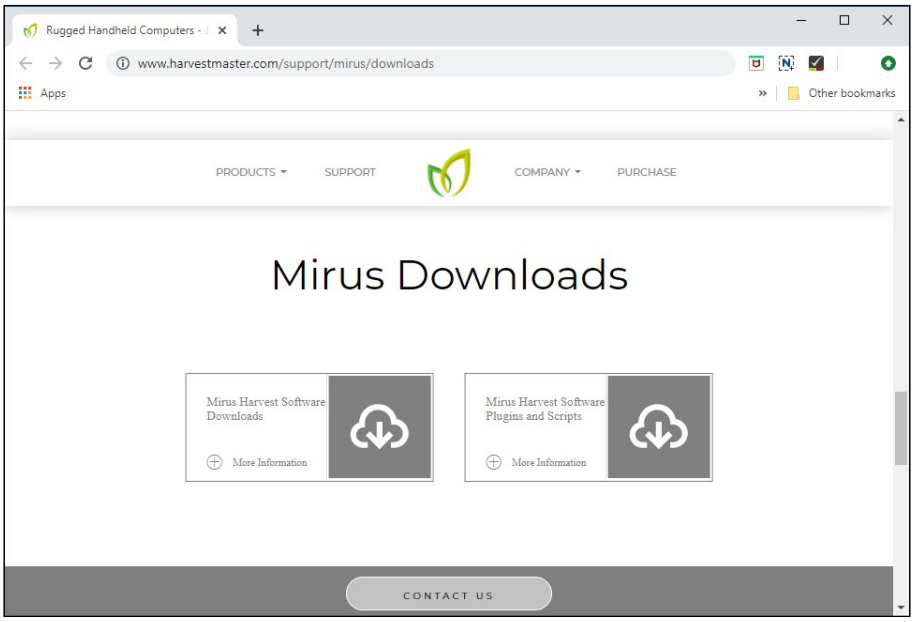
- Operating System: Windows® 8 or higher; 32 or 64-bit OS
- Processor Speed: 2.0 GHz Dual Core
- Memory: 4 GB recommended
- Data Storage: 500 MB available disk space
- Display Resolution: 1280 x 800 or higher

1.2 Download and Install Mirus

1.2.1 Download and Activate Mirus

After you have purchased a license for Mirus,

1. Go to *http://www.harvestmaster.com/support/mirus/downloads*.



2. Tap the down arrow for Mirus Harvest Software.
3. Select and download the most recent Mirus release.
4. Follow the installation instructions.
5. Go to *http://www.harvestmaster.com/activate* and fill out the form.
6. HarvestMaster will send the unlock code via email.
7. Return to the Mirus activation screen and input the unlock code.

1.2.2 Install Mirus Updates

Mirus is updated about once a year. Check with a HarvestMaster Field Service Engineer to make sure you have the latest version before harvest season.

If an update is necessary, do the following:

1. Go to *http://www.harvestmaster.com/support/mirus/downloads*.
2. Tap the down arrow for the Mirus Harvest Software.
3. Check for a newer version of Mirus.
4. If there is a newer version, download it.
5. Follow the installation instructions.

1.2.3 Verify Oxbo Plugin is Installed and Enabled

For more information about enabling the Oxbo plugin, see **6.4.1 Install and Enable the Oxbo Plugin** on page 121.

1.3 Preparing the GrainGage

1.3.1 Verify GrainGage Readiness

Verify that the GrainGage is ready for operation by checking the following:

- Mirus app is installed and activated
- Windows is up-to-date
- Automatic sleep, hibernate, and shutdown are disabled on the tablet
- Power cable connected to the tablet
- Power (12 VDC) connected to GrainGage DSP 2 Module
- USB to CAN or Serial to CAN converter cable connected between CAN bus and tablet
- Remote enter button (typically on the hydrostat lever) connected properly
- Pressurized air turned on and connected to the GrainGage

1.3.2 Turn on the H2 Triple GrainGage

To turn on the H2 Triple GrainGage,

1. Start the combine.
2. Activate the GrainGage by pressing the red button on the system controller.
3. Open Mirus.

Note: HarvestMaster recommends verifying the weight and test weight calibrations (in Diagnostics) of the GrainGage each morning using a known weight.

mirus™

H2 Triple GrainGage

CHAPTER TWO

Mirus and H2 Triple GrainGage Setup

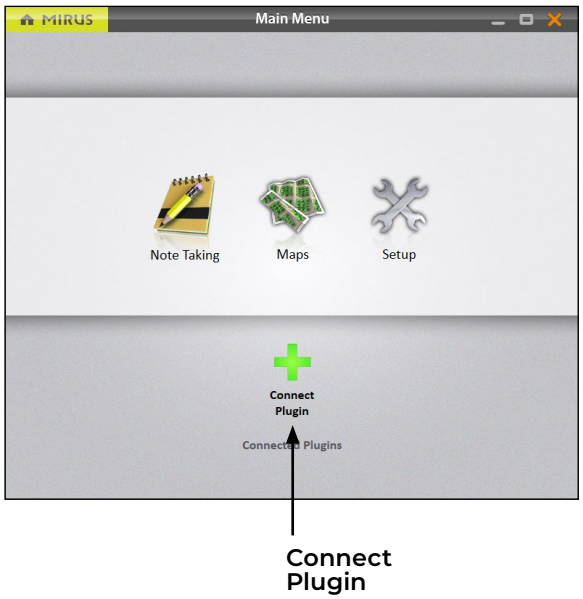
2 Mirus and H2 Triple GrainGage Setup

2.1 Start Mirus

Double tap the Mirus icon on your Windows desktop.

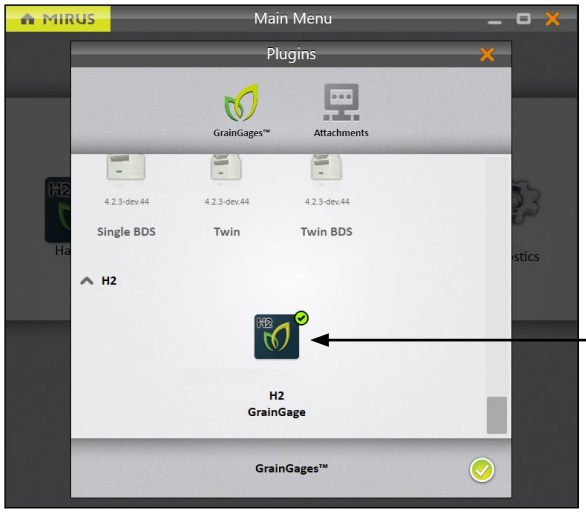
Mirus opens the Home screen.

2.1.1 Load H2 GrainGage Plugin



On the Mirus Home screen,

1. Tap **Connect Plugin**.



2. Tap **H2 GrainGage**.
3. Tap the check icon .

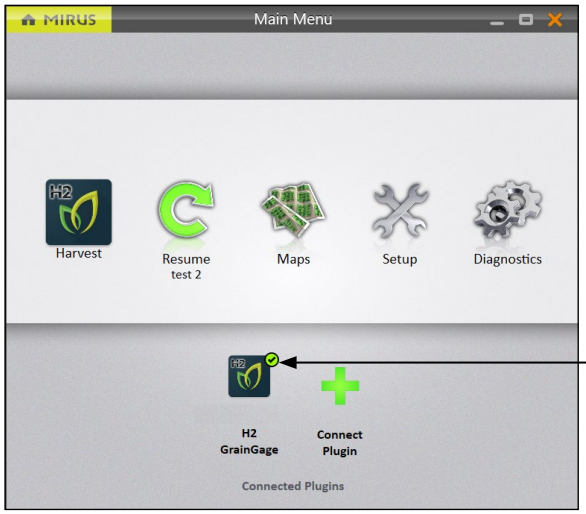
Note: Mirus for H2 GrainGages doesn't display the specific type of GrainGage for you to select. The software is able to detect which GrainGage is connected.

If Mirus is unable to detect the H2 GrainGage, the software may display a device connection error.

- Check the GrainGage power source and cables.

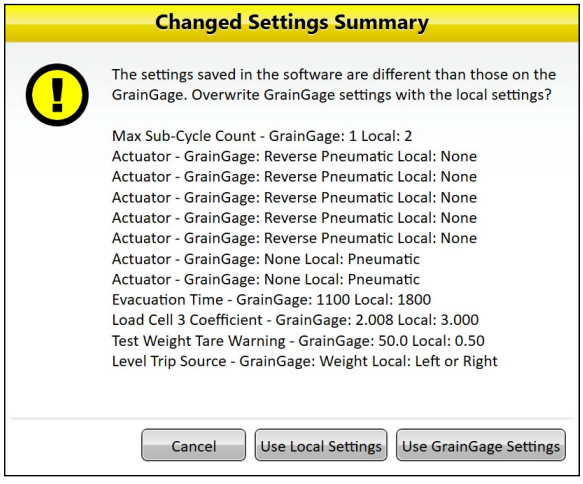
Or

- Select the **Use Emulator** option to proceed without connecting the H2 GrainGage. Emulator Mode is not recommended for setting up the H2 Triple GrainGage.



After adding the H2 GrainGage plugin, Mirus displays an icon for the H2 GrainGage on the Main Menu screen.

H2 GrainGage

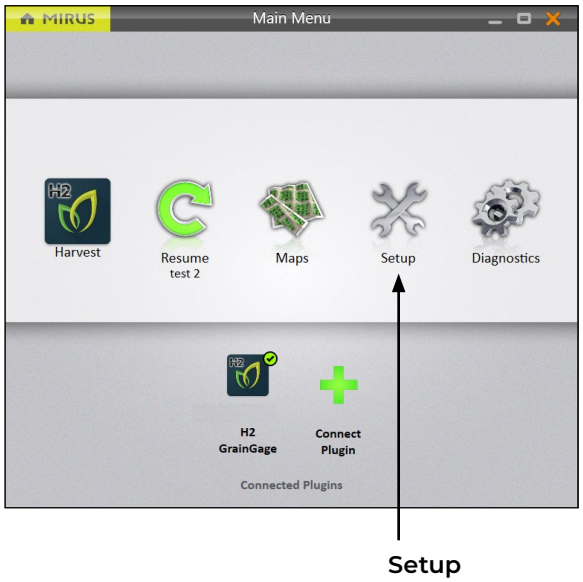


If you upgraded Mirus to a new version before connecting to the GrainGage, Mirus might display a Changed Settings Summary warning. You will be prompted to **Use Local Settings** or **Use GrainGage Settings**.

- Local settings use the current settings on the tablet.
- GrainGage settings use the old settings saved to the GrainGage from the previous Mirus version.

2.2 Setup Mirus Preferences

2.2.1 Open Setup

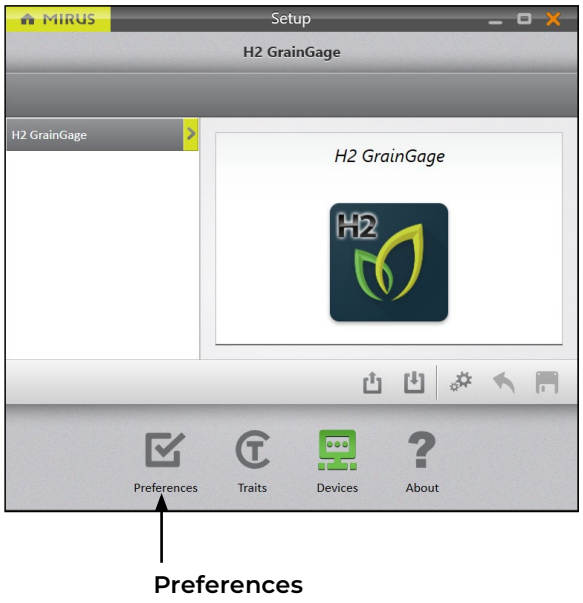


On the Home screen,

1. Tap **Setup**.

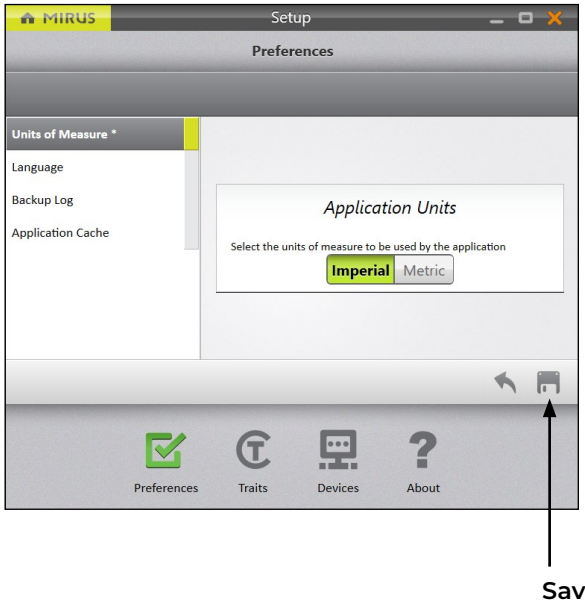
Mirus opens the Setup screen.

2.2.2 Set Preferred Units of Measure



On the Setup screen,

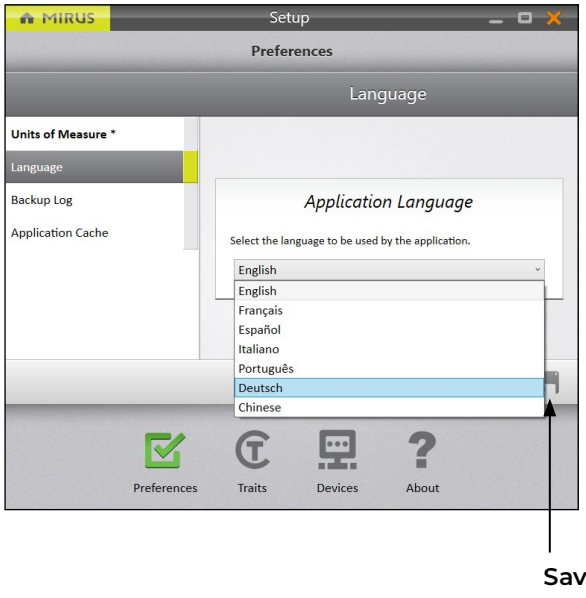
1. Tap **Preferences**.



On the **Setup** > **Preferences** screen,

2. Tap **Units of Measure**.
3. Select your preferred units of measure.
4. Tap **Save**.

2.2.3 Set Preferred Language

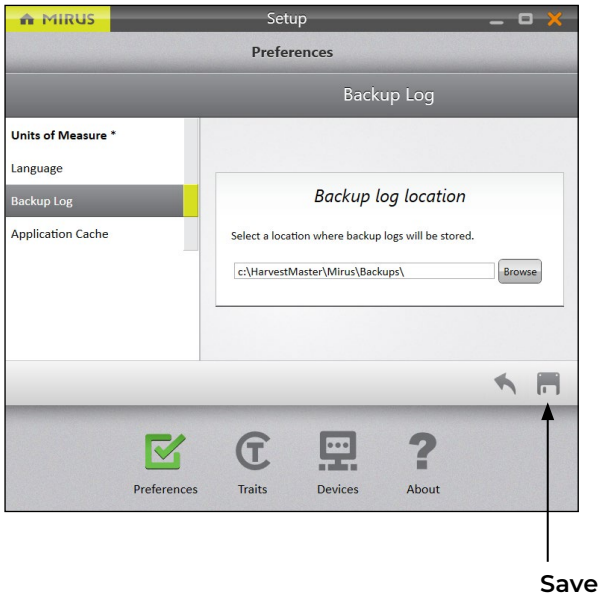


On the **Setup** > **Preferences** screen,

1. Select **Language**.
2. Choose your preferred language.
3. Tap **Save**.

Note: Some languages may not be fully translated in Mirus version 4.3.0.

2.2.4 Set Preferred Backup Log Location

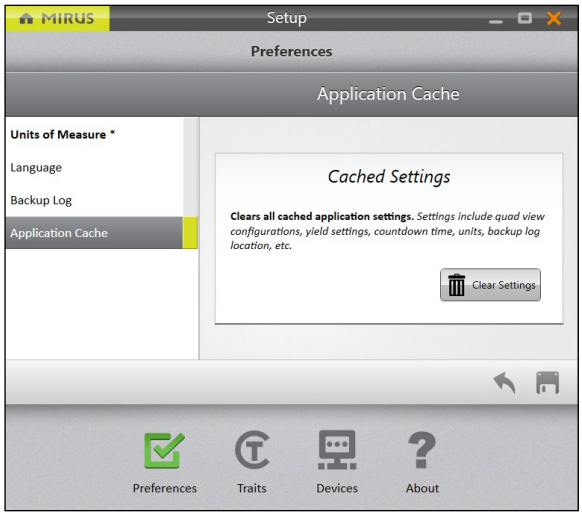


On the **Setup** > **Preferences** screen,

1. Select **Backup Log**.
2. Enter your preferred file path for the Mirus backup log.
3. Tap **Save**.

Note: Changing the Backup Log location is not recommended. If you do change it, be sure to record the new location.

2.2.5 Clear Cached Settings

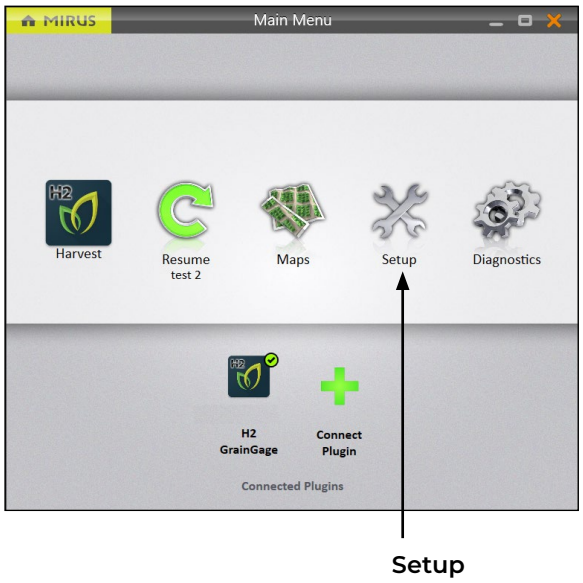


This option can be found on the **Setup** > **Preferences** > **Application Cache** screen.

CAUTION: This cannot be undone! Clearing the cache will erase all application settings and restart Mirus. This should only be done in consultation with a HarvestMaster Field Service Engineer.

2.3 Setup H2 Triple GrainGage

2.3.1 Open Setup



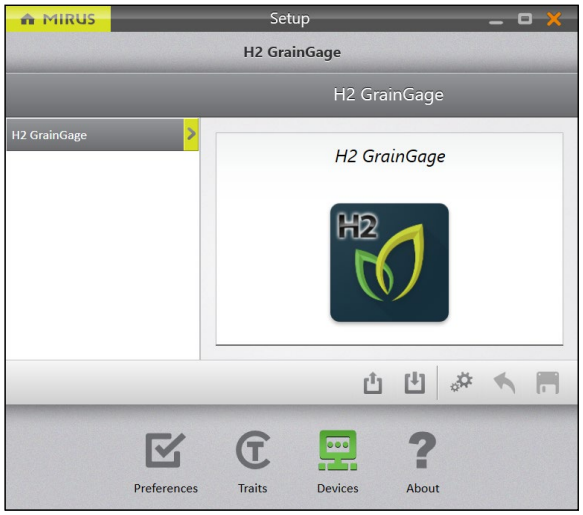
On the Home screen,

1. Tap **Setup**.

Mirus opens the Setup screen.

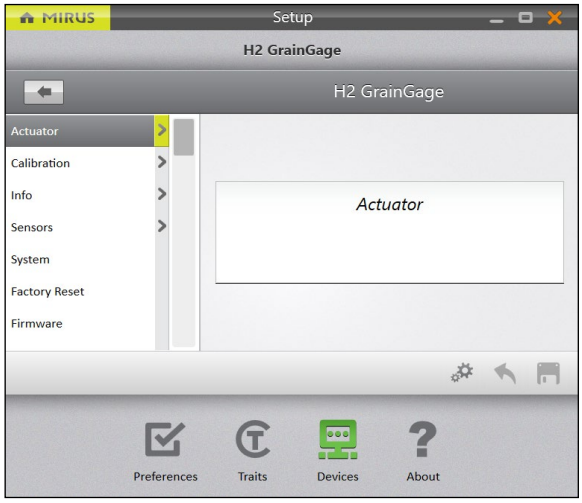
2.3.2 Configure Actuators

Note: Changing actuator times should only be done under the direction of a HarvestMaster Field Service Engineer. This is especially true if you intend to shorten the times.



On the Setup screen,

1. Tap **H2 GrainGage**.



2. Tap **Actuator**.

Mirus opens the Actuator Setup screen on which you can configure settings for each actuator in the GrainGage.

Tap **Description** for more information about each option.

The following tables display the default values for each actuator:

Note: The actuator times can affect the amount of grain that is carried over from plot-to-plot. To check the carryover, see **9 Appendix C: Plot-to-Plot Carryover** *on page* 138.

Top Gate Settings		
Setup Parameter	**Default Value**	**Description**
Actuator	Reverse Pneumatic	The type of actuator.
Limit Switch on Close	Yes	Enables the limit switch when the gate closes.
Limit Switch on Open	No	Enables the limit switch when the gate opens. This is not supported in the H2 Triple.
Open State Time*	400 msec	The amount of time the top gate remains open before beginning to close. The actual evacuation time is set in **Sensors** > **Weight** > **Evacuation Time**.
Open Transition Time*	300 msec	The amount of time it takes the actuator to open the gate.
Close Transition Time*	800 msec	The amount of time it takes the actuator to close the gate.

These settings can only be changed with the help of HarvestMaster Field Service Engineers. See* **8.4.2 Contact a HarvestMaster Field Service Engineer *on page 136.*

Bottom Gate Settings		
Setup Parameter	**Default Value**	**Description**
Actuator	Reverse Pneumatic	The type of actuator.
Limit Switch on Close	Yes	Enables the limit switch when the gate closes.
Limit Switch on Open	No	Enables the limit switch when the gate opens. This is not supported in the H2 Triple.
Open State Time*	500 msec	The amount of time the bottom gate remains open before beginning to close. The actual evacuation time is regulated in **Sensors** > **Weight** > **Evacuation Time**.
Open Transition Time*	300 msec	The amount of time it takes the actuator to open the gate.
Close Transition Time*	800 msec	The amount of time it takes the actuator to close the gate.

These settings can only be changed with the help of HarvestMaster Field Service Engineers. See* **8.4.2 Contact a HarvestMaster Field Service Engineer *on page 136.*

Separator Cylinder Settings		
Setup Parameter	**Default Value**	**Description**
Actuator	Reverse Pneumatic	The type of actuator.
Limit Switch on Close	Yes	Enables the limit switch when the gate closes.
Limit Switch on Open	No	Enables the limit switch when the gate opens. This is not supported in the H2 Triple.
Open State Time*	600 msec	The amount of time the test chamber rests on the load cell.
Open Transition Time*	300 msec	The amount of time it takes the cylinder to separate the test chamber from the weigh bucket.
Close Transition Time*	800 msec	The amount of time it takes the cylinder to re-dock the test chamber to the weigh bucket.

These settings can only be changed with the help of HarvestMaster Field Service Engineers. See* **8.4.2 Contact a HarvestMaster Field Service Engineer *on page 136.*

Evacuation Gate Settings		
Setup Parameter	**Default Value**	**Description**
Actuator	Reverse Pneumatic	The type of actuator.
Limit Switch on Close	Yes	Enables the limit switch when the gate closes.
Limit Switch on Open	No	Enables the limit switch when the gate opens. This is not supported in the H2 Triple.
Open State Time*	1100 msec	The amount of time the separator cylinder remains open before beginning to close. Actual evacuation time is regulated in **Sensors** > **Weight** > **Evacuation Time**.
Open Transition Time*	400 msec	The amount of time it takes the actuator to open the gate.
Close Transition Time*	800 msec	The amount of time it takes the actuator to close the gate.

These settings can only be changed with the help of HarvestMaster Field Service Engineers. See* **8.4.2 Contact a HarvestMaster Field Service Engineer *on page 136.*

Note: The actuator times can affect the amount of grain that is carried over from plot-to-plot. To check this, see **9 Appendix C: Plot-to-Plot Carryover** *on page* 138.

Left Hopper Gate Settings		
Setup Parameter	**Default Value**	**Description**
Actuator	Reverse Pneumatic	The type of actuator.
Limit Switch on Close	Yes	Enables the limit switch when the gate closes.
Limit Switch on Open	Yes	Enables the limit switch when the gate opens. This is not supported in the H2 Triple.
Open State Time	400 msec	The amount of time the isolation gate remains open before beginning to close.
Open Transition Time*	600 msec	The amount of time it takes the actuator to open the gate.
Close Transition Time*	400 msec	The amount of time it takes the actuator to close the gate.

These settings can only be changed with the help of HarvestMaster Field Service Engineers. See* **8.4.2 Contact a HarvestMaster Field Service Engineer *on page 136.*

Right Hopper 2 Gate Settings		
Setup Parameter	**Default Value**	**Description**
Actuator	Reverse Pneumatic	The type of actuator.
Limit Switch on Close	Yes	Enables the limit switch when the gate closes.
Limit Switch on Open	Yes	Enables the limit switch when the gate opens. This is not supported in the H2 Triple.
Open State Time	400 msec	The amount of time the isolation gate remains open before beginning to close.
Open Transition Time*	600 msec	The amount of time it takes the actuator to open the gate.
Close Transition Time*	400 msec	The amount of time it takes the actuator to close the gate.

These settings can only be changed with the help of HarvestMaster Field Service Engineers. See* **8.4.2 Contact a HarvestMaster Field Service Engineer *on page 136.*

Right Hopper 1 Gate Settings		
Setup Parameter	**Default Value**	**Description**
Actuator	Reverse Pneumatic	The type of actuator.
Limit Switch on Close	Yes	Enables the limit switch when the gate closes.
Limit Switch on Open	Yes	Enables the limit switch when the gate opens. This is not supported in the H2 Triple.
Open State Time	400 msec	The amount of time the isolation gate remains open before beginning to close.
Open Transition Time*	600 msec	The amount of time it takes the actuator to open the gate.
Close Transition Time*	400 msec	The amount of time it takes the actuator to close the gate.

These settings can only be changed with the help of HarvestMaster Field Service Engineers. See* **8.4.2 Contact a HarvestMaster Field Service Engineer *on page 136.*

Divider Gate Settings		
Setup Parameter	**Default Value**	**Description**
Actuator	Reverse Pneumatic	The type of actuator. This a custom setting, depending on the type of isolation gate.
Limit Switch on Close	Yes	Enables the limit switch when the gate closes.
Limit Switch on Open	Yes	Enables the limit switch when the gate opens. This is not supported in the H2 Triple.
Open State Time*	300 msec	The amount of time the isolation gate remains open before beginning to close.
Open Transition Time*	400 msec	The amount of time it takes the actuator to open the gate.
Close Transition Time*	400 msec	The amount of time it takes the actuator to close the gate.

These settings can only be changed with the help of HarvestMaster Field Service Engineers. See* **8.4.2 Contact a HarvestMaster Field Service Engineer *on page 136.*

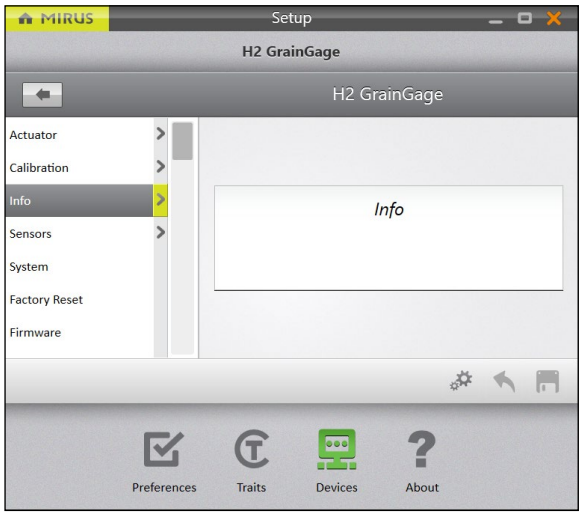
The Isolation Gate is not applicable to the H2 Triple GrainGage.

Isolation Gate Settings		
Setup Parameter	**Default Value**	**Description**
Actuator	Not Specified	The type of actuator. This is a custom setting, depending on the type of isolation gate.
Close Transition Time	200 msec	The amount of time it takes the actuator to close the gate.
Limit Switch on Close	No	Enables the limit switch when the gate closes.
Limit Switch on Open	No	Enables the limit switch when the gate opens. This is not supported in the H2 Triple.
Open State Time	0 msec	The amount of time the isolation gate remains open before beginning to close.
Open Transition Time	200 msec	The amount of time it takes the actuator to open the gate.

Note: Preconfigured values are default values based on generalized harvest conditions. They may not reflect the optimum settings for the harvest conditions for your particular climate, fields, or grains. Changing default values requires a certain level of experience. Please contact HarvestMaster Field Service Engineers when adjusting these settings. See **8.4.2 Contact a HarvestMaster Field Service Engineer** *on page 136.*

Note: For calibration instructions, see **4 H2 Triple GrainGage Calibration on page 45**.

2.3.3 View GrainGage Info



On the **Setup** > **H2 GrainGage** screen,

1. Tap **Info**.

Mirus opens the Info screen on which you can view Chamber, Module, and Sensor information for the H2 GrainGage.

2.3.4 Configure Weight Sensors

On the **Setup** > **H2 GrainGage** screen,

1. Tap **Sensors** > **Weight**.

Mirus opens the Weight Sensors Setup screen on which you can configure weigh bucket settings for the GrainGage.

Tap **Description** for more information about each option.

The following table displays the typical preferred setting for each item on this screen:

Weight Sensors Settings		
Setup Parameter	**Default Value**	**Description**
Chamber Head Room	25%	The percentage of additional grain required to perform a test chamber measurement and/or trigger additional sub-cycles. For example, if the minimum weight threshold from your moisture curve is 4 lb, then Mirus requires 5 lb to guarantee that the test chamber is full and that the data will be accurate. If the full amount isn't reached (i.e., *minimum weight threshold + chamber head room*), Mirus will not record the data because it is not likely to be accurate.
Evacuation Time	1100 msec	The amount of time all the top, bottom, and evacuation gates remain open to allow for the evacuation of all grain from the weigh bucket. This setting overrides the open state time for the top, bottom, and evacuation gates. *Caution: Wetter grain or oil seeds may require longer evacuation times. Low-volume inserts will also require a longer evacuation time. If this setting is inaccurate, it may increase the weighing cycle time unnecessarily or cause the mixing of two plots.* *Note: The evacuation time can affect the amount of grain that is carried over from plot-to-plot. To check this, see* **9 Appendix C: Plot-to-Plot Carryover** *on page* 138.
Load Cell Coefficients	2.000	The default values for load cell coefficients are placeholders. These are custom values that are generated during weight calibration. They are used to convert millivolt readings from the load cells into pounds or kilograms.
Slope and Motion Compensation	Yes	This corrects weight errors resulting from movement and vibration as well as harvesting on a slope.
Trip Point	80%	The percentage of full bucket capacity at which a weight trip cycle will occur.
Weigh Time	1000 msec	The period over which weight readings are averaged. A shorter weigh time may reduce the accuracy of the measurement.
Weight Tare Warning	0.500 lb (0.227 kg)	This is the threshold above which a tare warning is generated after weigh bucket evacuation.

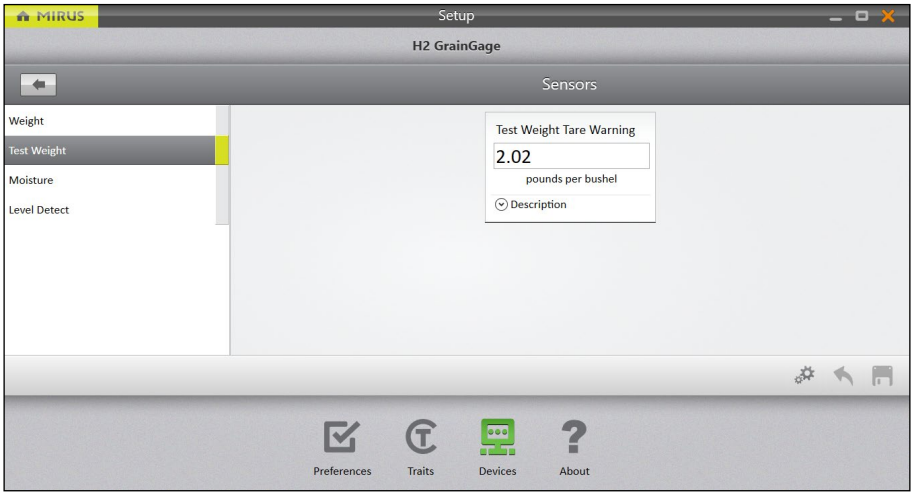
Note: Preconfigured values are default values based on generalized harvest conditions. They may not reflect the optimum settings for the harvest conditions for your particular climate, fields, or grains. Changing default values requires a certain level of experience. Please contact HarvestMaster Field Service Engineers when adjusting these settings. See **8.4.2 Contact a HarvestMaster Field Service Engineer** *on page 136.*

2.3.5 Configure Test Weight Sensors

On the **Setup** > **H2 GrainGage** > **Sensors** screen,

1. Tap **Test Weight**.

Mirus opens the Test Weight Sensors Setup screen on which you can configure test weight settings for the GrainGage.



Test Weight Sensor Settings

Setup Parameter	Default Value	Description
Test Weight Tare Warning	2.02 lb/bu 2.6 kg/hL	A tare warning is generated above this threshold when the chamber is empty.

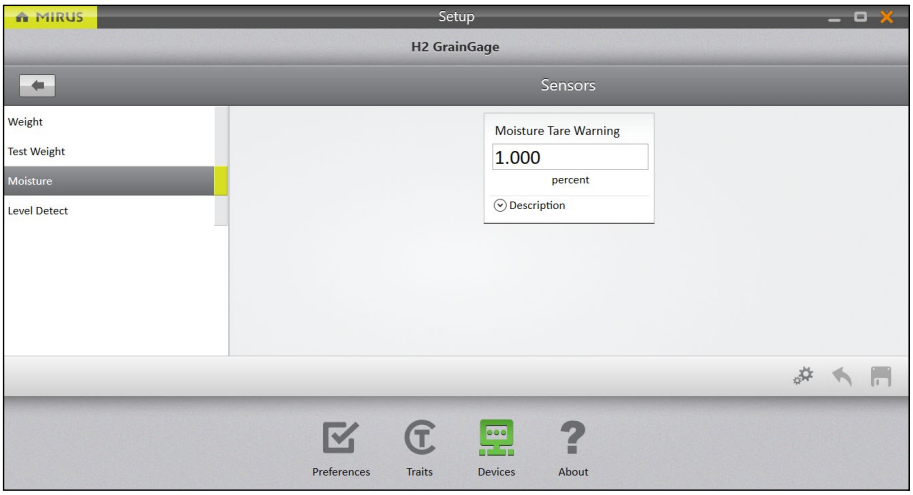
Note: To edit other test weight settings go to **4.3.1 Calibrate Test Weight on page 50**.

2.3.6 Configure Moisture Sensors

On the **Setup** > **H2 GrainGage** > **Sensors** screen,

1. Tap **Moisture**.

Mirus opens the Moisture Sensors Setup screen on which you can configure the moisture setting for the GrainGage.



Moisture Sensor Settings

Setup Parameter	Default Value	Description
Moisture Tare Warning	1%	A tare warning is generated above this threshold when the chamber is empty.

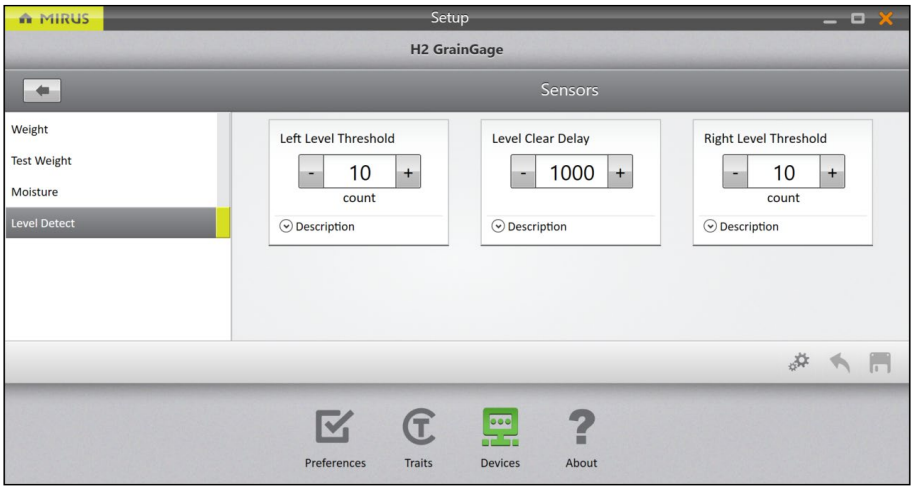
Note: To edit other moisture settings go to **4.4.4 Chamber Calibration on page 56**.

2.3.7 Configure Level Detect Sensor

Go to **Setup** > **H2 GrainGage** > **Sensors**.

1. Tap **Level Detect**.

Mirus opens the Level Detect Sensors Setup screen on which you can configure Level Clear Delay.



Level Detect Sensors Settings

Setup Parameter	Default Value	Description
Left Level Threshold	10 count	The volume of grain needed to trigger a cycle while harvesting in Strip Mode with a Triple.
Level Clear Delay	1000 msec	The amount of time delay between last level/weight trip and the start of the flush cycle.
Right Level Threshold	10 count	The volume of grain needed to trigger a cycle while harvesting in Strip Mode with a Triple.

2.3.8 Configure H2 Triple GrainGage System Settings

On the **Setup** > **H2 GrainGage** screen, tap **System**.

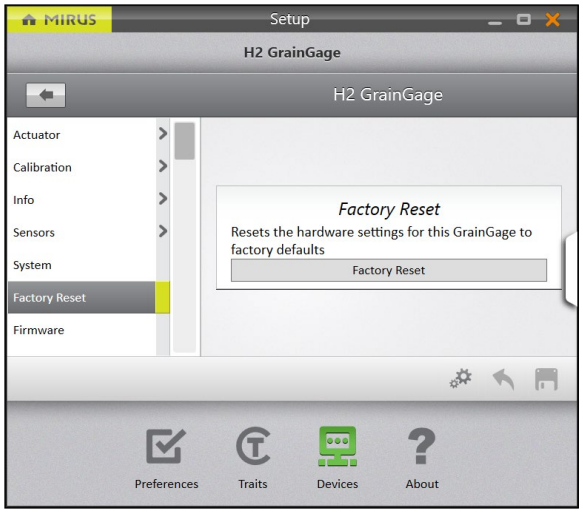
Mirus opens the System Setup screen on which you can configure settings for the GrainGage.

The following table displays the typical preferred setting for each item on this screen:

System Settings		
Item	**Default Value**	**Description**
Debug Streaming Enabled	Yes	This enables debug streaming messages for the DSP module. Enabling this is only recommended when troubleshooting the GrainGage with a service technician.
GrainGage Type	Triple	Designates which GrainGage type is connected to Mirus.
Isolation Gate Mode	Normally Open	Controls the initial state of the isolation gate. In some situations, closed is preferred.*
Override Threshold*	No	This bypasses the minimum weight threshold. It allows for the capture of moisture and test weight data in low yielding plots. *Caution: Changing this setting to Yes risks reduced data accuracy.*

Contact HarvestMaster Field Service Engineers to change this setting. See* **8.4.2 Contact a HarvestMaster Field Service Engineer *on page 136.*

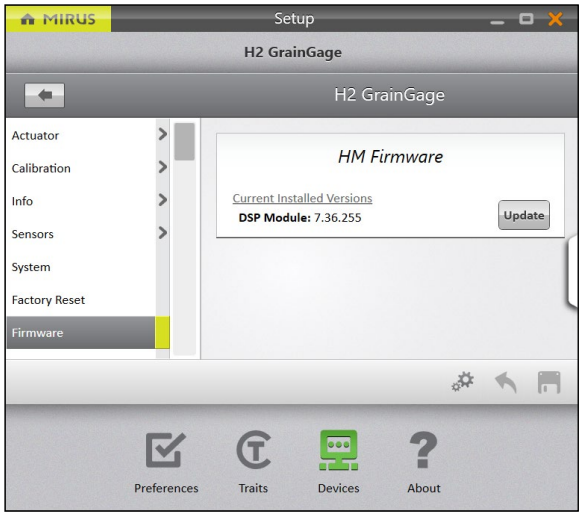
2.3.9 Reset the H2 Triple GrainGage to Factory Settings



This option can be found on the **Setup** > **H2 GrainGage** > **Factory Reset** screen.

CAUTION: This cannot be undone! Resetting the GrainGage to factory defaults will clear all your settings, including actuator timers and weight calibrations. This should only be done in consultation with a HarvestMaster Field Service Engineer.

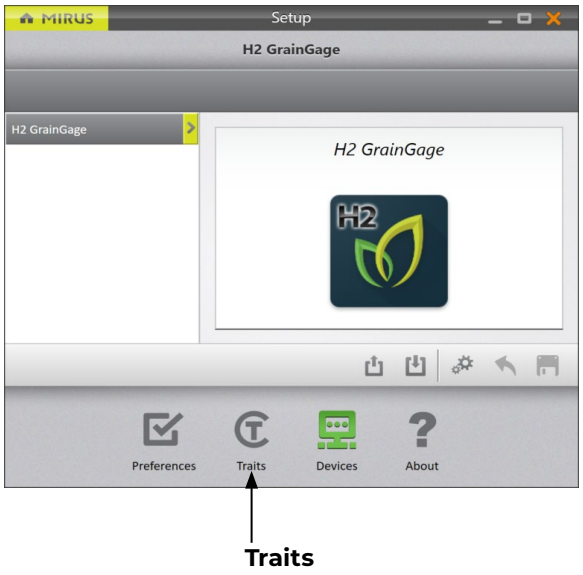
2.3.10 Update H2 Triple GrainGage Firmware



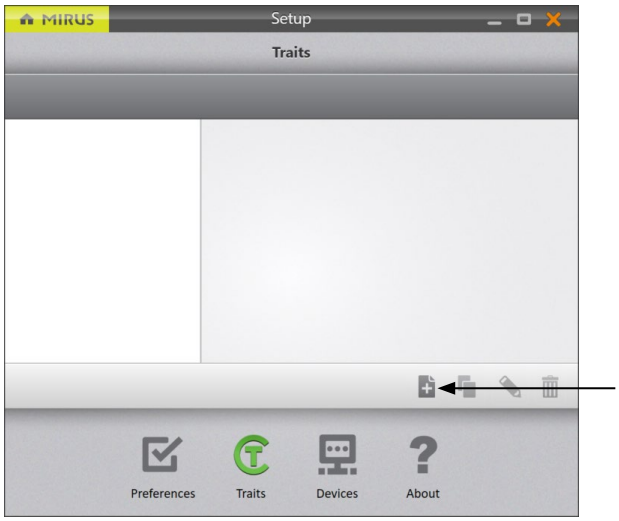
This option can be found on the **Setup** > **H2 GrainGage** > **Firmware** screen.

As an operator, you are not likely to need to use this screen. When you install or update Mirus, the program will check for the latest firmware and update it then. The purpose of this screen is mostly to help HarvestMaster Field Service Engineers during troubleshooting procedures.

2.3.11 Create and Record Traits

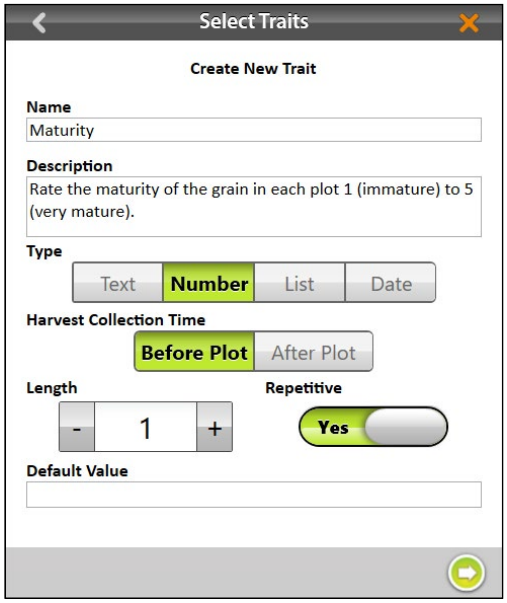


This option can be found on the **Setup** > **Traits** screen.



To create a new trait,

1. Tap the new icon .



2. Enter a **Name** and **Description** for the new trait.
3. Select the **Type** of trait.
4. Select when you want Mirus to prompt the operator to record the trait: **Before Plot** or **After Plot**.
5. Specify the **Length**, or number of characters allowed in the record field.
6. Indicate whether or not this trait is **Repetitive**.
7. Enter the **Default Value** (if needed).
8. Tap the next arrow to save the trait.

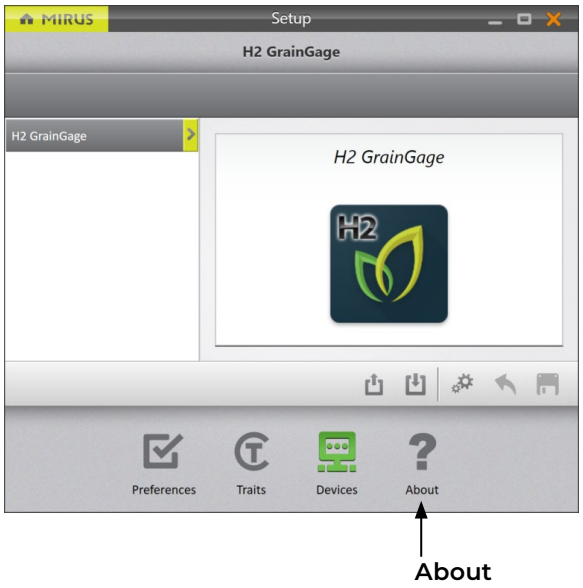
The following table describes the settings for each item on this screen.

New Trait Settings

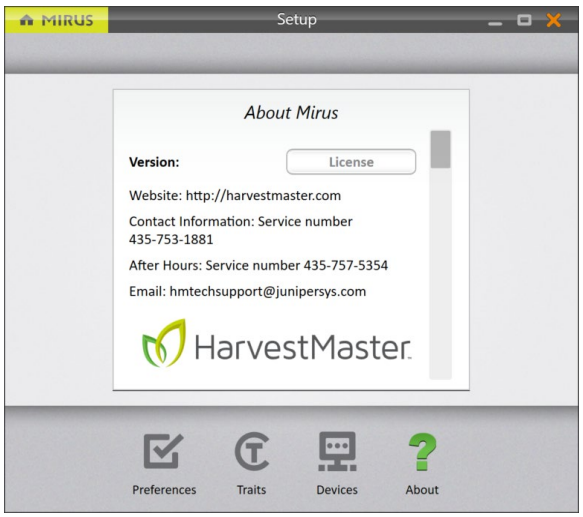
Item	Description
Name	This is the name of the trait.
Description	This describes the type of data to be recorded within the trait.
Type	• **Text:** A text trait allows the user to record text relative to the individual plot. You can set a character limit (Length) and/or a Default Value for quick selection. • **Number**: A number trait allows the user to record a number (e.g., a score) relative to an individual plot. You can set a character limit (Length) and/or a Default Value for quick selection. • **List**: A list trait allows the user to select a value from a list of options. The list is created by entering the values in the Default Value field. To add multiple values, tap the plus icon + on the right side of the window. This feature functions best when selecting from no more than five different trait values. • **Date**: A date trait records dates. The Default Value is the current date, but a user may select a different date.
Harvest Collection Time	Specifies whether trait data will be collected before or after the plot is harvested.
Length	This setting helps Mirus know when to move on to the next trait. After the allotted number of characters is entered, Mirus moves on automatically so that the operator doesn't need to press enter.

New Trait Settings	
Item	**Description**
Repetitive	Selecting “Yes” indicates data for that trait will be collected multiple times on different days. For example, if you wanted to rate your grain for disease three times a year, you would have a repetitive disease trait. Repetitive traits cannot be collected during harvest.
Default Value	This is the most common or most expected value for this trait. Mirus will automatically populate the record field with this value to save the operator time. The operator needs only to press or tap Enter. If the value is different from the default value, the operator can enter the new value then press Enter.

2.3.12 View Information About Mirus



This option can be viewed on the **Setup** > **About** screen.



This screen shows information about Mirus, including the version number, license information, website, and contact information.

mirus™

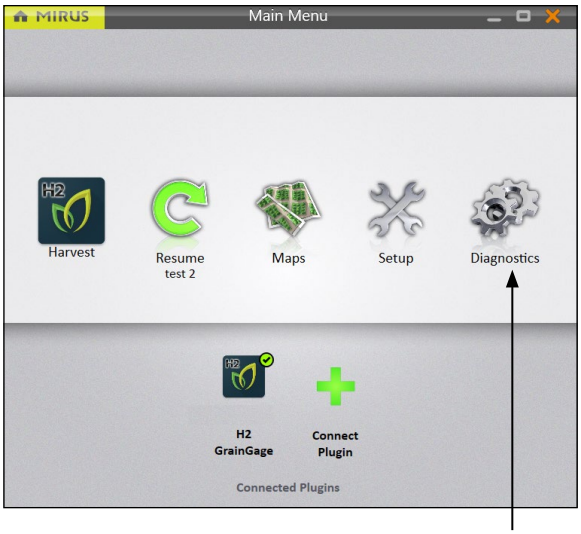
H2 Triple GrainGage

CHAPTER THREE

H2 Triple GrainGage Diagnostics and Alerts

3 H2 Triple GrainGage Diagnostics and Alerts

3.1 Diagnostics Dialogue Box

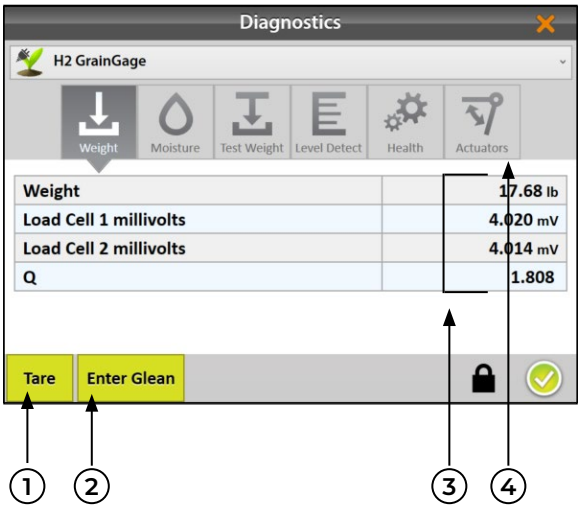


Diagnostics

On the Home screen,

1. Tap **Diagnostics**.

Mirus opens the Diagnostics dialogue box.



In Diagnostics, Mirus:

1. Allows the operator to tare all load cells and the moisture sensor in the GrainGage.
2. Allows the operator to enter and exit Glean Mode, which opens all gates in the GrainGage and allows the grain to flow straight through.
3. Displays live readings from the GrainGage.
4. Provides direct access for manually opening and closing the actuators.

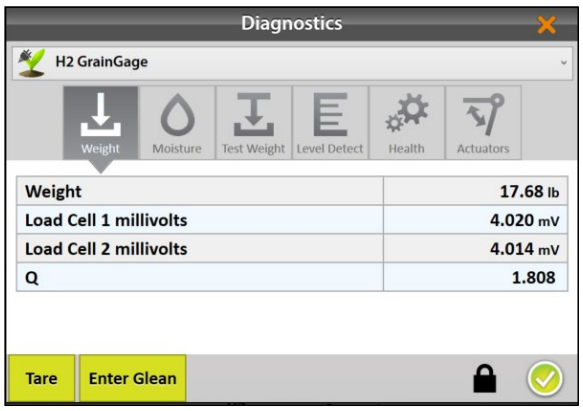
*Note: Tapping **Tare** in any Diagnostics tab tares all sensors (load cells and moisture). Mirus does not allow taring of individual sensors.*

The icon panel across the top of the Diagnostics dialogue box allows you to access each diagnostic category. All Diagnostics screens show the **Tare** and **Enter Glean** (or **Exit Glean**) buttons, as explained in the following table:

Diagnostics Tare and Enter/Exit Glean

Item	Description
Tare button	Use the Tare button to zero all load cells and the moisture sensor. The tare process is as follows: • Check the GrainGage and make sure it is free of grain or debris. • Tap **Tare**. • The gates open and clear the GrainGage. • The gates close. • Load cell voltages average over 4 seconds. • Mirus then uses that average to establish the zero weight readings for the empty weigh bucket and test chamber. • Mirus also resets the moisture to zero.
Enter Glean button	Use the **Enter Glean** button to put the combine and GrainGage in Glean Mode. This mode opens all gates in the GrainGage so that grain flows straight through unimpeded. Use Glean Mode when you need to glean off border plots. In this mode, the button changes to **Exit Glean**. **No data will be collected or recorded in Glean Mode.**
Exit Glean button	Use the **Exit Glean** button to put the combine and GrainGage into Harvest Mode and return to measuring the grain and recording data.

3.1.1 Tare the GrainGage

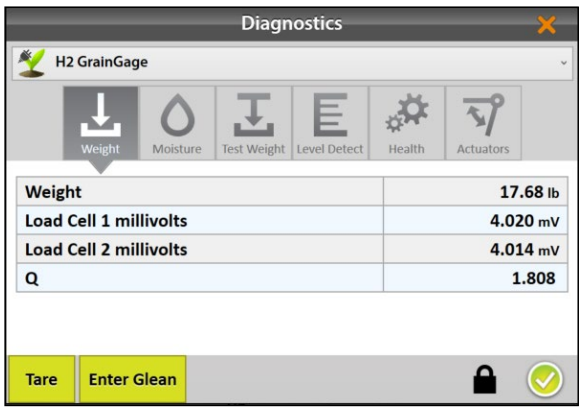


In the Diagnostics box,

1. Tap **Tare**.
2. After the tare is complete, tap the check icon to exit Diagnostics.

Note: HarvestMaster recommends that the combine be turned on with the throttle turned up and the thresher running. Taring should be the last thing you do before you start to harvest.

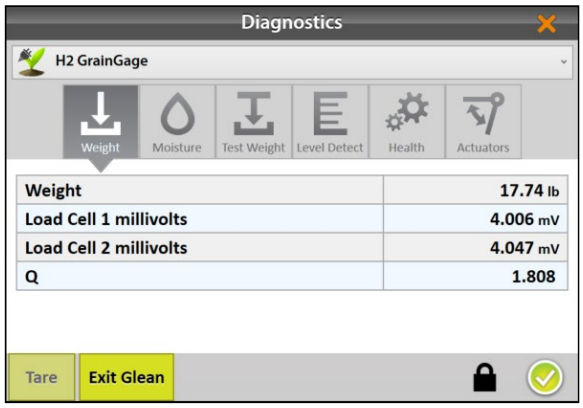
3.1.2 Enter/Exit Glean Mode



In the Diagnostics box,

1. Tap **Enter Glean**.
2. Glean off border plots.

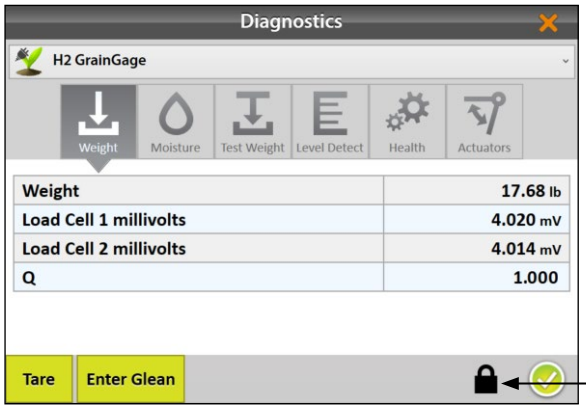
All gates are in the open position.



3. Tap **Exit Glean** to begin measuring grain again.
4. Tap the check icon to exit Diagnostics.

All gates are in the correct position for Harvest Mode.

3.1.3 Weight Diagnostics

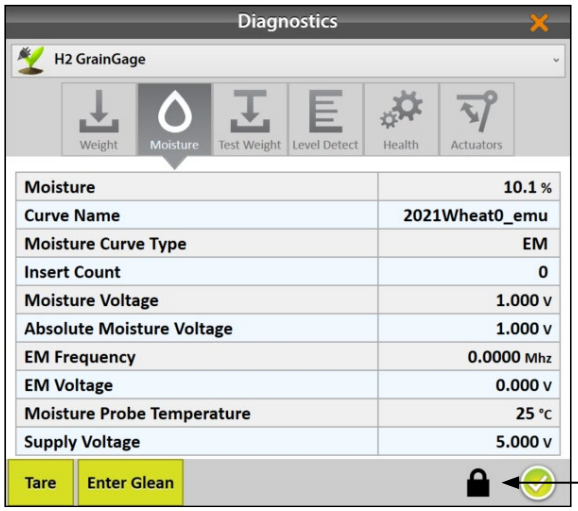


On the Weight Diagnostics screen, live values are shown for the load cells.

Unlock the screen to view additional information.

Weight Diagnostics	
Item	**Description**
Weight	Shows the weight of the contents in the weigh bucket. Depending on the preferred units of measure, weight will be shown in pounds or kilograms. To change the units of measure see **2.2.2 Set Preferred Units of Measure** on page 14.
Load Cell 1 millivolts / Load Cell 2 millivolts	These readings are for the two load cells that measure plot weight. The millivolt readings vary linearly with weight added. The empty weigh bucket causes the load cells to read between 3 and 4 mV.
Q	This multiplier corrects the weight measurement based on the slope and motion of the weighing platform. When Slope and Motion Compensation is disabled, Q is 1.000. When slope and motion compensation is enabled, Q should be 1.000 +/- .01 (depending on the slope the combine is on or intensity of vibrations/movement). If Q value is off, see **4.1 Slope and Motion Calibration on page 45**.

3.1.4 Moisture Diagnostics

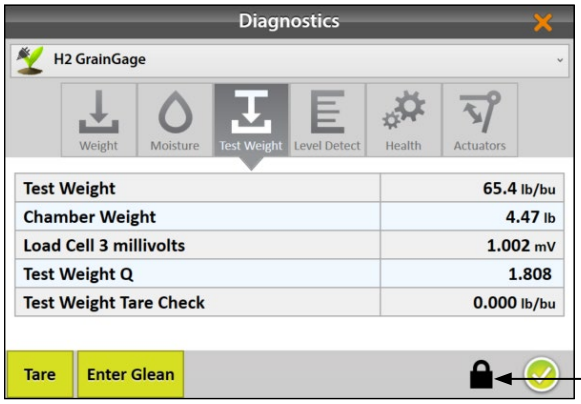


On the Moisture Diagnostics screen, live values are shown for the moisture sensor in the GrainGage.

Unlock the screen to view additional information..

Moisture Diagnostics	
Item	**Description**
Moisture	This is the moisture measurement for grain in the test weight chamber.
Curve Name	This is the name of the grain moisture curve that is applied. It is typical to have a moisture curve for each type of grain being harvested (e.g. corn, wheat, soy beans, etc.).
Moisture Curve Type	This displays the type of the active moisture calibration—EM or M2.0. If the M2.0 calibration is active the grain type is displayed.
Insert Count	The number of inserts specified in the active chamber calibration.
Moisture Voltage	This is a relative voltage reading that is calculated based on the EM sensor reading and empty chamber voltage. This voltage is part of moisture curve calculations. It can be used to tune or generate a new moisture curve.
Absolute Moisture Voltage	This is the raw moisture sensor reading without any offset applied from a moisture curve. This is primarily used for troubleshooting.
EM Frequency	This is a basic measure used for calculating grain moisture. This value is typically between 1.5 and 1.8 V for an empty chamber.
EM Voltage	This is a basic measure used for calculating grain moisture. This value is typically about 1.600 V for an empty chamber.
Moisture Probe Temperature	This is the temperature measured by the moisture probe. Since the sensed signal from moist grain decreases with temperature, the temperature measurement is used to apply a correction in calculating grain moisture. It is measured in degrees Celsius.
Supply Voltage	The amount of supply voltage the moisture sensor is receiving. This value is typically between 11 and 14 volts.

3.1.5 Test Weight Diagnostics



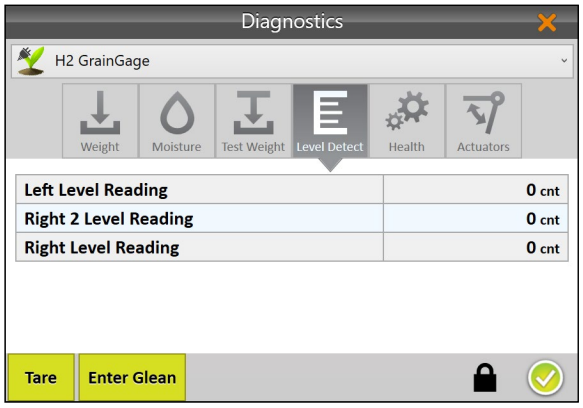
On the Test Weight Diagnostics screen, live values are shown for chamber weight and calculated test weight.

Unlock the screen to view additional information.

Test Weight Diagnostics

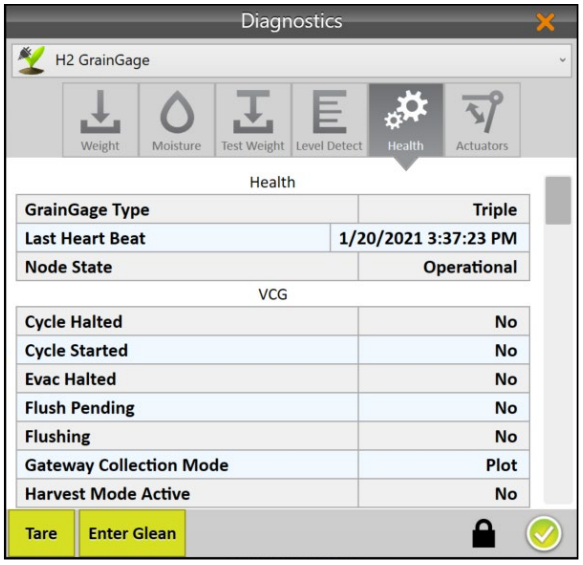
Item	Description
Test Weight	Real time test weight (lb/bu or kg/hL) of grain in the chamber.
Chamber Weight	Real time weight (lb or kg) of the grain in the chamber. This value does not include the weight of the chamber.
Load Cell 3 millivolts	The live operating voltage of the test weight load cell.
Test Weight Q	This multiplier corrects the test weight measurement based on the slope and motion of the weighing platform.
Test Weight Tare Check	Test weight value (lb/bu or kg/hL) at the time the system last performed a tare check.

3.1.6 Level Detect Diagnostics



On the Level Detect Diagnostics screen, Mirus displays the status of the Level Detect Sensors. They should be at zero count when the hoppers are empty.

3.1.7 Health Diagnostics



The Health Diagnostics screen is used by HarvestMaster Field Service Engineers.

3.1.8 Actuators Diagnostics

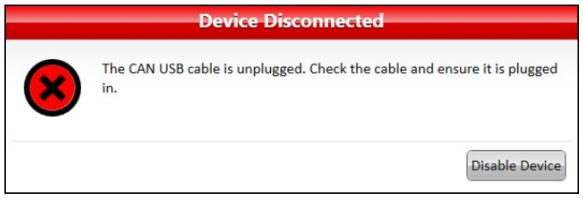
Use the Actuators Diagnostics screen to manually test the actuators controlling all gates connected to the GrainGage. For more information about actuators see **2.3.2 Configure Actuators** *on page 17.*

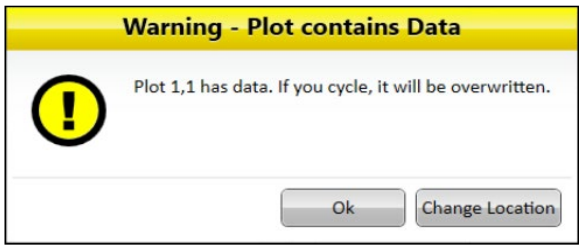
3.2 Alerts

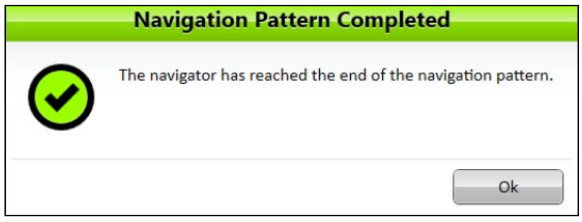
Mirus uses three categories of user messages, distinguishable by the icon and color used with the message.

Mirus Alerts

Icon	Category	Description
	Error	An error message describes a problem that prevents the user or GrainGage from completing a task. The problem could cause erroneous measurements, data corruption, data loss, or some other system malfunction.
	Warning	A warning message provides cautionary information.
	Confirmation	A confirmation message provides status information about the changing nature of an activity. These messages provide information to explain that the GrainGage is operating as expected.

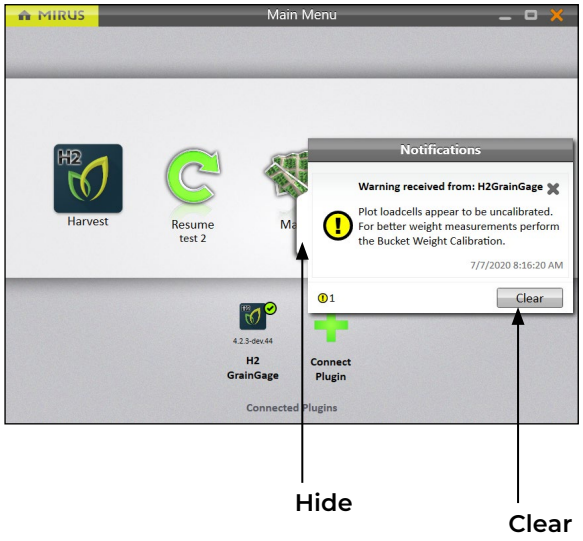






Messages requiring action appear in a dialog box. Click the button to acknowledge the message or to choose an option. The images below display examples of these messages.

Other messages appear as notifications that pop out from the right side of the window.



- Tap the white tab to hide the message.

Or

- Tap the X or **Clear** to clear it.

Or

- Do nothing and Mirus will automatically hide the message.

Messages that have been hidden can be viewed again by clicking on the notifications tab on the right edge of the window.

This tab is only visible if there are messages, and it disappears when there are no messages or when all messages have been cleared.

mirus™

H2 Triple GrainGage

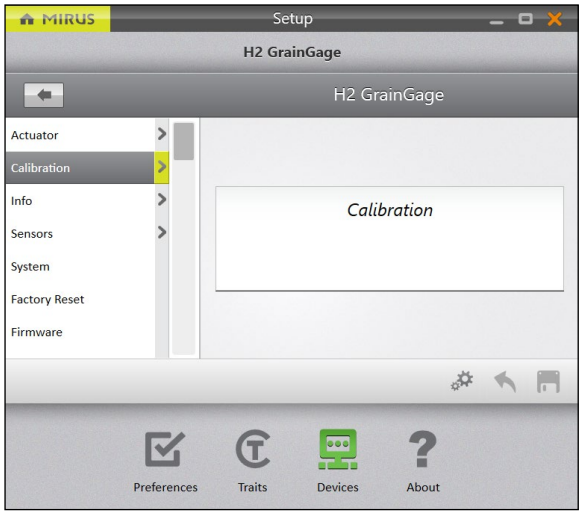
CHAPTER FOUR

GrainGage Calibration

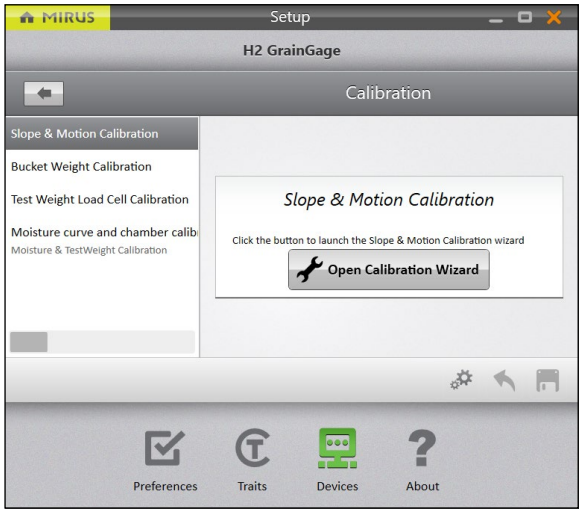
4 H2 Triple GrainGage Calibration

4.1 Slope and Motion Calibration

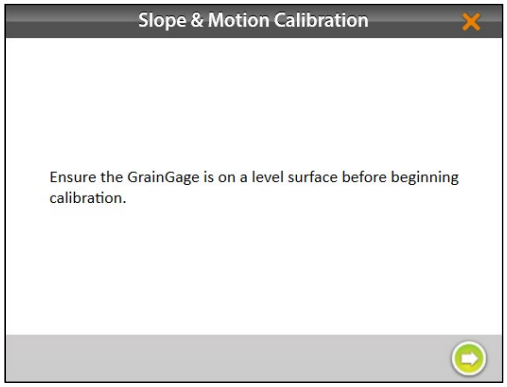
Slope and motion calibration establishes the 1G voltage for the accelerometer inside the GrainGage. This calibration is critical for good weight measurements on the moving combine. It only needs to be done once a year.



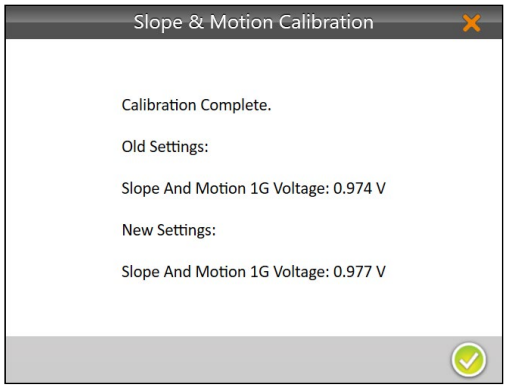
1. Park the combine on a level surface.
2. Shut off the engine and keep the GrainGage powered on.
3. Go to **Home** > **Setup** > **H2 GrainGage**.
4. Tap **Calibration**.



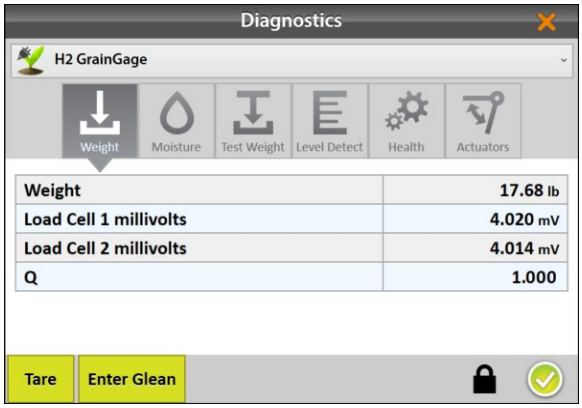
5. Tap **Slope & Motion Calibration**.
6. Select **Open Calibration Wizard**.



7. Tap the next arrow to initiate the calibration.



8. Tap the check icon to apply the new slope and motion settings.
9. Tap the gear icon below the calibration wizard to open Diagnostics.



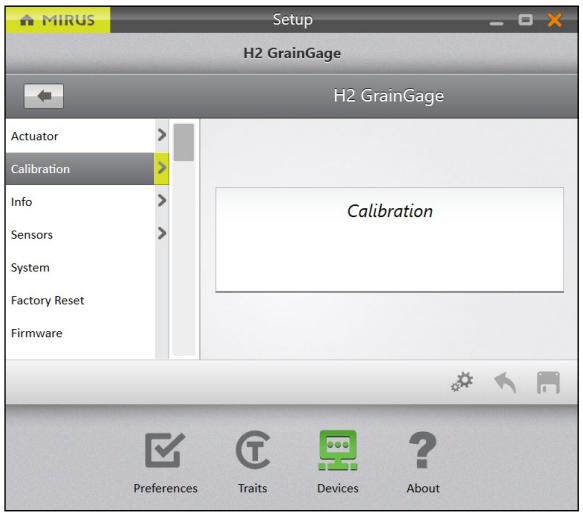
10. Tap the padlock icon to extend the dialog box.
11. Verify that slope and motion compensation has been enabled by checking the Q value. It should be 1.000 +/- .01.
12. Tap the check icon to close Diagnostics.

4.2 Weigh Bucket Calibration

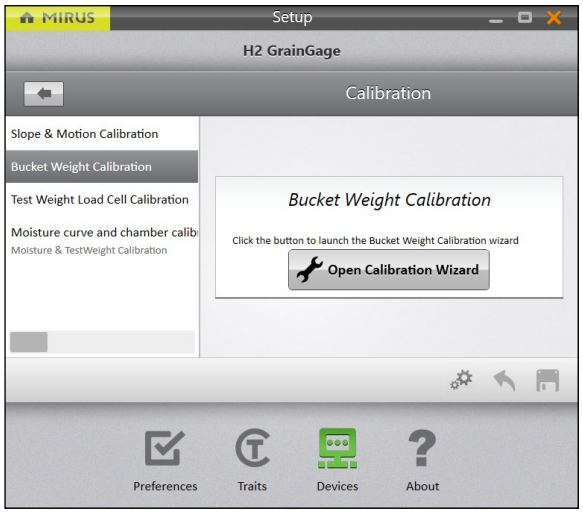
Weigh bucket calibration ensures the accuracy of the GrainGage's weight calculations. This calibration should be done on initial setup.

4.2.1 Calibrate Weigh Bucket

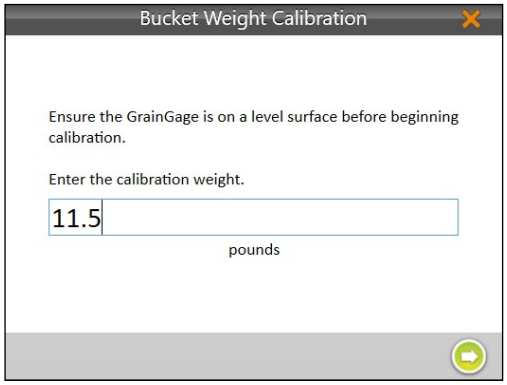
Use the weight calibration wizard and the larger weight (11 lb (5 kg)) included with the GrainGage to calibrate the weigh bucket load cells.



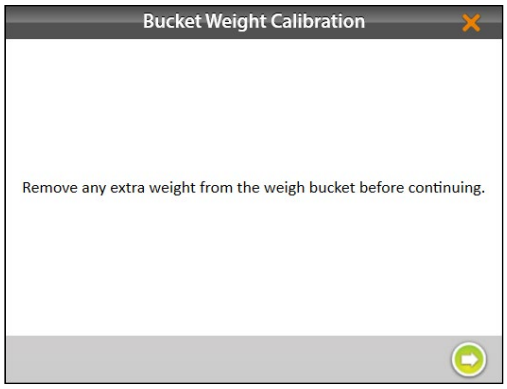
1. Park the combine on a level surface.
2. Shut off the engine, and keep the GrainGage powered on.
3. Make sure the weigh bucket is empty.
4. Go to **Home** > **Setup** > **H2 GrainGage**.
5. Tap **Calibration**.



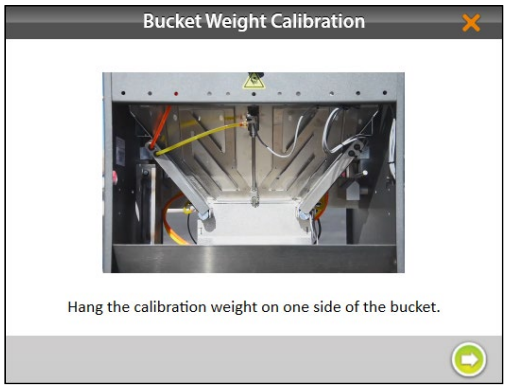
6. Tap **Bucket Weight Calibration**.
7. Select **Open Calibration Wizard**.
8. Follow the on-screen instructions.



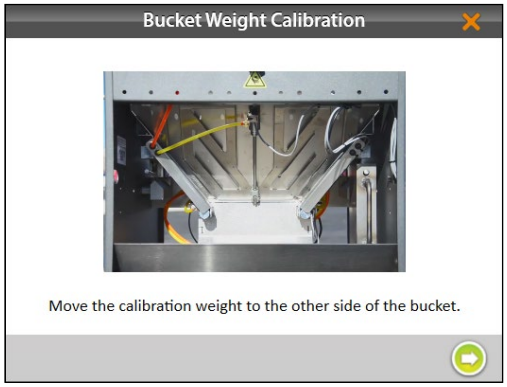
9. Find the value stamped on the side of the weight.
10. Enter that value in the prompt.
11. Tap the next arrow to initiate the calibration.
12. Follow the on-screen video instructions.



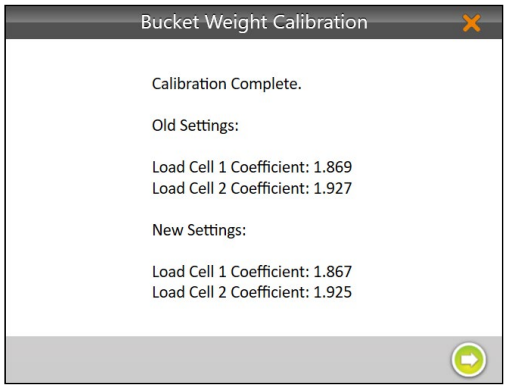
13. Check for and remove any extra weight from the weigh bucket.



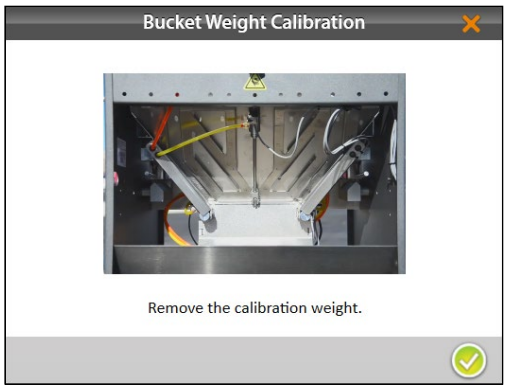
14. Hang the weight as directed.
15. Tap the next arrow.



16. Move and hang the weight on the other side as directed.
17. Tap the next arrow.



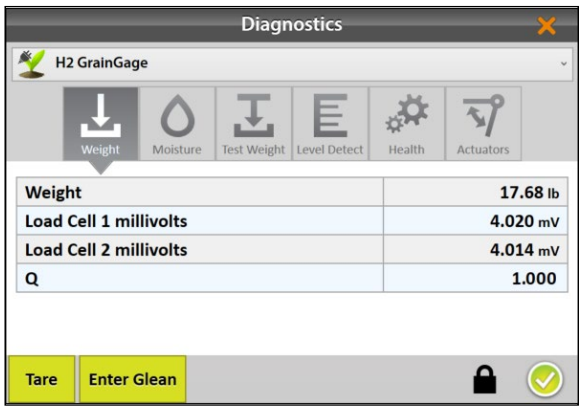
18. Mirus displays the old and new load cell coefficients.
19. Tap the next arrow.



20. Remove the calibration weight.
21. Tap the next arrow. The system will tare and show the new calibration values.
22. Tap the check icon to finish.

4.2.2 Check Weigh Bucket Calibration

Weigh bucket calibration is stable. It rarely changes or loses accuracy. However, because the consequences of poor calibration can be devastating to your research data, HarvestMaster highly recommends checking the weigh bucket calibration every year before the harvest season begins, as well as every day before harvest. This can be done on the Weight Diagnostics screen.



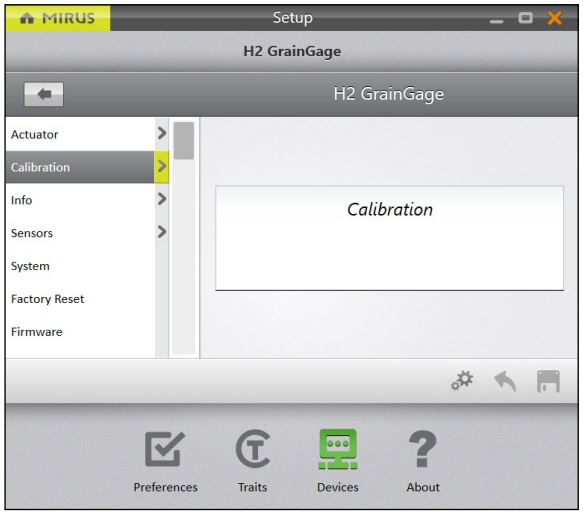
1. After calibrating the weigh bucket, tap the gear icon below the calibration wizard to open Diagnostics.
2. Hang the calibration weight from each of the weight hangers.
3. The Diagnostics screen should report Weight readings that are very close to the value stamped on the calibration weight. If it's not within .05 lb (23 g) with the combine off, HarvestMaster recommends a new weight calibration.
4. Tap the check icon to close Diagnostics.

4.3 Test Weight Calibration

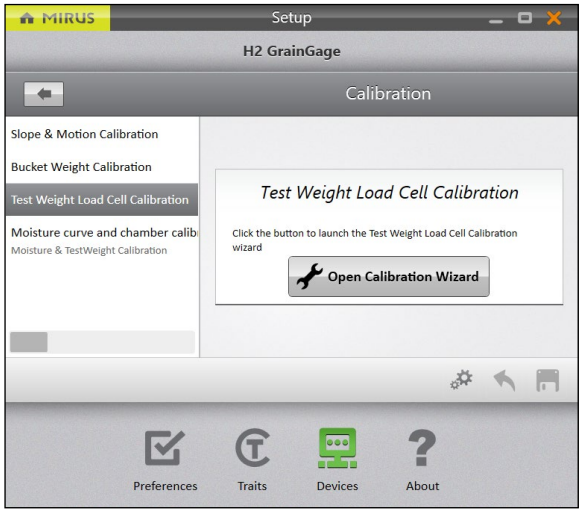
Test weight load cell calibration ensures the accuracy of the GrainGage's weight calculations. This calibration should be done on initial setup.

4.3.1 Calibrate Test Weight

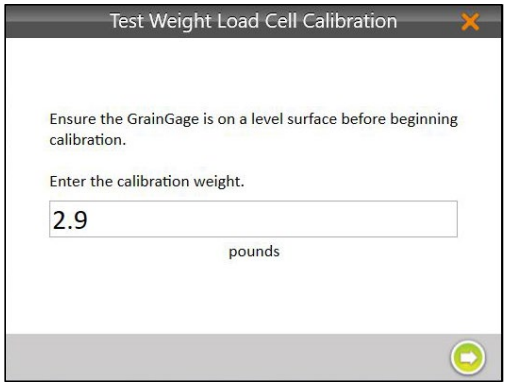
Use the test weight load cell calibration wizard and the smaller calibration weight (3 lb (1.4 kg)) included with the GrainGage to calibrate the test weight chamber load cell.



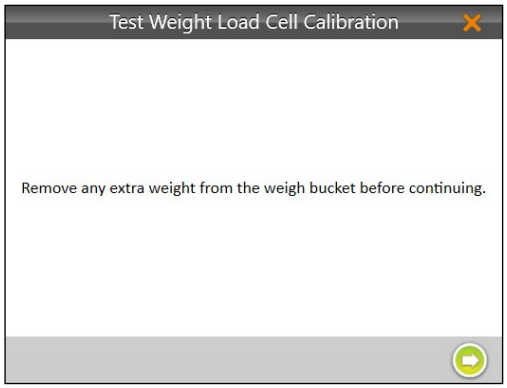
1. Park the combine on a level surface.
2. Shut off the engine and keep the GrainGage powered on.
3. Make sure the test chamber is empty.
4. Go to **Home** > **Setup** > **H2 GrainGage**.
5. Tap **Calibration**.



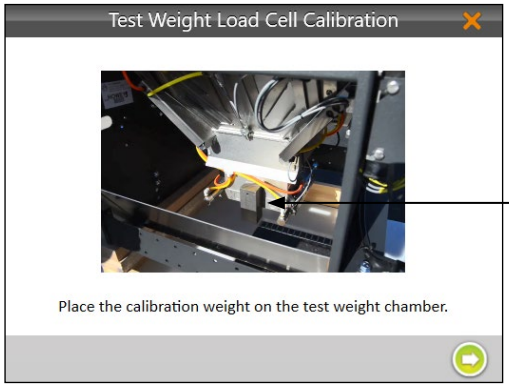
6. Tap **Test Weight Load Cell Calibration**.
7. Select **Open Calibration Wizard**.
8. Follow the on-screen video instructions.



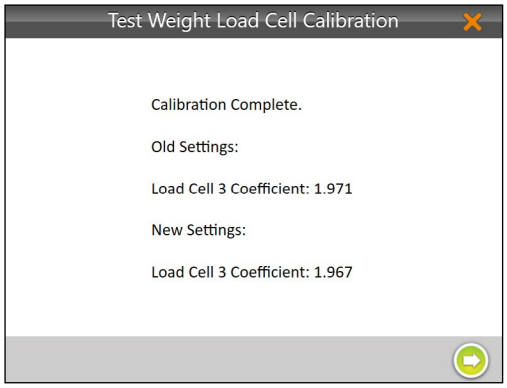
9. Find the value stamped on the side of the weight.
10. Enter that value in the prompt.
11. Tap the next arrow to initiate the calibration.
12. Follow the on-screen instructions.



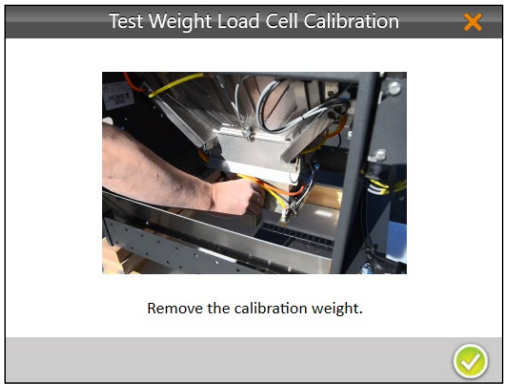
13. Check for and remove any extra weight from the weigh bucket.



14. Hang the weight as directed.
15. Tap the next arrow.



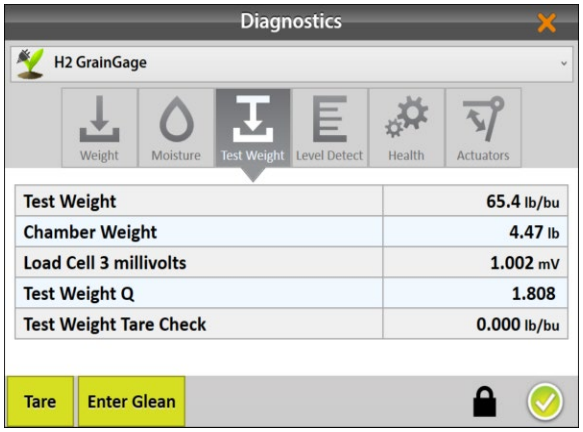
16. Mirus displays the old and new load cell coefficients.
17. Tap the next arrow.



18. Remove the calibration weight.
19. Tap the next arrow. The system will tare and show the new calibration values.
20. Tap the check icon to finish.

4.3.2 Check Test Weight Calibration

Test weight calibration is stable. It rarely changes or loses accuracy. However, because the consequences of poor calibration can be devastating to your research data, HarvestMaster highly recommends checking the test weight calibration every year before the harvest season begins, as well as every day before harvest. This can be done on the Test Weight Diagnostics screen.



1. After calibrating the test chamber, tap the gear icon below the calibration wizard to open Diagnostics.
2. Hang the calibration weight from the weight hanger below the test chamber.
3. The Diagnostics screen should report a Chamber Weight reading that is very close to the value stamped on the calibration weight. If it's not within .05 lb (23 g) with the combine off, HarvestMaster recommends a new weight calibration.
4. Tap the check icon to close Diagnostics.

4.4 Moisture Curve Calibration

CAUTION: Do not re-wet grain samples. If you need to adjust the moisture content, take a natural sample and dry it down.

Before harvesting, you need to generate a chamber calibration (moisture curve). Chamber calibrations align the test weight and moisture reading with a benchtop lab sensor.

For better accuracy, the practices in this guide are designed to streamline the calibration process and teach users how to create moisture curves.

4.4.1 M2.0 Moisture Calibration

With the release of Mirus 4.3.0 there are two ways to perform a moisture calibration with the same hardware—the traditional EM moisture curve or the new M2.0 moisture calibration for certain grains. The new M2.0 moisture model is a preset model that will be offset based on the samples you provide during calibration. If you are harvesting wheat, corn, barley, oats, canola/rapeseed, or soybean, HarvestMaster recommends using the M2.0 moisture model. For more information about the M2.0 moisture calibration see **8.4.1 Instructional Content** on page 136.

4.4.2 Prepare Samples

Preparing your samples is a critical first step towards creating and maintaining an effective moisture curve.

Step 1: Plan ahead for calibration. Creating an accurate moisture curve requires using grain samples with a range of moisture percentages. Collecting enough samples to calibrate properly requires some advanced planning. HarvestMaster recommends two separate strategies: planting grain varieties that will be available for harvest before test plots are ready or harvesting border plots early and drying them to varying moistures.

Step 2: Imitate harvest conditions. When calibrating, it is recommended that you imitate harvest conditions as close as possible. This means grain has enough time to equilibrate to ambient outdoor temperature before calibrating. The grain should be cycled through the hopper or cyclone to reduce grain packing differences. If using test chamber inserts, separate moisture curves *with* and *without* inserts are required.

HarvestMaster recommends cycling samples 3–5 times each in both the benchtop sensor and the GrainGage and then averaging the moisture readings. When possible, grain samples should be tested in the lab and in the GrainGage within an hour of each other.

When calibrating GrainGages mounted on Quantum combines, run the combine for at least 30 minutes before doing the moisture calibration. This ensures that the moisture sensor is at harvest temperature.

Step 3: Collect and prepare samples. Your challenge is to create a moisture curve that is representative of the moisture range that will be encountered during harvest. The more samples available during calibration, the more accurate the curve will be. HarvestMaster recommends:

- Using no less than three samples to generate a curve. The more samples the better.
- Each sample should be at least 6 pounds.
- At least a 3% moisture range from lowest moisture to highest moisture.
- The more samples within about a 10% range the better, but two or three samples will suffice.

Step 4: Adjust for high moisture corn harvest. If you have high moisture samples, HarvestMaster recommends initially calibrating with samples below 26% to set the curve and then manually calibrating the curve above 26% for the high moisture samples. A split curve will generate better data than an average curve.

Step 5: Annually check and tune moisture curves. Checking and tuning moisture curves each season will give you the best data quality.

4.4.3 Chamber Calibration Overview

It is important to maintain 75 lb (34 kg) of air pressure during the chamber calibration. If needed, run the combine to maintain the air pressure.

Calibrating the chamber to create a moisture curve consists of two parts:

1. Calibrating with moisture and test weight.
2. Calibrating with only moisture.

Both of these parts are necessary to create an accurate moisture curve.

To begin the calibration you will need one sample that is at least 6 lb (2.7 kg) at the industry moisture standard (e.g., the industry moisture standard for corn is 15.5%). Cycle this sample three times after providing the Known Moisture and Test Weight. These values do not change between cycles of the same sample.

Continue the calibration with a wet grain sample and a dry grain sample (more samples can be used as well). Each sample should be cycled at least three times. After the first cycle, the moisture values can be input by using the **Last Value** option. Test weight is not included.

The Calibration Steps in the table below describe each step needed to create a moisture curve.

Calibration Steps			
	Cycle with Test Weight	**Moisture**	**Test Weight**
1.	Sample A	Industry Standard	Variable
2.	Cycle Sample A two more times.		Continue to use the same test weight value.
	Cycle without Test Weight	**Moisture**	**Test Weight**
3.	Sample B	Wet Grain	Test weight output should reflect the benchtop test weight.
4.	Cycle Sample B two more times.		
5.	Sample C	Dry Grain	Test weight output should reflect the benchtop test weight.
6.	Cycle Sample C two more times.		

Note: This table reflects the minimum number of cycles needed to create a moisture curve. To improve your moisture curve, cycle several more moisture samples.

About Test Weight

Slope and motion, bucket weight, and test weight load cell calibration should have been performed before adjusting the test weight chamber volume.

Entering the test weight value during moisture calibration automatically adjusts the chamber volume and saves time in calibrating test weight.

It is only necessary to find test weight once.

When calibrating test weight, the moisture value of the sample should be close to the industry standard moisture range for harvest.

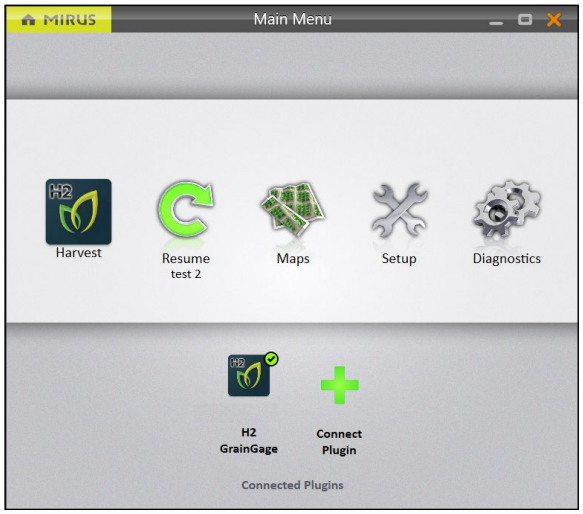
4.4.4 Chamber Calibration

To create a new moisture curve in Mirus for the H2 Triple GrainGage, do the following:

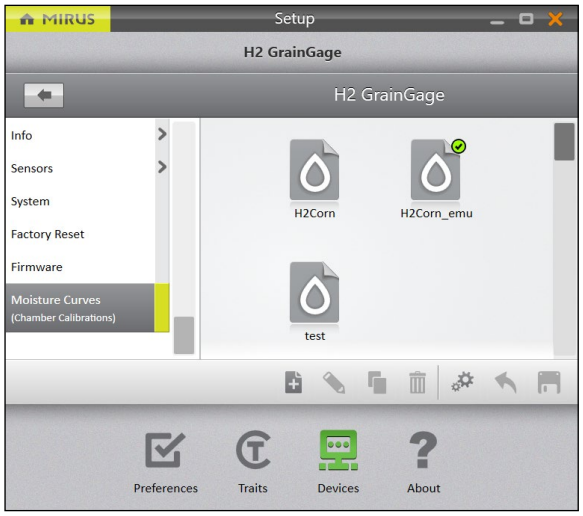
1. If the grain samples have been in air conditioning or cold storage, acclimate them by spreading them out on a clean surface in the shop overnight. **Do not** leave them in the sun to warm up.
2. Test the ambient samples in a benchtop sensor by cycling sub-samples from each larger sample 3–5 times and then averaging the moisture and test weight readings. This is the Known Moisture and Test Weight.

   Note: A test weight from a known source is only needed from one sample.

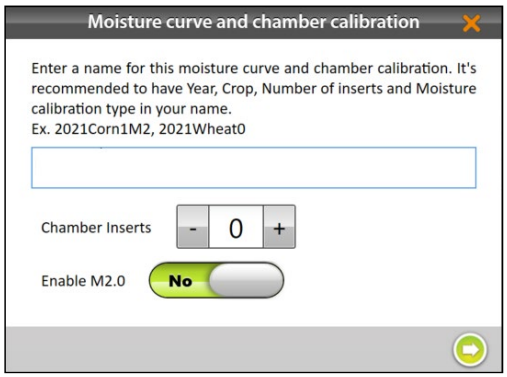
3. Within the hour, take the samples out to the GrainGage. If you are calibrating outside, make sure the samples stay in the shade.



4. Open Mirus.
5. Make sure that the **H2 GrainGage plugin** is loaded.
6. Select **Setup** > **H2 GrainGage**.



7. Scroll down and select **Moisture Curves**.
8. Tap the new icon  .

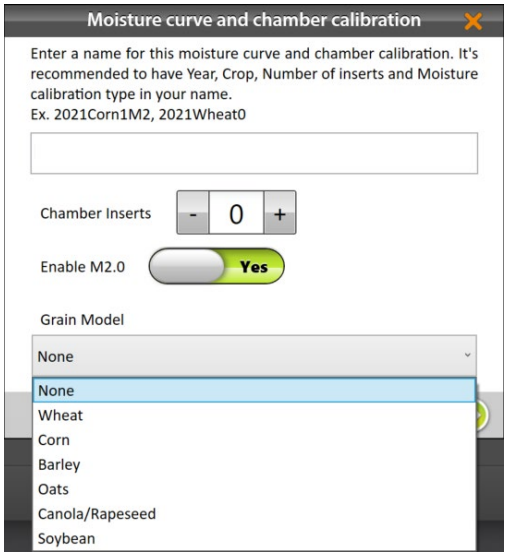


9. Enter a **Name** for the moisture curve.
10. Enter the **Chamber Inserts** count.

    The insert count is the number of inserts present in the chamber. It is used to select default volume for the test chamber, which is important to the accuracy of the system.

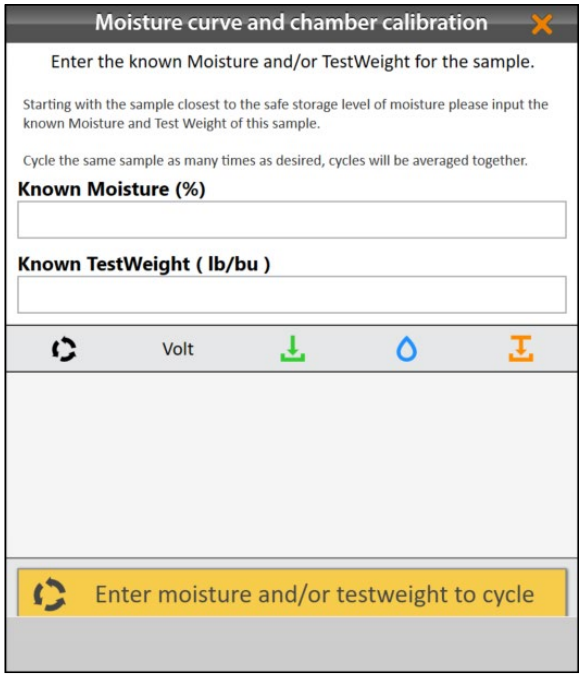
    For more information on insert counts see **7 Appendix A: Standard Grain Information on page 129**.

11. Enable M2.0 calibration if you are harvesting wheat, corn, barley, oats, canola/rapeseed, or soybean.



12. If you selected M2.0 Calibration, choose which grain you are harvesting.
13. Tap the next arrow .
14. Calibrate the chamber with test weight (steps 15–19) and then without test weight (steps 20–29).

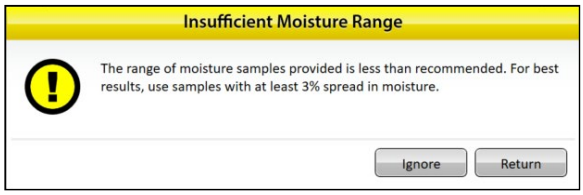
The following steps explain how to begin a chamber calibration by using moisture and test weight.



15. Pour the grain sample into the GrainGage hopper to simulate harvest.
16. Enter the Known Moisture and Test Weight.
17. Tap **Click to run a sample**.

    Note: After the first sample is cycled the values will not change.

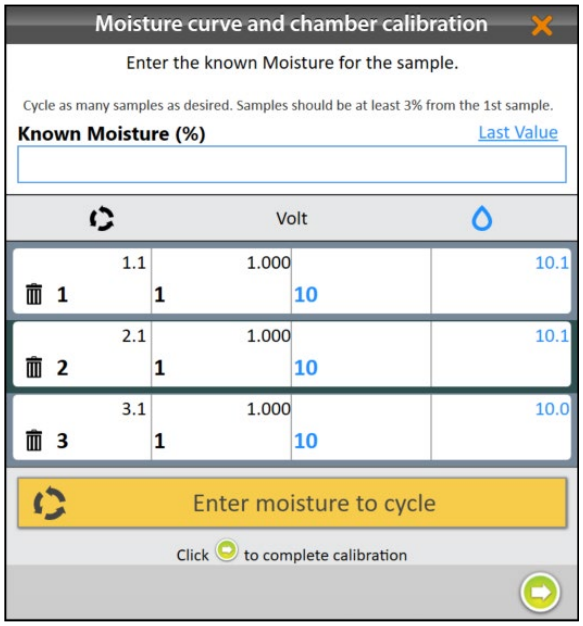
    The GrainGage cycles the grain, and Mirus displays the voltage, moisture percentage, and test weight.
18. Collect the same sample and pour it into the GrainGage again.
19. Repeat the calibration cycle with the same test weight (steps 15–19) at least two more times for a total of three times with this grain sample.



If the moisture content of your samples does not cover a range of at least 3%, Mirus displays an Insufficient Moisture Range warning.

- Tap **Ignore** to continue with the current samples.
- Tap **Return** to add more samples with a variety of moisture percentages.

The following steps explain how to continue a chamber calibration by adding moisture samples (with no test weight).



20. Pour a grain sample into the GrainGage hopper to simulate harvest.
21. Enter the Known Moisture.
22. Tap **Click to run a sample**.

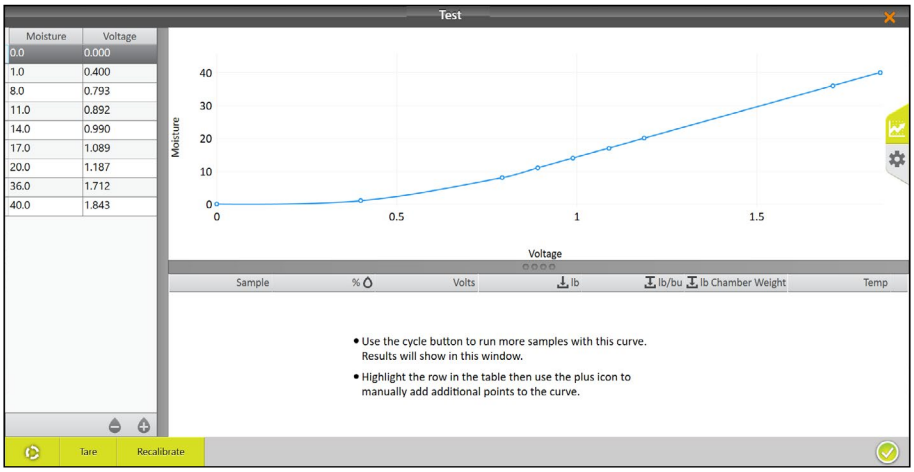
    The GrainGage cycles the grain, and Mirus displays the voltage and moisture percentage.

23. Collect the same sample and pour it into the GrainGage again.
24. Tap **Last Value** to automatically populate the Known Moisture with the same value as the previous sample.
25. Repeat steps 20–24 until all grain samples have been cycled through the GrainGage.

    Note: HarvestMaster recommends using three to four samples and cycling them three times each.

26. Tap the next arrow to complete the calibration.
27. Tap the check icon.
28. Mirus displays the moisture curve and voltages graphically.

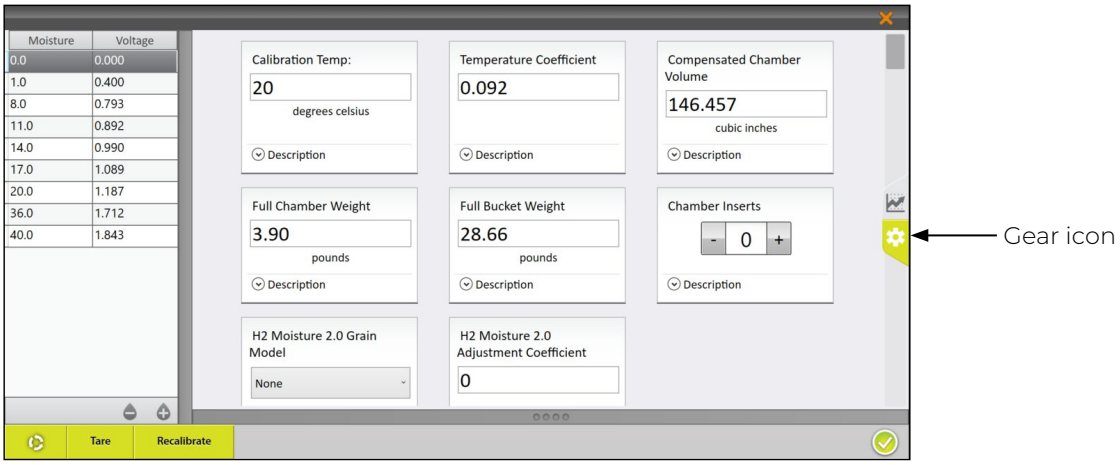
Note: The graphic curve displayed will show the EM calibration. If you did an M2.0 calibration, Mirus will save an EM calibration, but it will use the M2.0 calibration throughout harvest.



29. Tap the check icon to save the new moisture curve.

    If desired, first tap the gear icon on the right for more information about this moisture curve.

    Note: Only adjust these settings if a HarvestMaster Field Service Engineer tells you to.

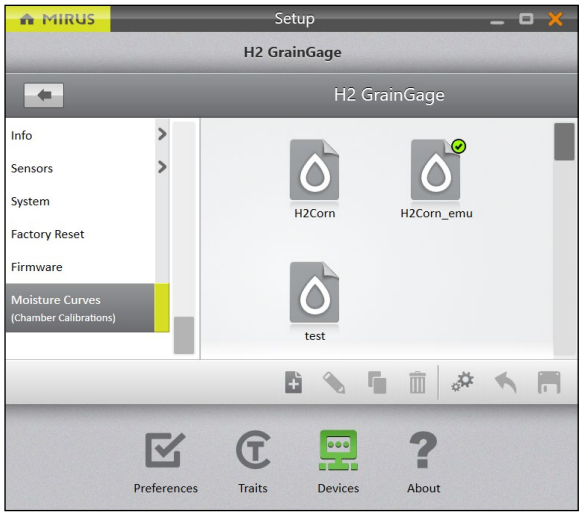


4.4.5 Test and Tune a Moisture Curve

Note: This section is only applicable to the EM moisture curve.

HarvestMaster recommends testing the new moisture curve against other grain samples to confirm the moisture and test weight values.

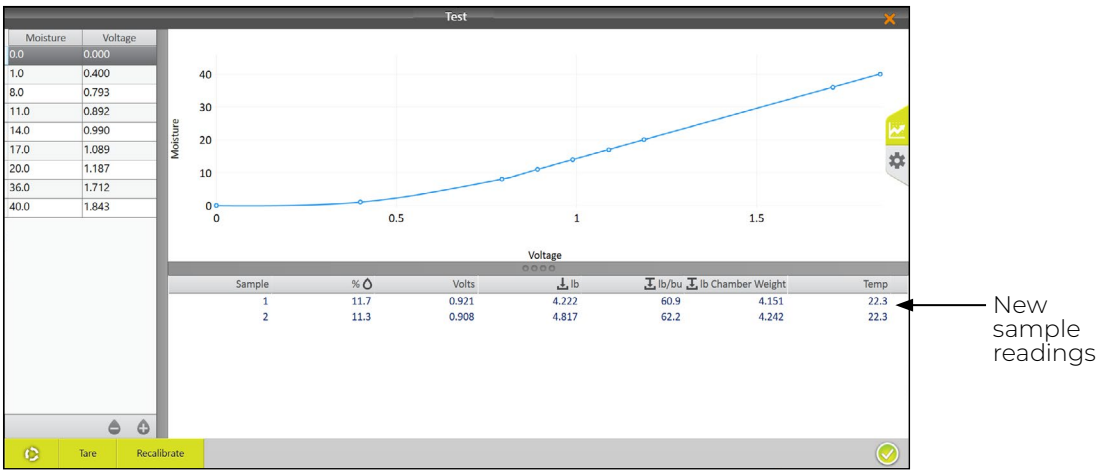
1. Test the grain sample in a benchtop sensor by cycling sub-samples from the larger sample 3–5 times and averaging the moisture and test weight readings. The averages are the Known Moisture and Test Weight.
2. Within the hour, take the sample out to the GrainGage. If you are calibrating outside, make sure the sample stays in the shade.



3. Open Mirus.
4. Go to **Setup** > **H2 GrainGage** > **Moisture Curves**.
5. Select the moisture curve you want to test.
6. Tap the edit icon .

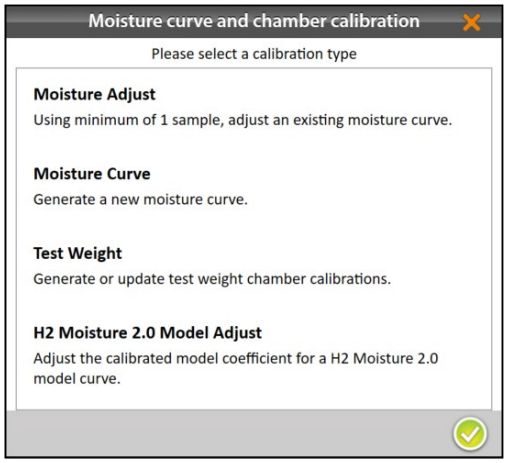
7. Pour the grain sample into the hopper (to simulate harvest). Release the isolation gate so that the grain drops into the GrainGage uniformly.
8. Tap the **Cycle** button .

   Mirus displays the moisture, voltage, bucket weight, test weight, and temperature of the sample.



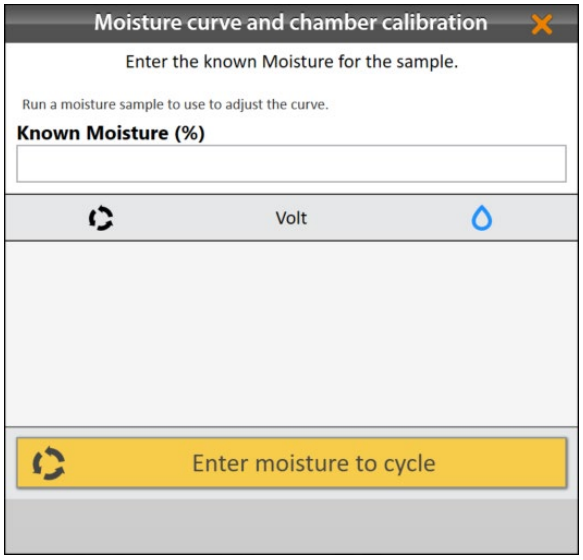
9. Cycle the sample through the GrainGage (repeat steps 7 and 8) two more times. This allows Mirus to average the moisture readings for the sample.
10. If the moisture curve needs to be tuned to match the sample, tap **Recalibrate**.

    The Recalibrate feature is designed to adjust previously created moisture curves to match a new grain sample. The slope of the curve is not changed. The entire curve shifts to match the new sample. Fine tuning of a curve is often done later in the season as additional moisture samples are available.

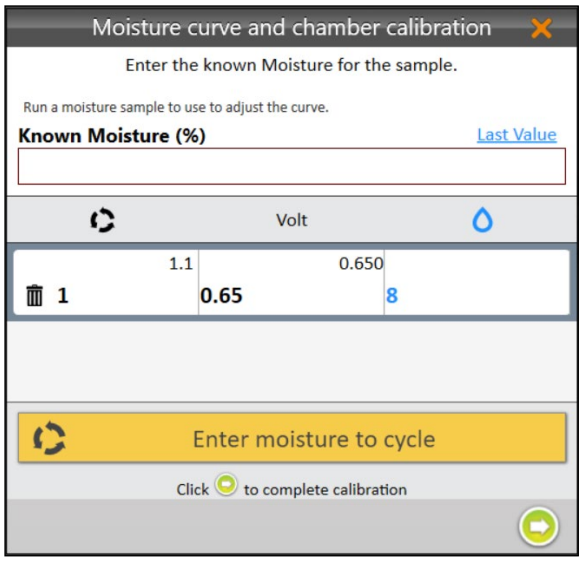


11. Select **Moisture Adjust** and tap the next arrow .

    Note: Multiple samples can be used to adjust an existing moisture curve. If test weight needs to be adjusted, see the next section.



12. Pour the grain sample into the hopper (to simulate harvest). Ensure the isolation gate is open so the grain drops into the GrainGage.
13. Enter the Known Moisture percentage.
14. Tap **Click to run a sample**.



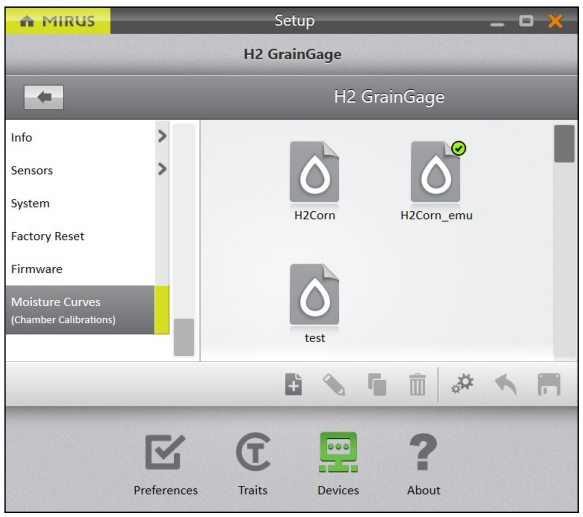
15. Repeat steps 12–14 with the same sample at least two more times.

    *Note: The **Last Value** button can be used to fill the Known Moisture field with the previous percentage when the same sample is run multiple times.*

16. Tap the next arrow to complete the recalibration.
17. Tap the check icon.

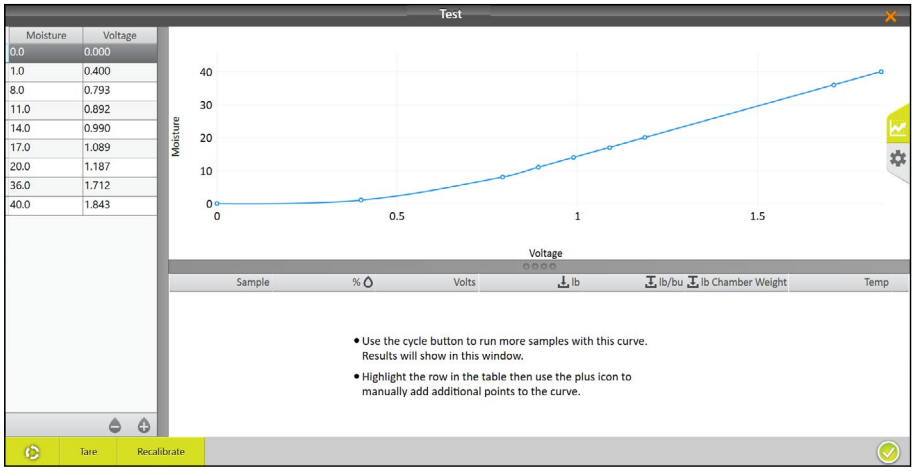
    Mirus displays the adjusted moisture curve with its moisture percentages and voltages.

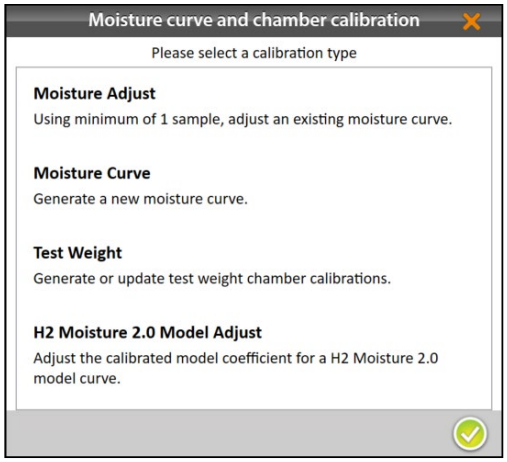
4.4.6 Test Weight Recalibration



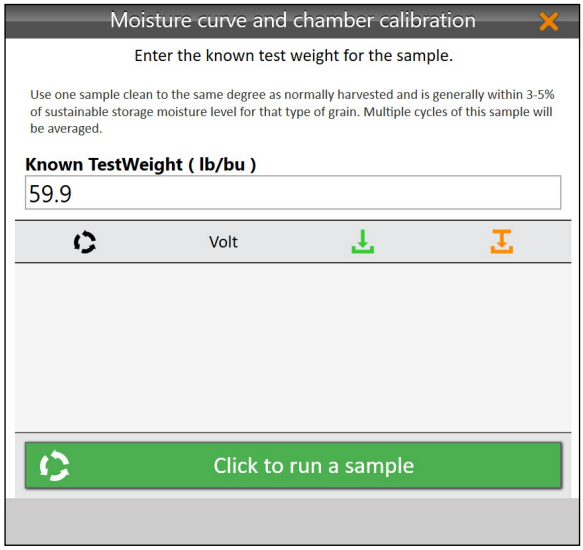
1. Open Mirus.
2. Go to **Setup** > **H2 GrainGage** > **Moisture Curves**.
3. Select the moisture curve you want to test.
4. Tap the edit icon .

5. Tap **Recalibrate**.

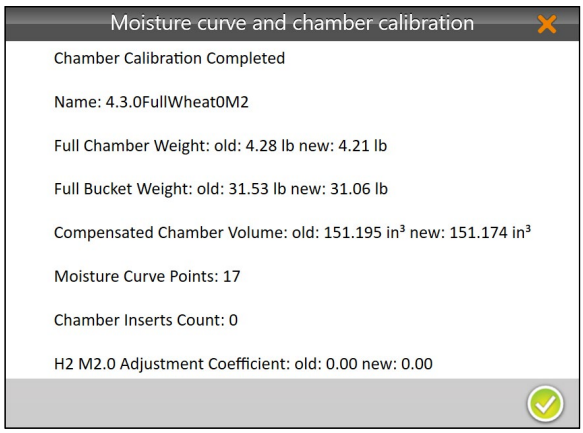




6. Select **Test Weight** and tap the next arrow .



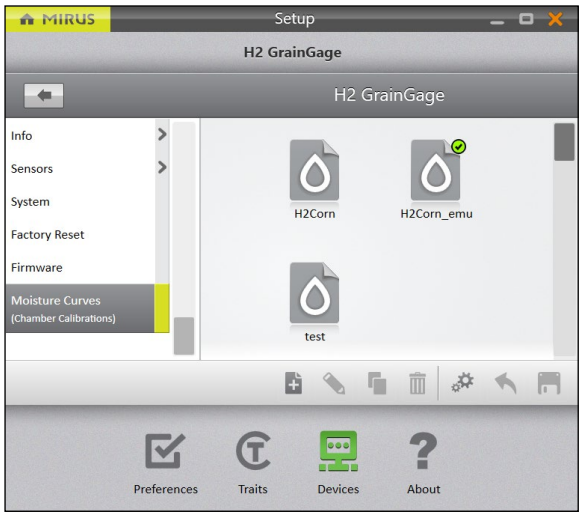
7. Pour the grain sample into the hopper (to simulate harvest). Ensure the isolation gate is open so the grain drops into the GrainGage.
8. Enter the **Known Test Weight**.
9. Tap **Click to run a sample**.
10. After you have run one sample 3–5 times, tap the next arrow .



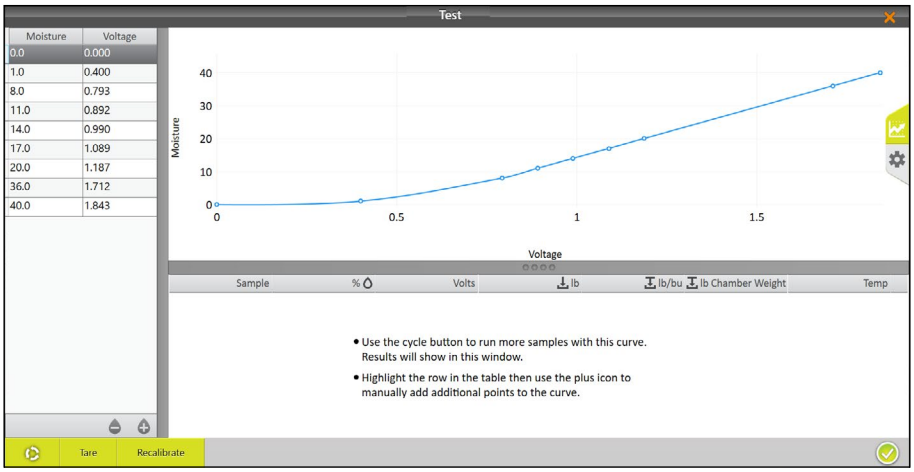
11. The final screen will display the recalibrated values.

4.4.7 M2.0 Moisture Model Recalibration

To adjust an M2.0 moisture calibration,

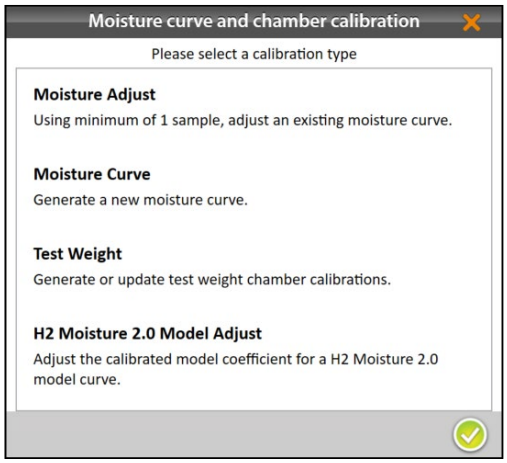


1. Open Mirus.
2. Go to **Setup** > **H2 GrainGage** > **Moisture Curves**.
3. Select the moisture curve you want to adjust.
4. Tap the edit icon .



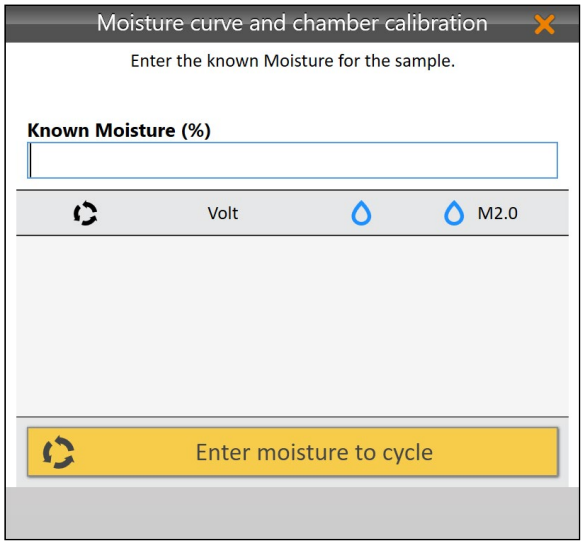
5. Tap **Recalibrate**.

   Adjusting the M2.0 calibration does not factor in the samples originally used in the calibration. The adjustment only uses new samples to create a new calibration. However, your initial EM curve will remain unchanged.

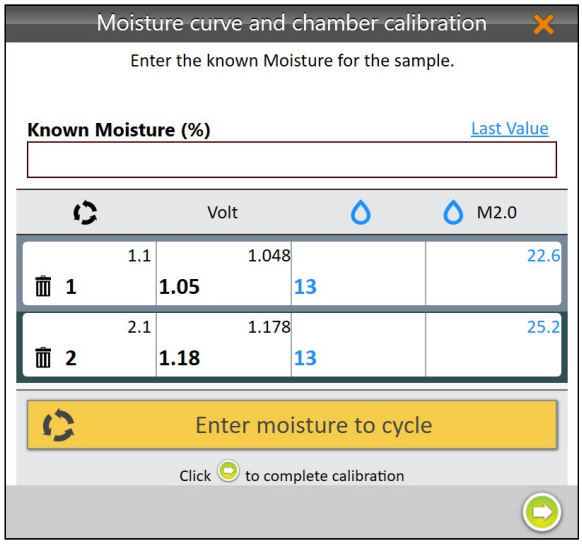


6. Select **H2 Moisture 2.0 Model Adjust** and tap the next arrow.

   Note: Multiple samples can be used to adjust an existing moisture curve.



7. Pour the grain sample into the hopper (to simulate harvest). Ensure the isolation gate is open so the grain drops into the GrainGage.
8. Enter the Known Moisture percentage.
9. Tap **Click to run a sample**.



10. Repeat steps 7–9 with the same sample at least two more times

    *Note: The **Last Value** button can be used to fill the Known Moisture field with the previous percentage when the same sample is run multiple times.*

11. Tap the next arrow to complete the recalibration.
12. Tap the check icon.

    Mirus displays the adjusted moisture curve with its moisture percentages and voltages.

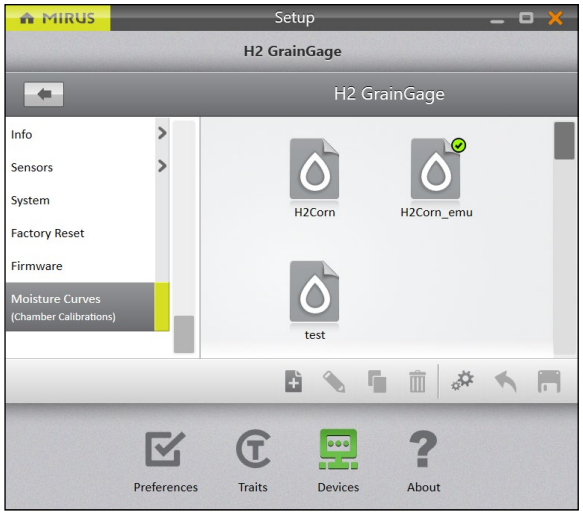
4.4.8 Manually Adjust a Moisture Curve

Note: This section is only applicable to the EM moisture curve.

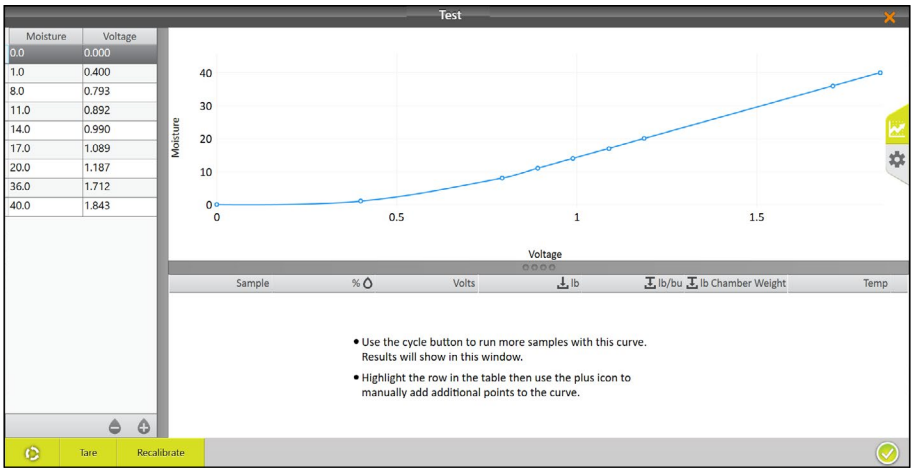
If desired, you can manually adjust a moisture curve using one or more grain samples.

Note: Manually adjusting the curve should be done by more experienced users. If you are unfamiliar with moisture curves, call a HarvestMaster Field Service Engineer to walk you through the adjustment. See **8.4.2 Contact a HarvestMaster Field Service Engineer** *on page 136*.

1. Test the grain samples in a benchtop sensor by cycling sub-samples from each larger sample 3–5 times and averaging the moisture readings. This is the Known Moisture.
2. Within the hour, take the samples out to the GrainGage. If you are calibrating outside, make sure the samples stay in the shade.

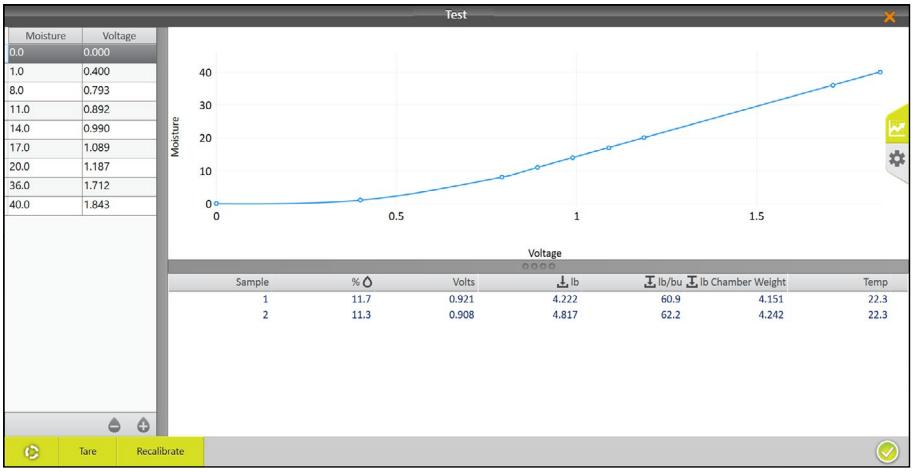


3. Open Mirus.
4. Go to **Setup** > **H2 GrainGage** > **Moisture Curves**.
5. Select the moisture curve you want to test.
6. Tap the edit icon .



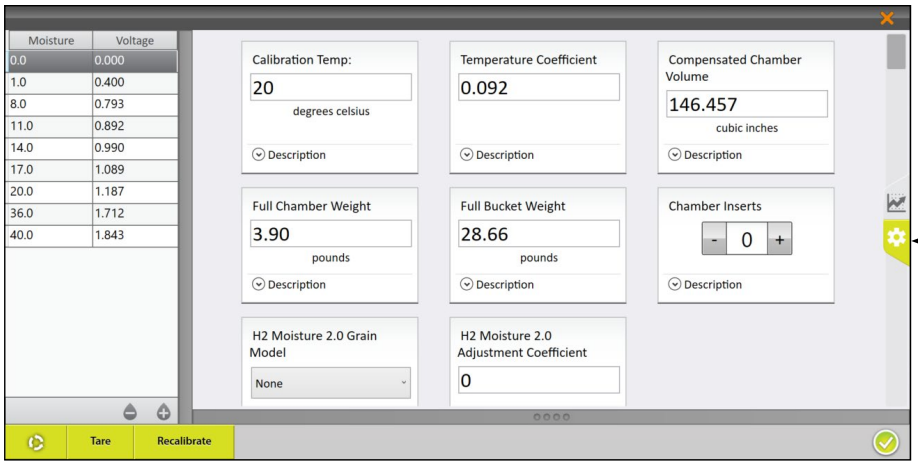
7. Pour the grain sample into the hopper (to simulate harvest). Release the isolation gate so that the grain drops into the GrainGage uniformly.
8. Tap the **Cycle** button .

   Mirus displays the moisture, voltage, bucket weight, and temperature of the sample.



If desired, tap on the gear icon on the right for more information about the moisture curve.

Note: Only adjust these settings if a HarvestMaster Field Service Engineer tells you to.



9. Cycle the same sample through the GrainGage (repeat steps 7 and 8) two more times. This allows Mirus to average the moisture readings for each sample.
10. Repeat steps 7–9 for all prepared samples. Each grain sample should be cycled 3–5 times.
11. Calculate the moisture percentage offsets.

    The offset is the difference between the benchtop sensor's moisture measurement and the GrainGage's moisture measurement.

For example, Sample One has the following moisture measurements:

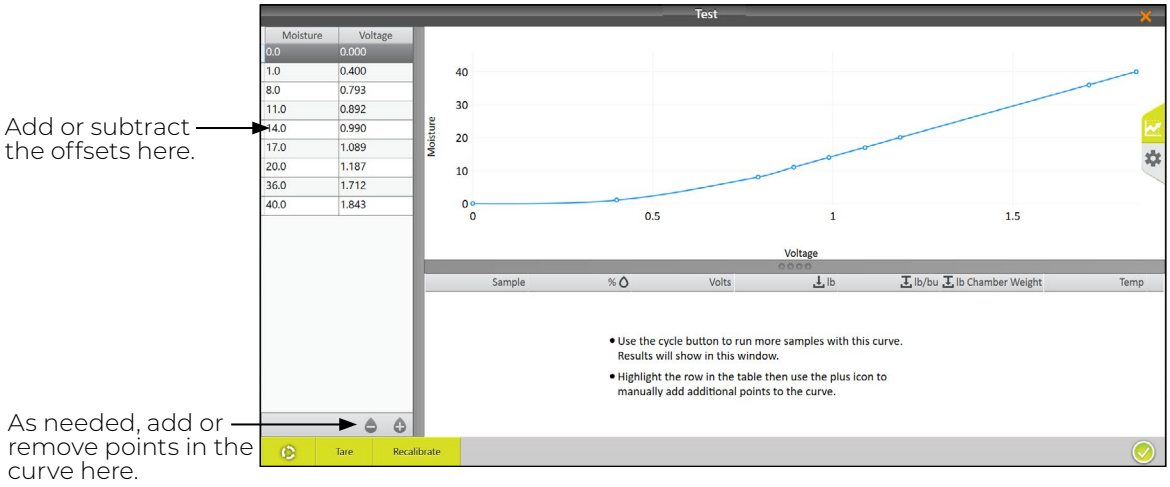
- Benchtop sensor: 18%
- GrainGage: 16.8%

The offset would be 18% – 16.8% = +1.2%

12. Average the sample offsets.

    For example, if your benchtop sensor says Sample One is +1.2% more than the GrainGage measurement and Sample Two is +0.8%, the average offset is +1.0%.

13. Add the average offset to each moisture point with exception of the 0 and 1 moisture points (never adjust 0 or 1). Subtract for a negative average offset. Do not adjust voltages.



In the example above, readings from the benchtop sensor indicate that the samples have, on average, 1% higher moisture than the percentages in the previously calculated moisture curve.

The following tables illustrate this type of adjustment:

Original Curve	
Moisture	Voltage
0.0	0.000
1.0	0.400
8.0	0.793
11.0	0.892
14.0	0.990
17.0	1.089
20.0	1.187
36.0	1.713
40.0	1.845

Adjusted Curve	
Moisture	Voltage
0.0	0.000
1.0	0.400
9.0	0.793
12.0	0.892
15.0	0.990
18.0	1.089
21.0	1.187
37.0	1.713
41.0	1.845

4.4.9 Manual Calibration Using Excel

Note: This section is only applicable to the EM moisture curve.

HarvestMaster provides a spreadsheet for creating a two-point calibration online. It can be downloaded here: *www.harvestmaster.com/data/files/mirus/EM2 Sample Curves 2018.xlsx*. Follow the instructions in the spreadsheet for creating the curve.

4.4.10 Calibrate High Moisture Corn

Note: This section is only applicable to the EM moisture curve.

When calibrating with high moisture corn samples, some moisture curves do not follow a linear voltage relationship. HarvestMaster recommends manually adjusting the upper half of moisture curves with grain samples above 26%.

To do this type of adjustment, start by using samples below 26% moisture to create a base curve as described in **4.4.3 Chamber Calibration Overview on page 54**.

Once you have a base curve, use 3–5 samples (multiple samples required) that are 26% and above to manually adjust the top half of the curve:

1. With the moisture curve open, cycle samples above 26% through the GrainGage 3–5 times each. Average the moisture readings for each sample.
2. Calculate the moisture percentage offsets.

   The offset is the difference between the benchtop sensor's moisture measurement and the GrainGage's moisture measurement.

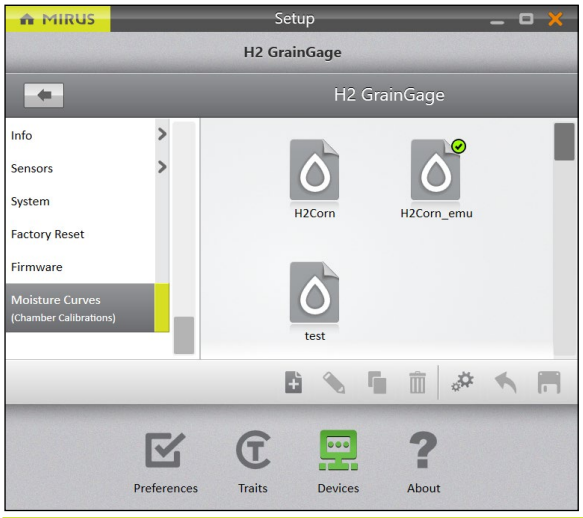
   For example, Sample One has the following moisture measurements:

   - Benchtop sensor: 33%
   - GrainGage: 31.8%

   The offset would be 33% – 31.8% = +1.2%

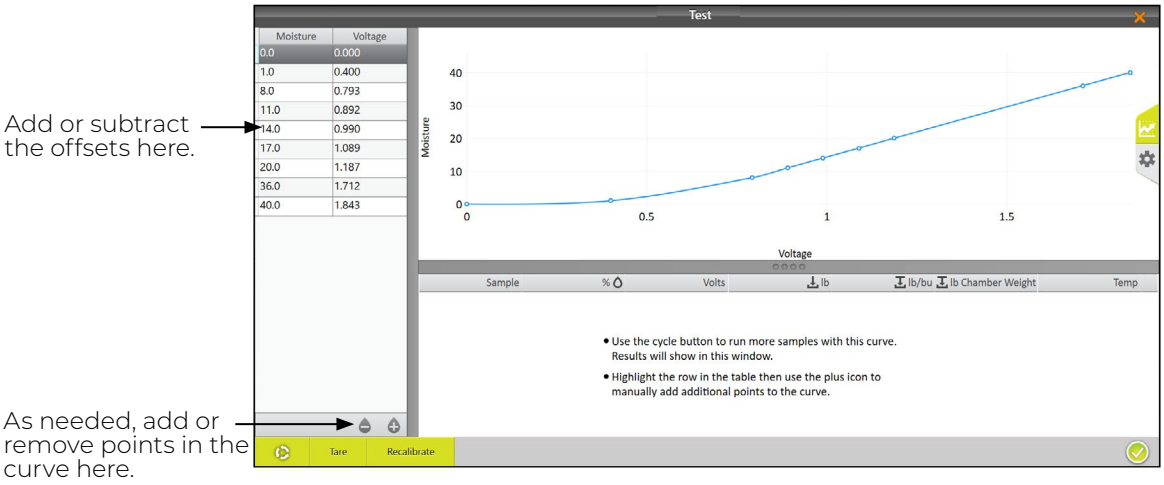
3. If the average readings of the higher moisture samples do not match the moisture curve, average all the sample offsets.

   For example, if your benchtop sensor says Sample One is +1.2%, Sample Two is +0.8%, and Sample Three is +1.0%, the average offset is +1.0%.



4. Open Mirus.
5. Go to **Setup** > **H2 GrainGage** > **Moisture Curves**.
6. Select the moisture curve you want to test.
7. Tap the edit icon .

8. Add the average offset to each moisture point with the exception of the 0 and 1 moisture points (never adjust 0 or 1). Subtract for a negative average offset. Do not adjust voltages.

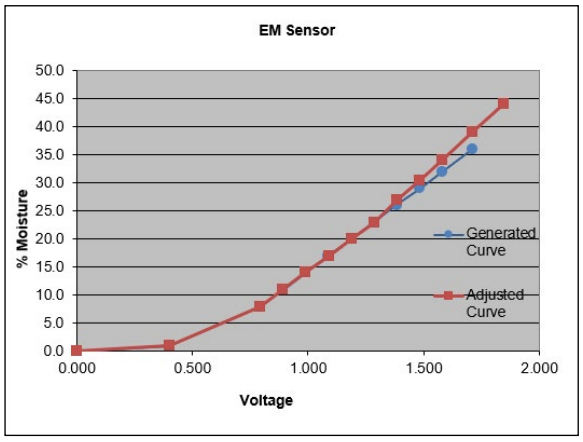


In the example above, readings from the benchtop sensor indicate that the grain samples above 26% have, on average, 1% higher moisture than the percentages in the base moisture curve. Therefore, in the curve:

- 26% would become 27%
- 28% would become 29%
- 40% would become 41%

The lower and upper ends of the newly adjusted moisture curve should graphically depict a smooth point-to-point transition (as illustrated below). If it isn't smooth, HarvestMaster recommends generating a new curve.

9. Once the curve is adjusted, recheck samples, starting with the lower half of the moisture curve.
10. After adjusting the lower half of the curve, cycle samples above 26% and repeat the adjustment procedure (steps 1–8 above). Only adjust the points above 26% and leave the points on the lower half alone.



In some cases, the higher the moisture, the steeper the slope of the curve. This is indicated by a *steady increase in the difference* between the moisture curve and the moisture percentages in the grain samples as the moisture values increase.

This scenario is not uncommon in high moisture corn. It requires adding extra percentage points as the moisture value increases. For example, adding the following percentages to the default curve will help match the steeper slope in higher moisture grain samples:

- Add 1% to moisture values 26% to 27%
- Add 1.5% to moisture values 28% to 30%
- Add 2% to moisture values above 30%

The following tables illustrate this type of adjustment.

Original Curve	
Moisture	Voltage
0.0	0.000
1.0	0.400
8.0	0.793
11.0	0.892
14.0	0.990
17.0	1.089
20.0	1.187
23.0	1.286
26.0	1.385
29.0	1.483
32.0	1.582
36.0	1.713
40.0	1.845

Adjusted Curve	
Moisture	Voltage
0.0	0.000
1.0	0.400
8.0	0.793
11.0	0.892
14.0	0.990
17.0	1.089
20.0	1.187
23.0	1.286
27.0	1.385
30.5	1.483
34.0	1.582
39.0	1.713
44.0	1.845

mirus™

H2 Triple GrainGage

CHAPTER FIVE

Field Maps

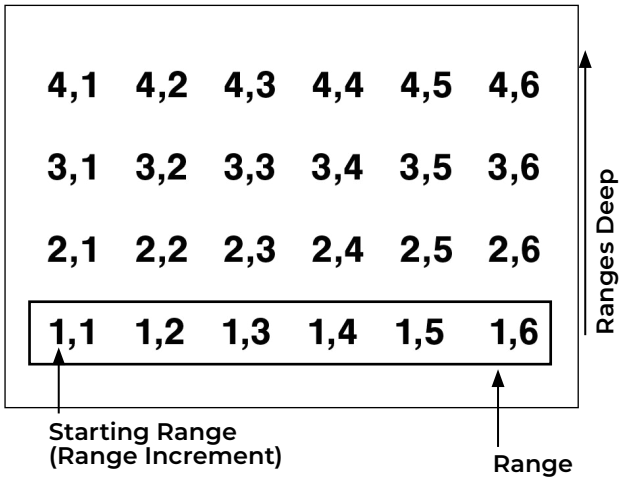
5 Field Maps

5.1 Create a Field Map

This section explains how to create Range Row maps and Standard Plot ID maps. Mirus also offers an option for a Four Row map. A Four Row map is a special Range Row map that is generally used with split combines. It doesn't apply to the H2 Classic or H2 Single GrainGages.

5.1.1 Create a Range Row Field Map

In a Range Row field map,

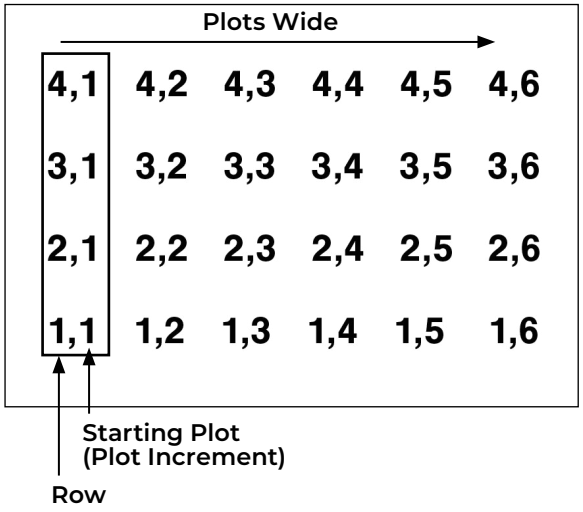


- **Range** indicates a horizontal group of plots.
- **Ranges deep** indicates the number of ranges within a given field.
- **Range increment** is the numeric interval between ranges. This will usually be 1.

Range numbering begins with the bottom left corner of a field and proceeds upward.

In the example to the left,

- Starting Range is 1
- Range increment is 1
- Field is four ranges deep

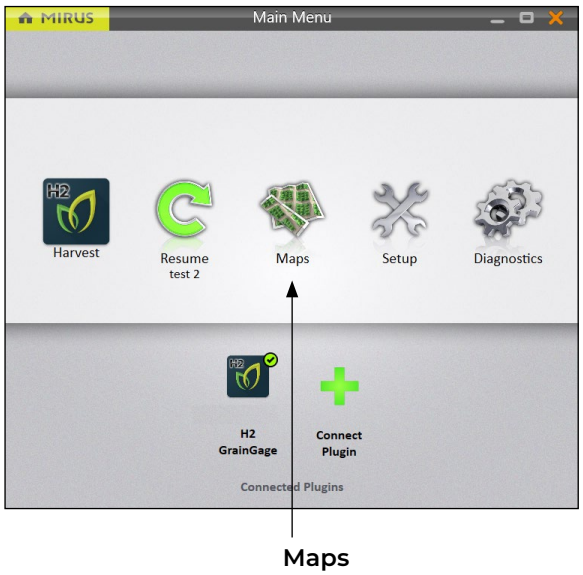


- **Row** indicates a vertical group of plots.
- **Plots wide** indicates the number of plots within a given range.
- **Plot increment** is the numeric interval between plots. This will usually be 1.

Plot numbering begins in the bottom left corner of a field and proceeds right.

In the example to the left,

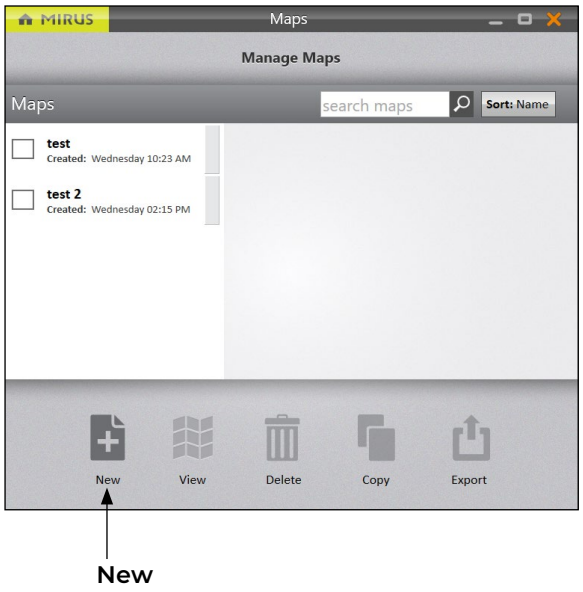
- Starting plot is 1
- Plot increment is 1
- Field map is six rows (plots) wide



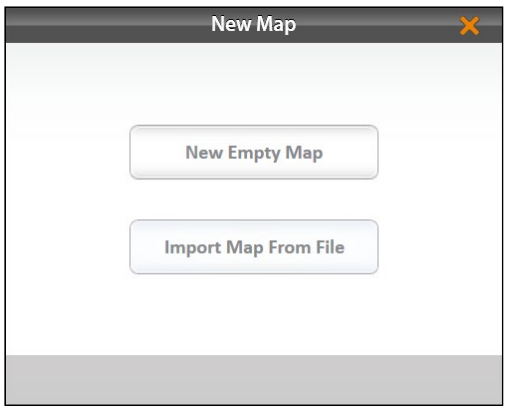
The following instructions walk you through creation of a Range Row map.

On the Mirus Home screen,

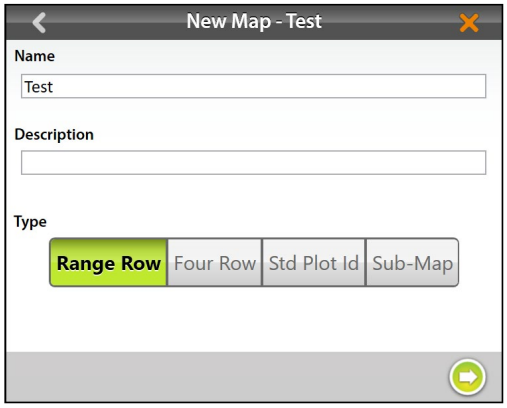
1. Tap **Maps**  .



2. Tap **New**.

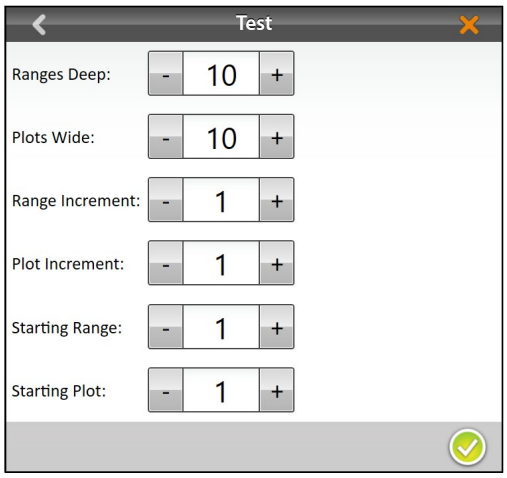


3. Select **New Empty Map**.

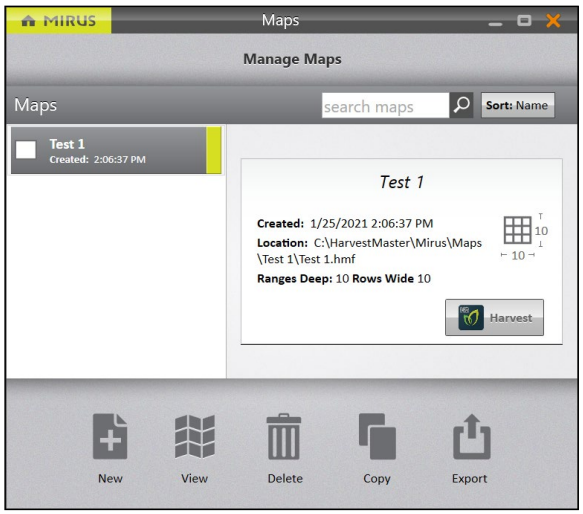


4. Name and describe the map.
5. Tap **Range Row**.
6. Tap the next arrow.

*Note: The **Name** box will only accept basic letters and numbers. Do not use emojis or the following special characters:* > < : " \ ? | / *



7. Set the following:
   - Ranges deep
   - Plots wide
   - Range increment
   - Plot increment
   - Starting range
   - Starting plot
8. Tap the check icon to save the map.



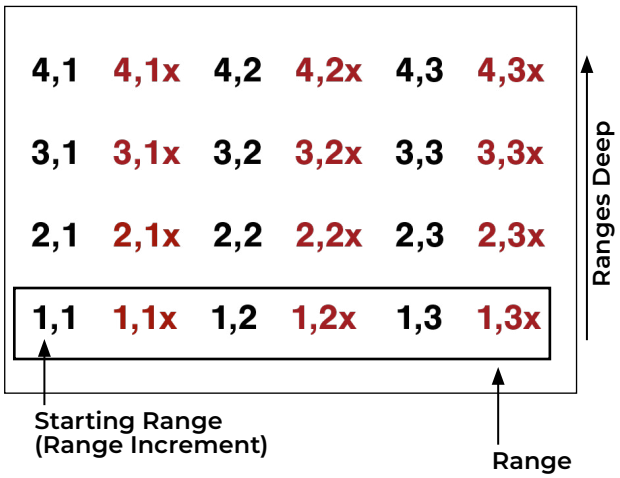
Mirus displays a description of the map on the Manage Maps screen. From this screen, Mirus allows you to do the following with your maps:

- Create new
- View
- Delete
- Copy
- Export

You also have the option to begin harvest.

5.1.2 Create a Four Row Field Map

In a Four Row field map,

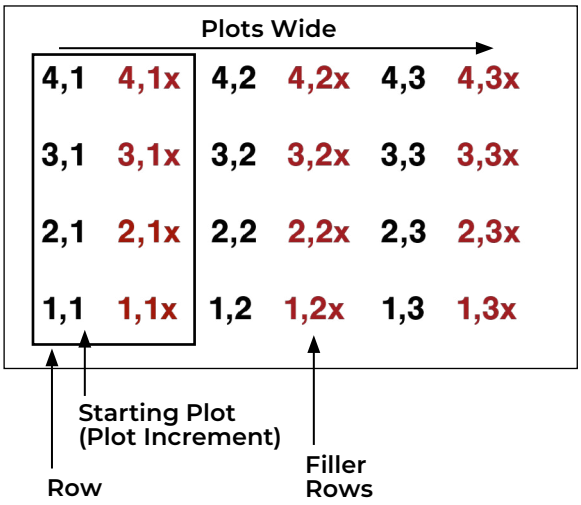


- **Range** indicates a horizontal group of plots.
- **Ranges deep** indicates the number of ranges within a given field.
- **Range increment** is the numeric interval between ranges. This will usually be 1.

Range numbering begins with the bottom left corner of a field and proceeds upward.

In the example to the left,

- Starting Range is 1
- Range increment is 1
- Field is four ranges deep



- **Row** indicates a vertical group of plots.
- **Plots wide** indicates the number of plots within a given range.
- **Plot increment** is the numeric interval between plots. This will usually be 1.
- **Filler rows** (also called Border or X plots) are plots marked with an X. The data collected for these rows are only accessible in the backup file.

Plot numbering begins in the bottom left corner of a field and proceeds right.

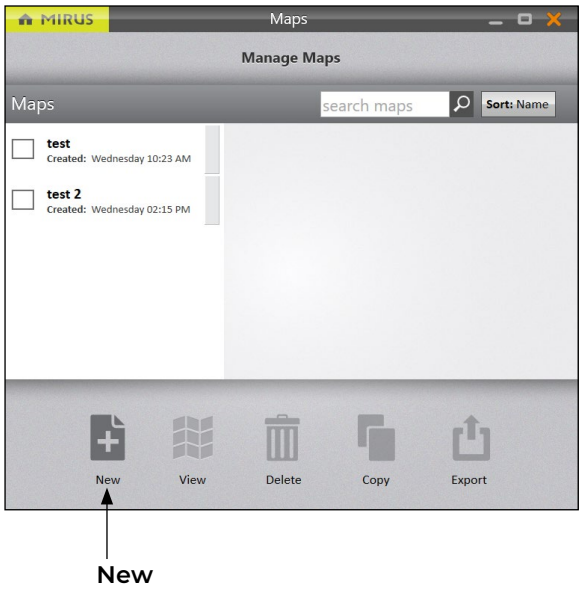
In the example to the left,

- Starting plot is 1
- Plot increment is 1
- Field map is three rows (plots) wide
- Filler rows are highlighted red

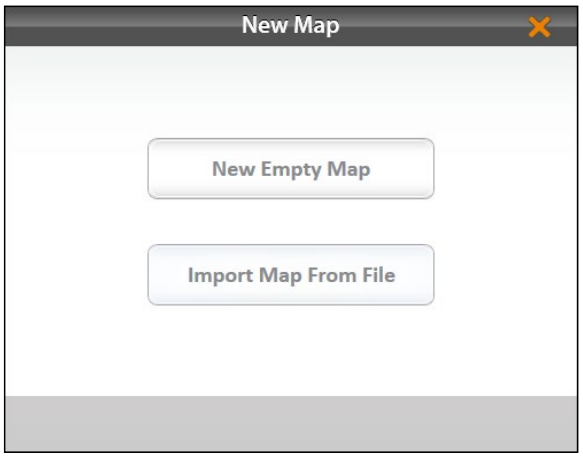
The following instructions walk you through creation of a Four Row map.

On the Mirus Home screen,

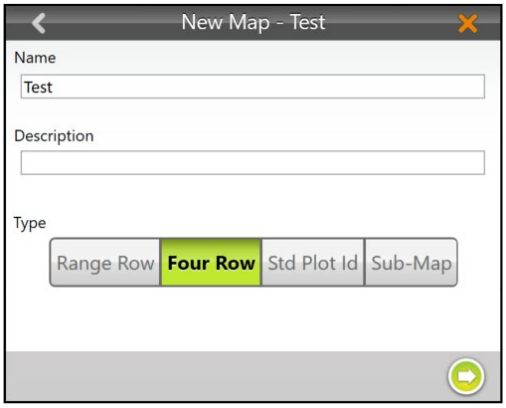
1. Tap **Maps** .



2. Tap **New**.

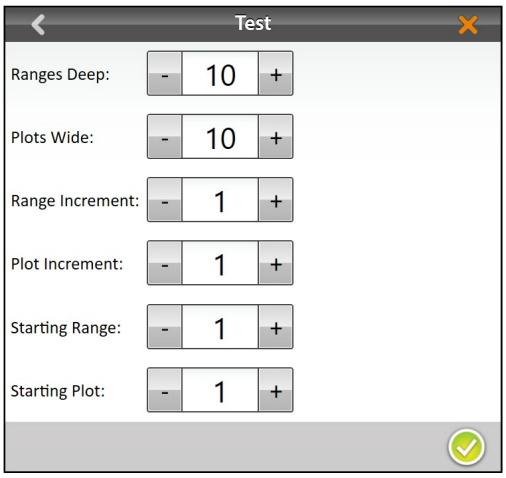


3. Select **New Empty Map**.

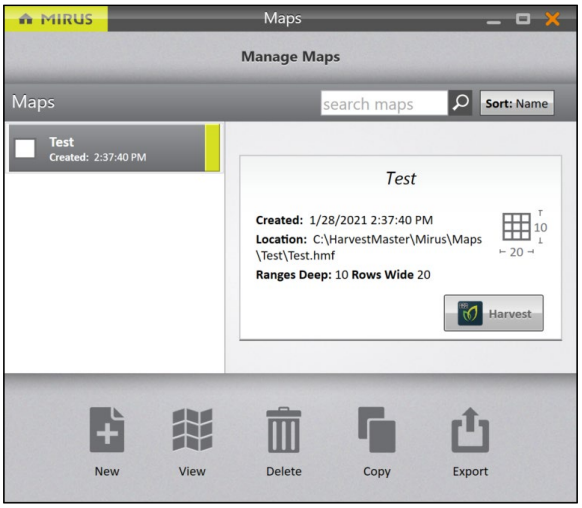


4. Name and describe the map.
5. Tap **Four Row**.
6. Tap the next arrow .

*Note: The **Name** box will only accept basic letters and numbers. Do not use emojis or the following special characters:* > < : " \ ? | / *



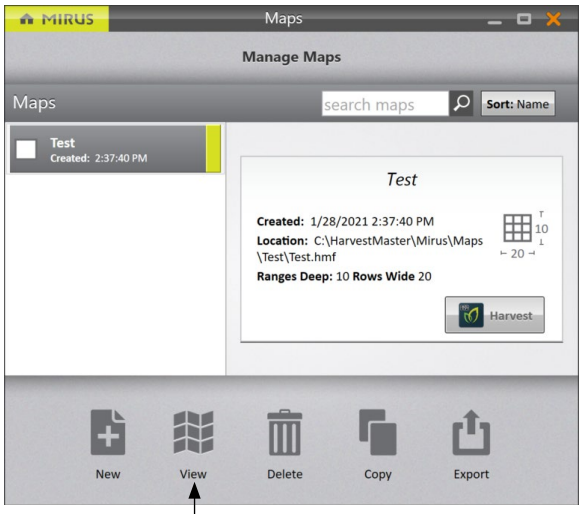
7. Set the following:
   - Ranges deep
   - Plots wide
   - Range increment
   - Plot increment
   - Starting range
   - Starting plot
8. Tap the check icon to save the map.



Mirus displays a description of the map on the Manage Maps screen. From this screen, Mirus allows you to do the following with your maps:

- Create new
- View
- Delete
- Copy
- Export

You also have the option to begin harvest.

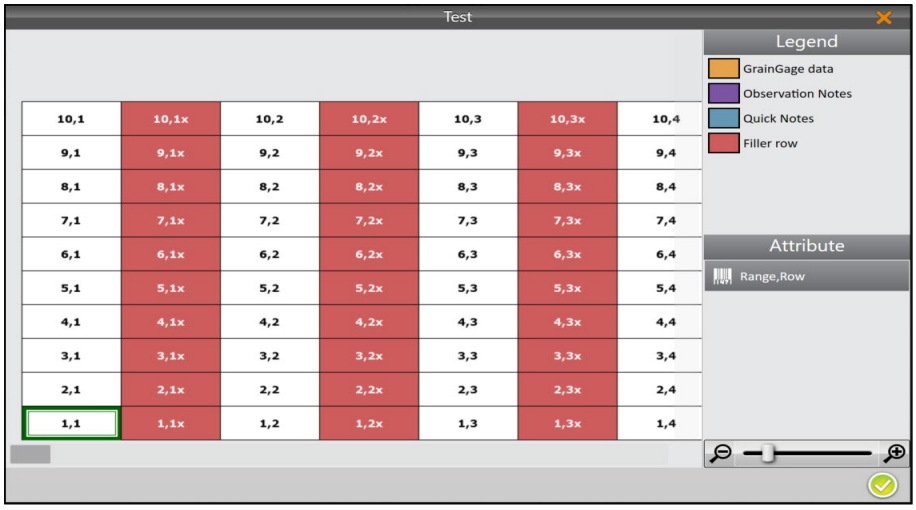


View

To see a display of your map,

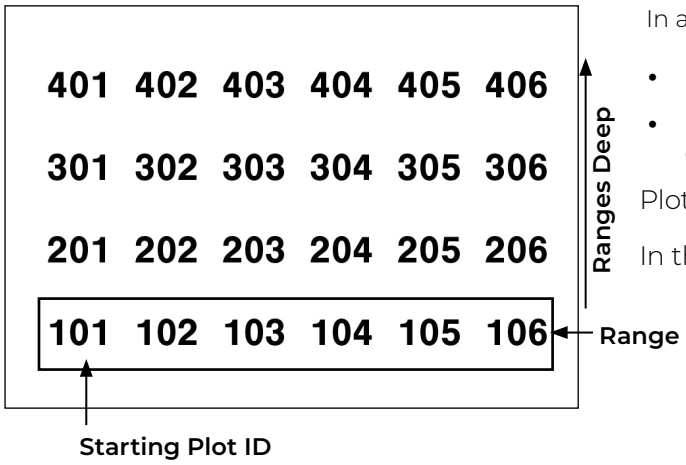
1. Tap **View**.

Mirus displays the Four Row map with the filler rows in red and marked with an X.



5.1.3 Create a Standard Plot ID Map

A Standard Plot ID map gives a unique ID number to each individual plot. The number of Ranges and Rows can reach up to 999. However, the display number can reach up to five digits, depending on how you choose to number the plots.



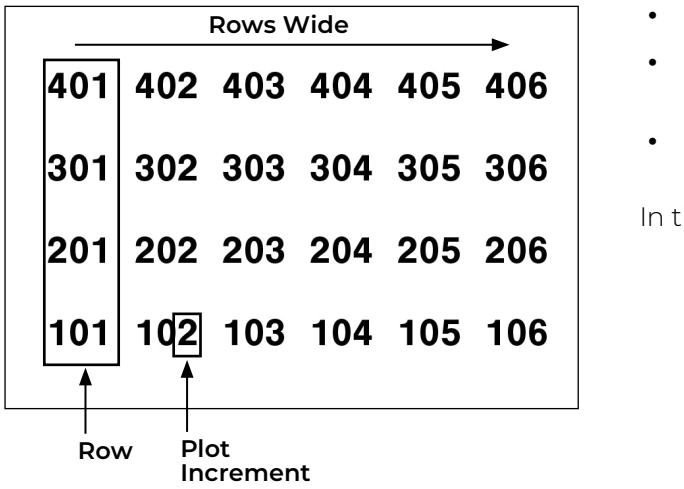
In a Standard Plot ID map,

- **Range** indicates a horizontal group of plots.
- **Ranges deep** indicates the number of ranges within a given field.

Plot numbering begins in the bottom left corner of a field.

In the example to the left,

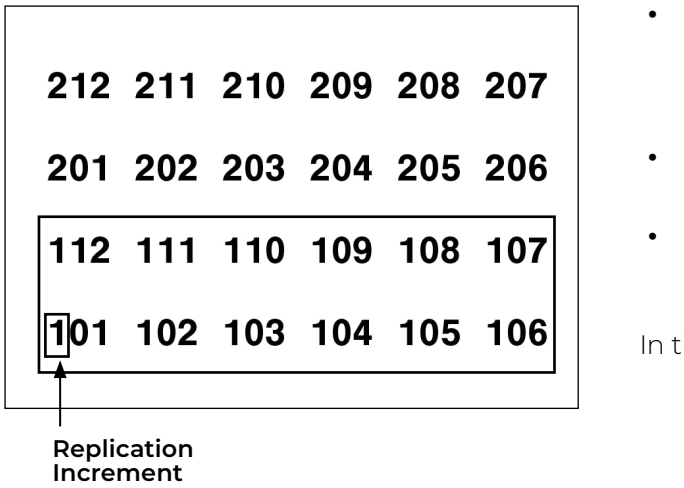
- Starting plot is 101
- Field map is four ranges deep



- **Row** indicates a vertical group of plots.
- **Rows wide** indicates the number of rows within a given field.
- **Plot increment** is the numeric interval between plots. This will usually be 1.

In the example to the left,

- Plot increment is 1
- Field map is six rows (plots) wide

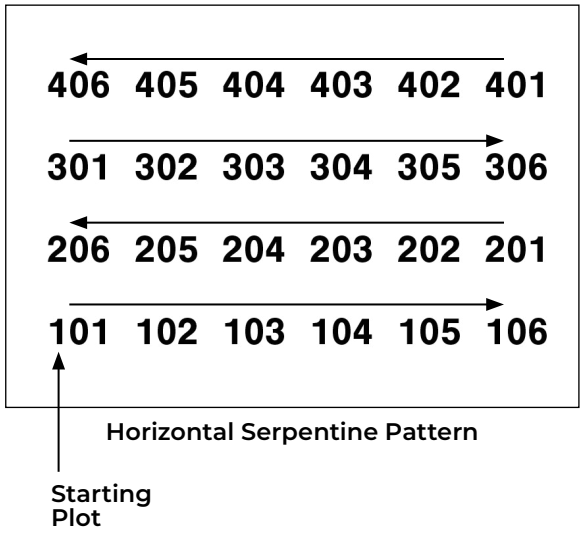


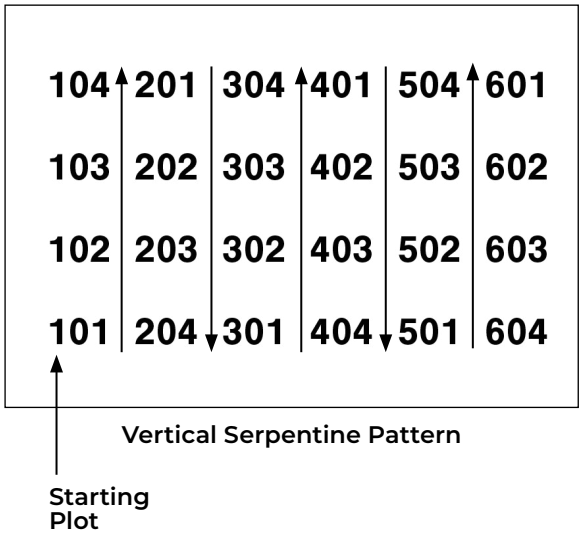
- **Reps** (or Replication) usually indicates the same horizontal group of plots in a particular range as in the above examples. However, in some cases a replication will extend beyond a range (left).
- **Plots per replication** indicates the number of plots in each replication.
- **Replication increment** is the numeric interval between the first plots in each replication (e.g., 100, 1000, or 10000).

In the example to the left,

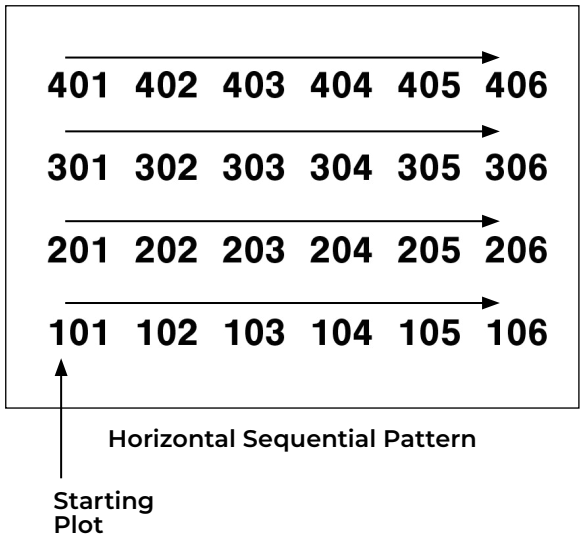
- Replication increment is 100
- Field map is six rows (plots) wide
- Plots per replication is 12

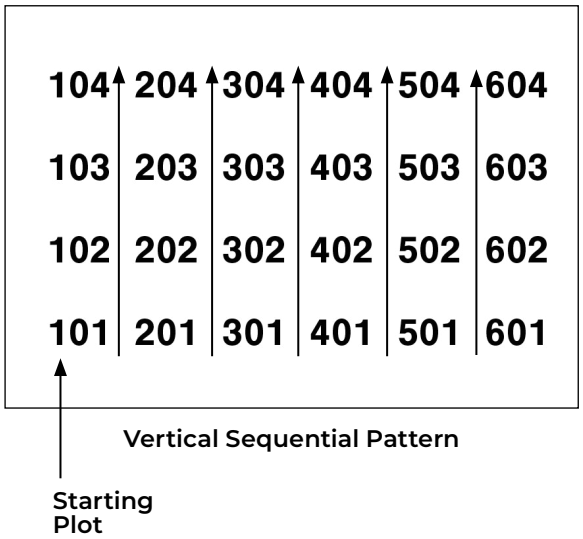
- **Pattern** indicates the layout sequence for the plot increments.
- **Serpentine pattern** numbers the plots in a back and forth pattern across the field. The back and forth pattern can be either horizontal or vertical.





- **Sequential pattern** numbers the plots in parallel columns. The columns can be ranges (horizontal) or rows (vertical).





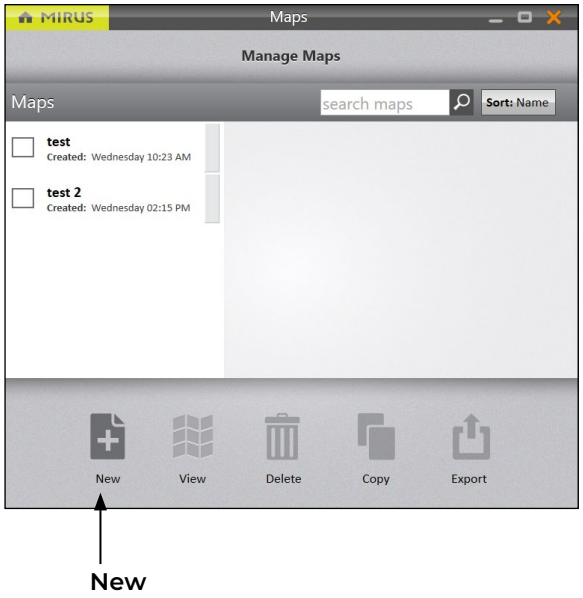
- **Direction** indicates the direction in which plot increments increase.

Note: In order to collect the correct data, the map pattern and direction should follow the planted pattern. This may or may not correspond with your harvest pattern.

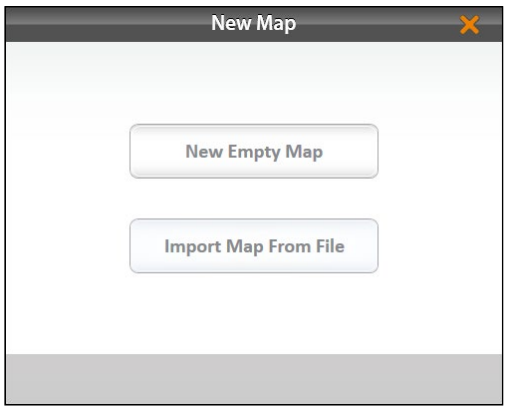
The following instructions walk you through creation of a Standard Plot ID map.

On the Mirus Home screen,

1. Tap **Maps** .



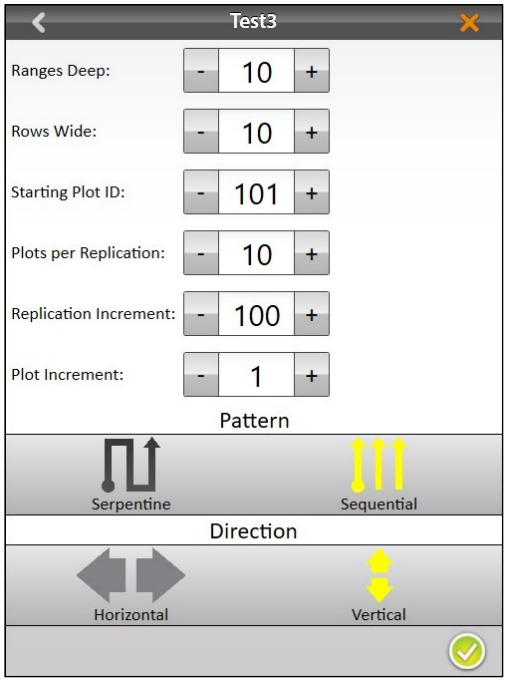
2. Tap **New**.



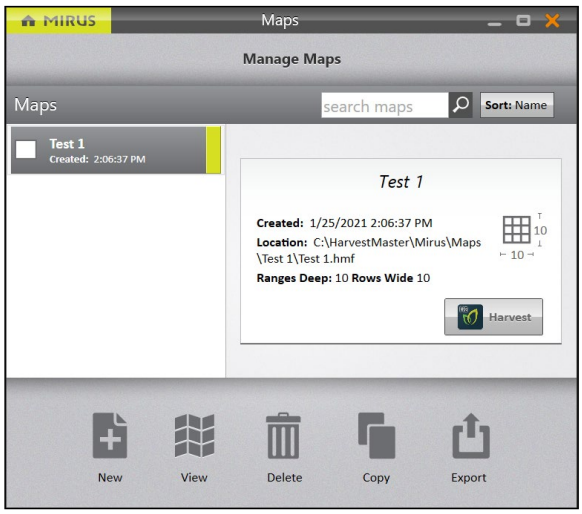
3. Select **New Empty Map**.

4. Name and describe the map.
5. Tap **Standard Plot ID**.
6. Tap the next arrow.

*Note: The **Name** box will only accept basic letters and numbers. Do not use emojis or the following special characters: > < : " \ ? | / **



7. Set the following:
   - Ranges deep
   - Rows wide
   - Starting plot ID
   - Plots per replication
   - Replication increment
   - Plot increment
   - Pattern
   - Direction
8. Tap the check icon to save the map.

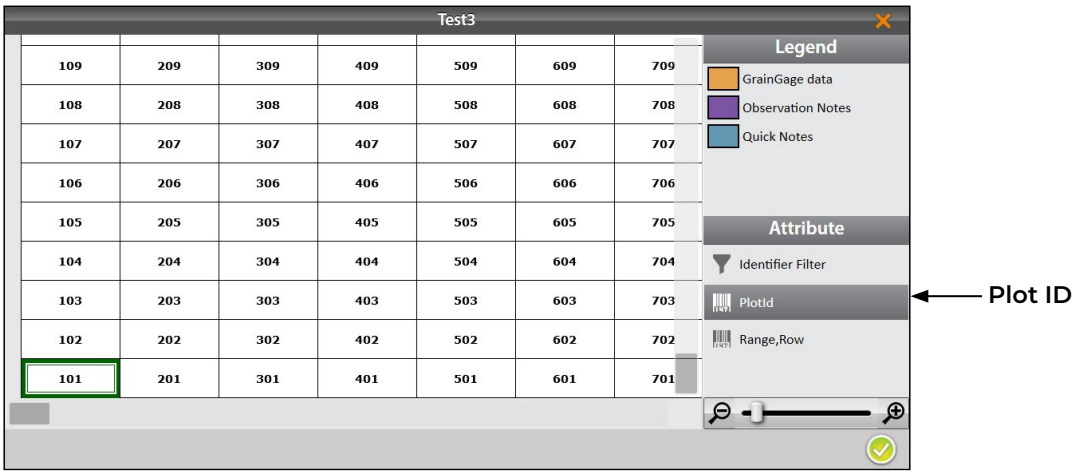


Mirus displays a description of the map on the Manage Maps screen. From this screen, Mirus allows you to do the following with your maps:

- Create new
- View
- Delete
- Copy
- Export

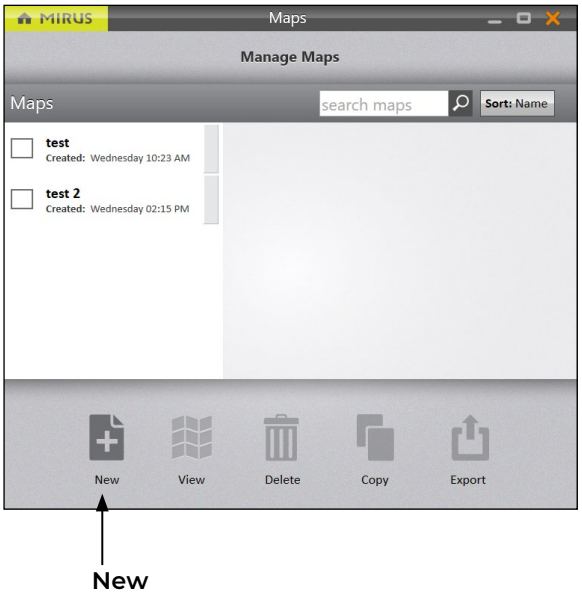
You also have the option to begin harvest.

Note: In Map View, Mirus initially displays Standard Plot ID maps as Range Row maps. To display the plot IDs, select **Plot ID** *under Attribute.*



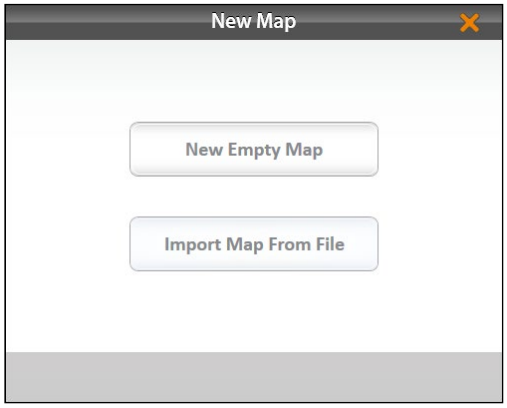
5.1.4 Create a Sub-Map

Mirus allows the creation of sub-maps—smaller divisions of the larger field maps.

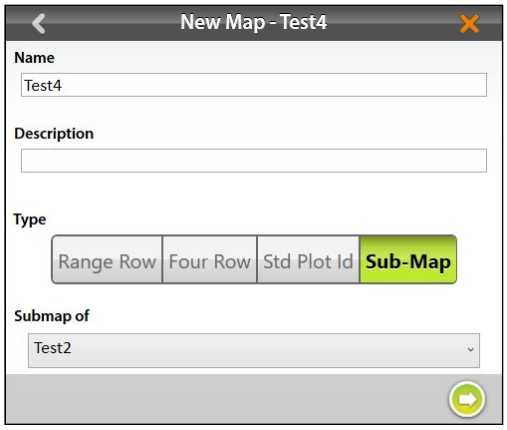


On the Manage Maps screen,

1. Tap **New**.

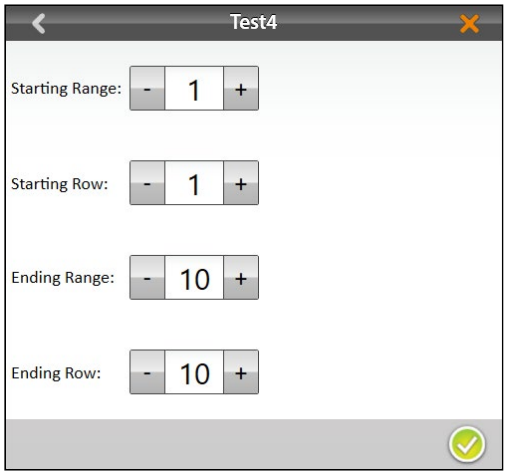


2. Select **New Empty Map**.

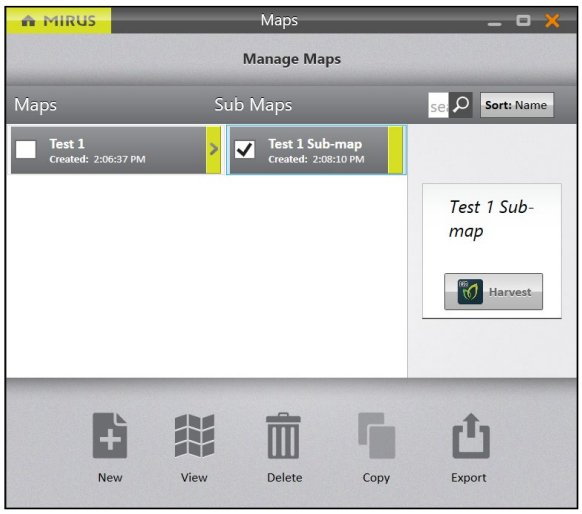


3. Name and describe the map.
4. Tap **Sub-Map**.
5. Select which map this will be a sub-map of.
6. Tap the next arrow.

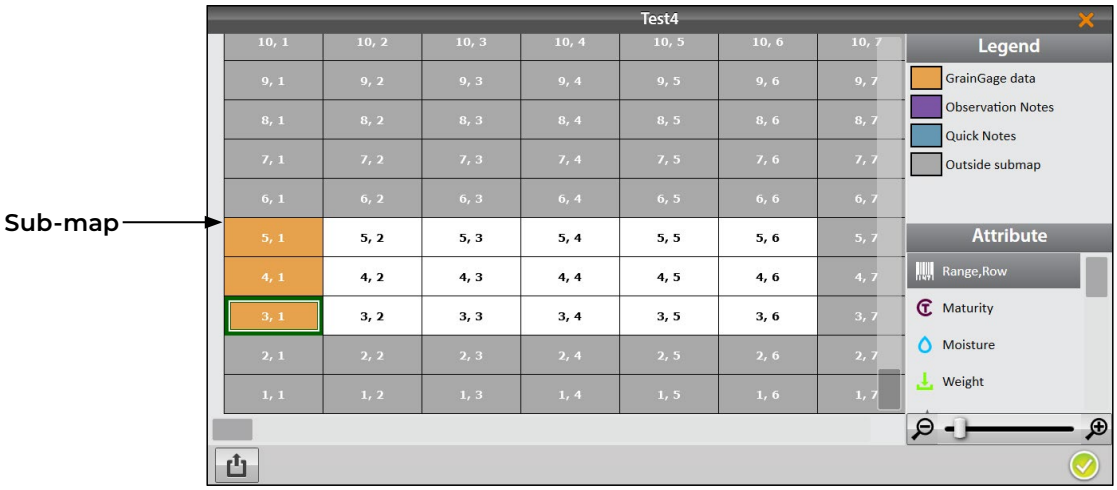
*Note: The **Name** box will only accept basic letters and numbers. Do not use emojis or the following special characters:* > < : " \ ? | / *



7. The plot and range increments are the same as the larger field map. Set the following:
   - Starting range
   - Starting row
   - Ending range
   - Ending row
8. Tap the check icon to save the map.



On the Manage Maps screen, Mirus displays the sub-map under the main field map it is a part of.

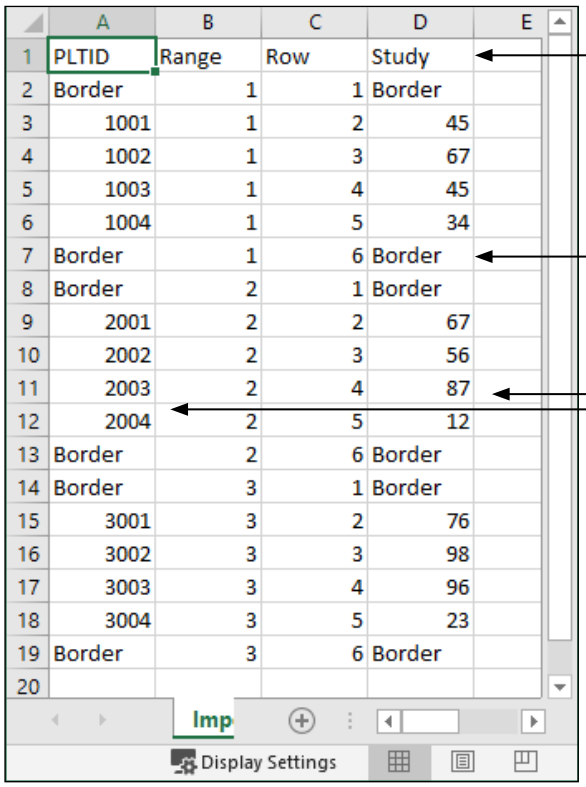


5.2 Import a Map

In Mirus you can import field map information such as Range, Row, Rep, Pass, Pedigree, or other IDs. This can be done in Range Row and Two Dimensional (2D) formats. This section explains how to import Range Row and 2D maps.

5.2.1 Import a Range Row Map

Range row maps need to be in CSV format in order to be imported. The following is an importable range row map file:



	A	B	C	D	E
1	PLTID	Range	Row	Study	
2	Border	1	1	Border	
3	1001	1	2	45	
4	1002	1	3	67	
5	1003	1	4	45	
6	1004	1	5	34	
7	Border	1	6	Border	
8	Border	2	1	Border	
9	2001	2	2	67	
10	2002	2	3	56	
11	2003	2	4	87	
12	2004	2	5	12	
13	Border	2	6	Border	
14	Border	3	1	Border	
15	3001	3	2	76	
16	3002	3	3	98	
17	3003	3	4	96	
18	3004	3	5	23	
19	Border	3	6	Border	
20					

Imp

Display Settings

Header row must include columns for range and row. Additional columns are optional.

If you will be harvesting border plots, do not forget to include them in your map.

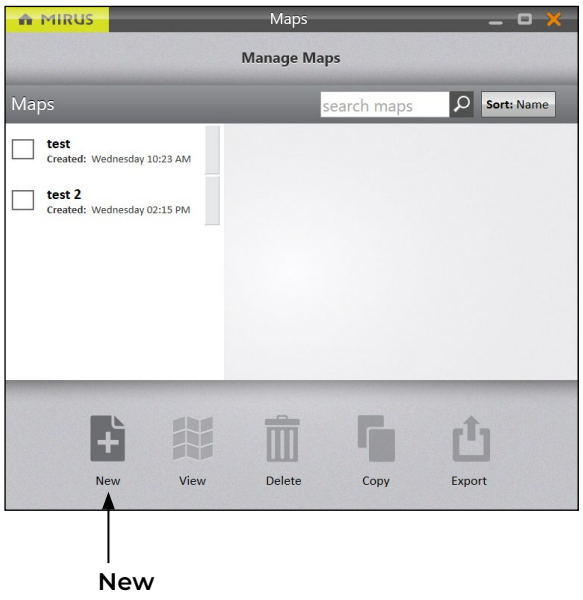
The main benefit of importing maps is that you can include more data and identifiers (in addition to range and row) for each plot.

Note: The range row map is in list format, and the range and row columns are entirely numeric. The column names are unimportant. During the import process, Mirus allows you to select which of the entirely numeric columns are Range and Row.

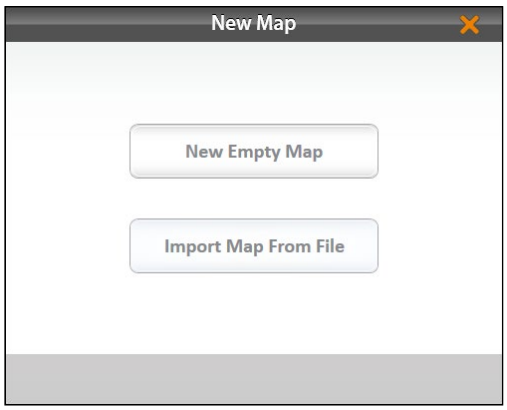
The following instructions walk you through importing a Range Row map.

On the Mirus Home screen,

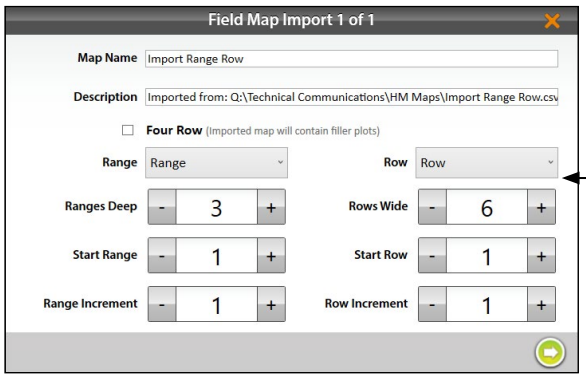
1. Tap **Maps** .



2. Tap **New**.



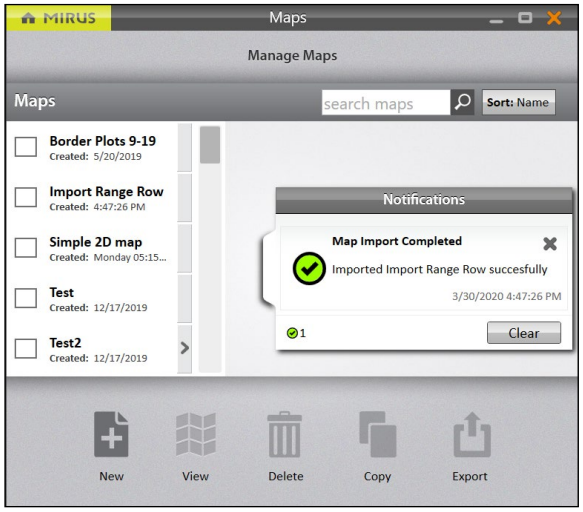
3. Select **Import Map from File**.
4. Navigate to and select the desired file.



Tap the drop-down menus to display other options for the range and row columns.

5. Check the values displayed by Mirus and make sure they reflect the map you are importing. If necessary, change the columns designated as Range and Row by clicking on their respective drop-down menus.

6. Tap the next arrow .



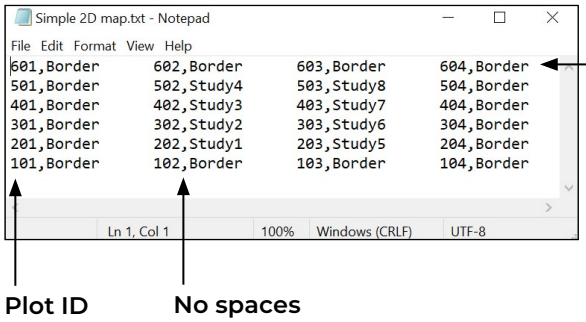
On the Manage Maps screen, Mirus displays a notification that the map has been imported successfully.

Mirus imports the additional attributes. Select to change view.

5.2.2 Import a Two Dimensional (2D) Map

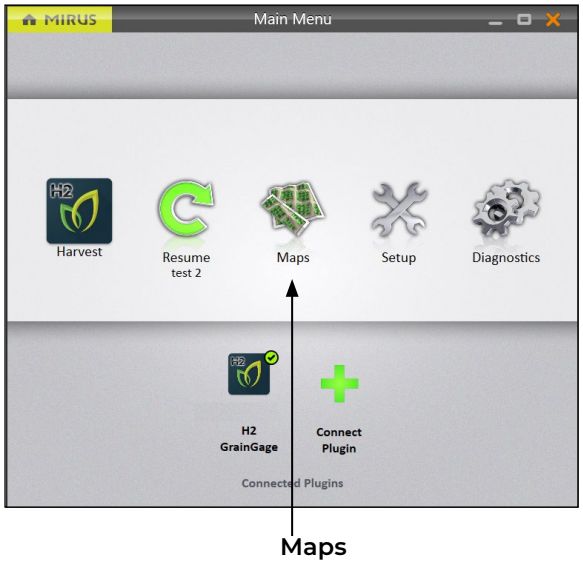
Two dimensional (2D) maps have the same layout as the field. Plot IDs in a 2D map allow any plot name in any order to be used on the map. This type of map must be created with a spreadsheet or text editor and saved as a tab delimited file or TXT file. Do not use any headings or spaces when creating a 2D map. Plot IDs may not contain any symbols.

Two dimensional maps need to be in TXT format in order to be imported. The following is an importable 2D map file:



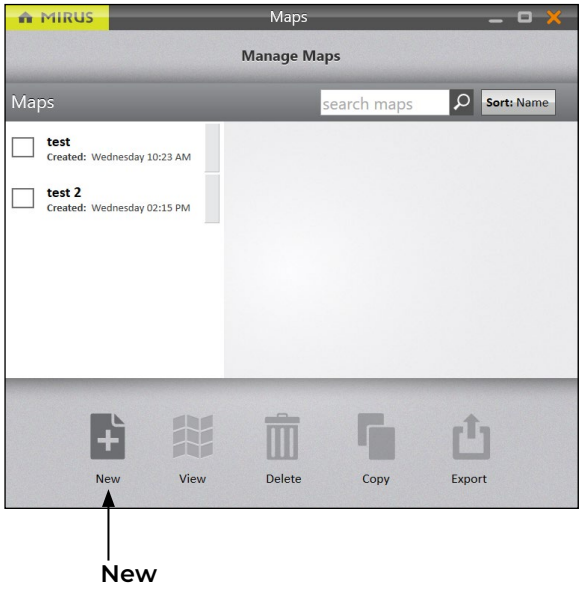
If you will be harvesting border plots, do not forget to include them in your map.

The following instructions walk you through importing a 2D map.

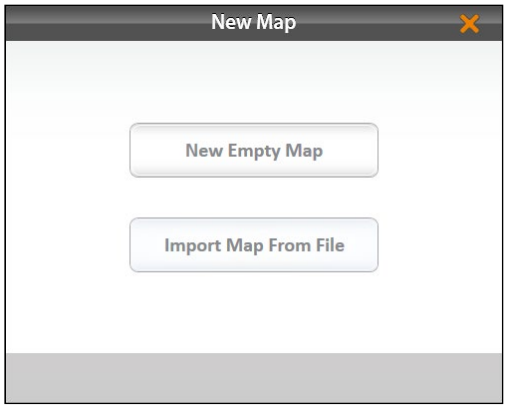


On the Mirus Home screen,

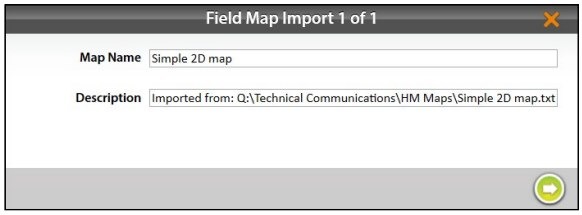
1. Tap **Maps** .



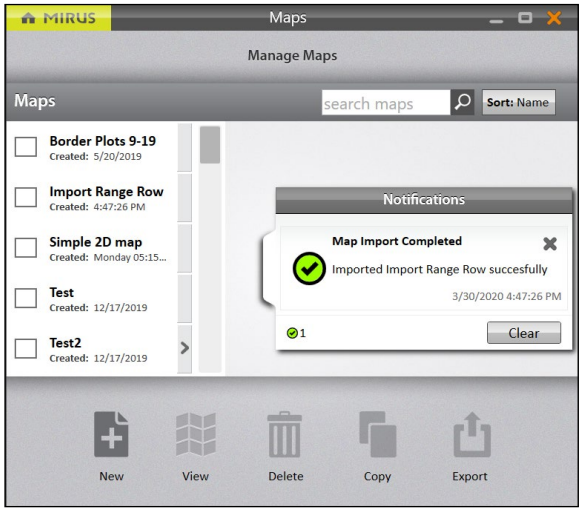
2. Tap **New**.



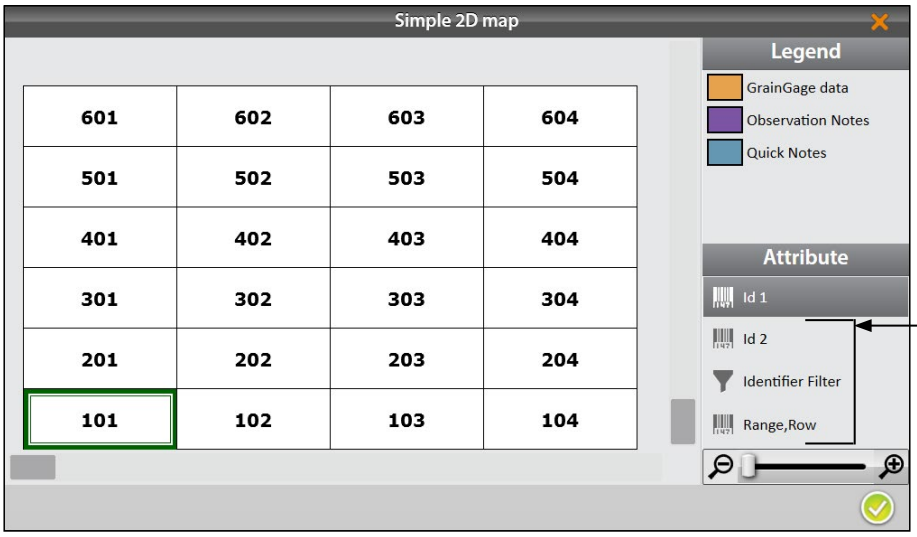
3. Select **Import Map from File**.
4. Navigate to and select the desired file.



5. If desired, change the default description displayed by Mirus.
6. Tap the next arrow .



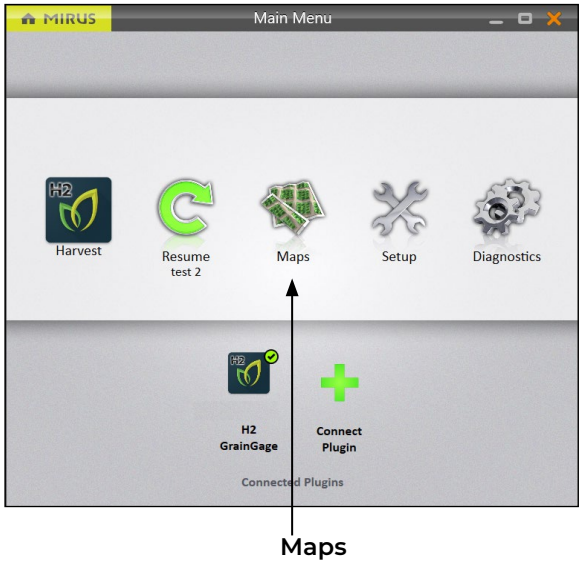
On the Manage Maps screen, Mirus displays a notification that the map has been imported successfully.



Mirus imports the additional attributes. Select to change view.

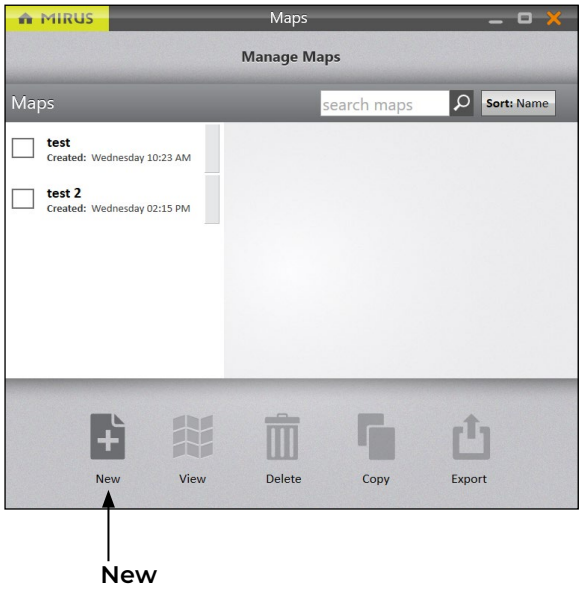
5.2.3 Import Multiple Maps

It is possible to import multiple maps at the same time.

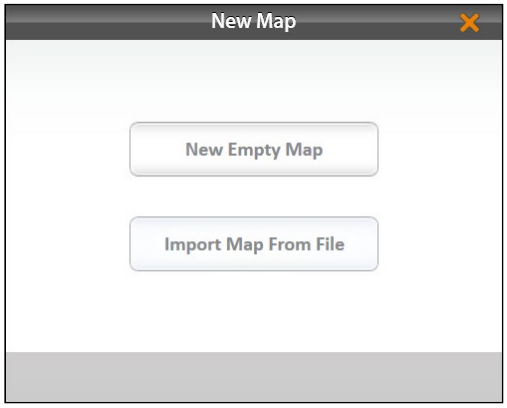


On the Mirus Home screen,

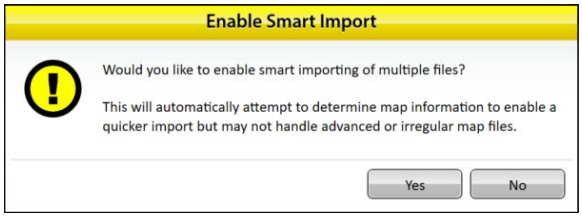
1. Tap **Maps** .



2. Tap **New**.

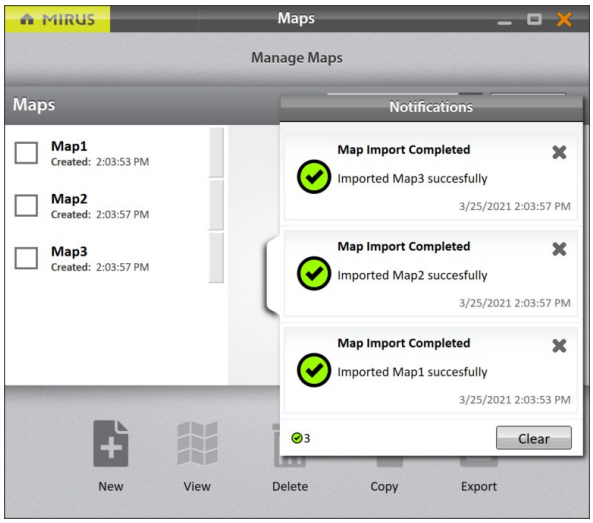


3. Select **Import Map from File**.
4. Navigate to the desired files.
5. Select the desired files and click **Open**.



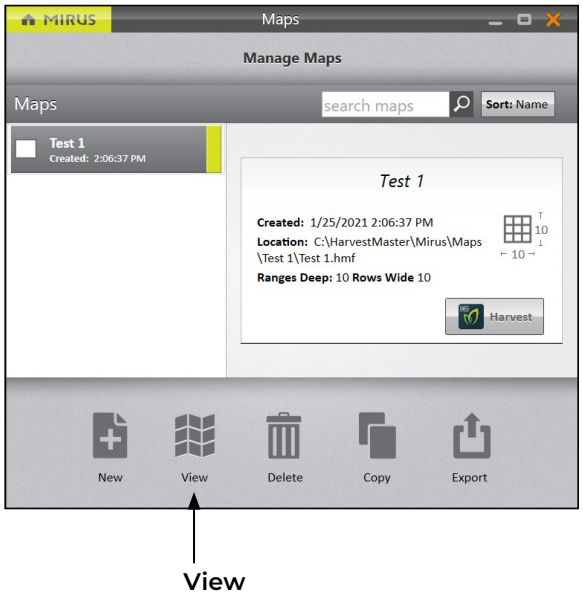
6. Tap **Yes** to enable Smart Import.

   Smart Import will import each file automatically without any additional input from the user. If the map name already exists, the import will stop to allow the user to change the name.



On the Manage Maps screen, Mirus displays a notification that the maps have been imported successfully.

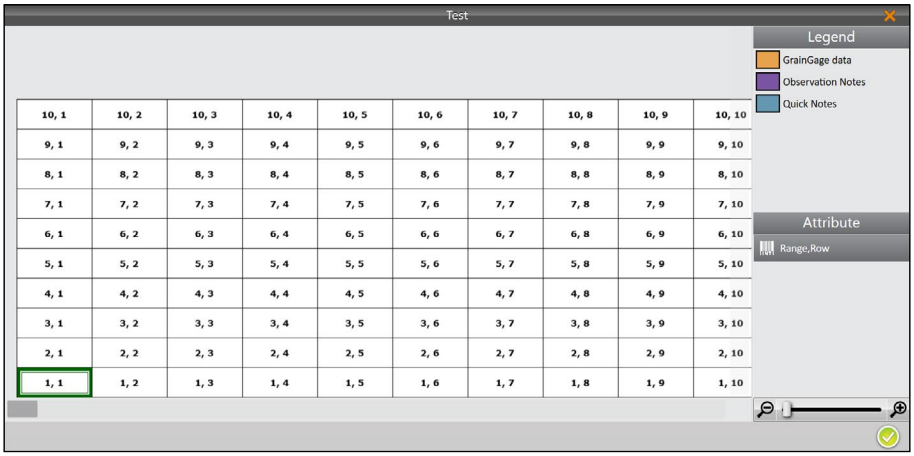
5.3 View a Map



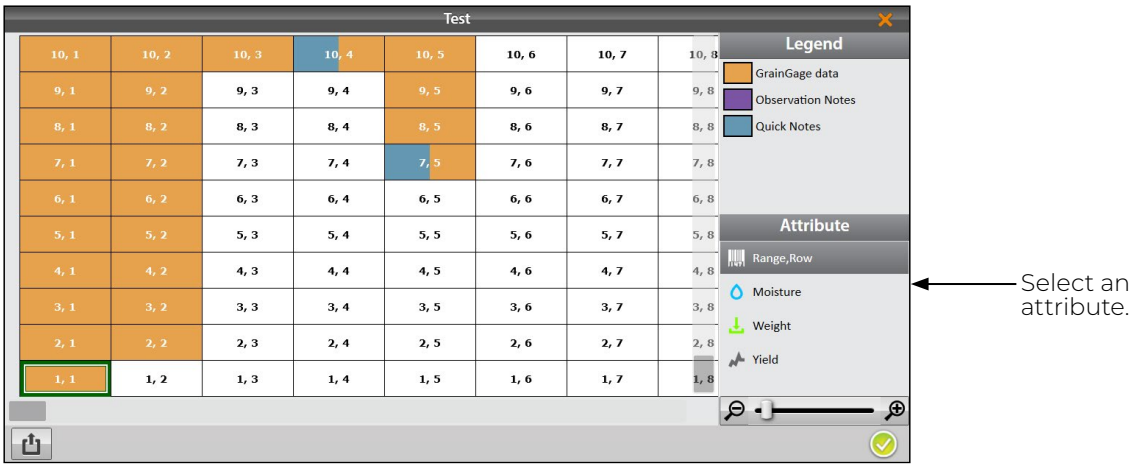
On the Manage Maps screen,

1. Select the map you want to view.
2. Tap **View**.

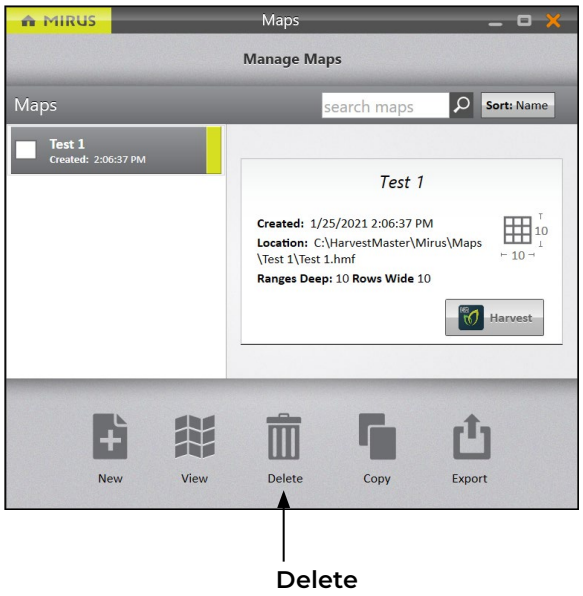
Mirus opens the Map View screen. The image below displays a map that has not yet been harvested:



Depending on the attributes in the map and what data has been collected, Map View can be configured to display different attributes of the grain as shown in the image below:

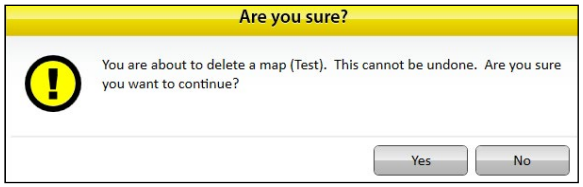


5.4 Delete a Map



On the Manage Maps screen,

1. Select the map you want to delete.
2. Tap **Delete**.



Mirus asks if you are sure.

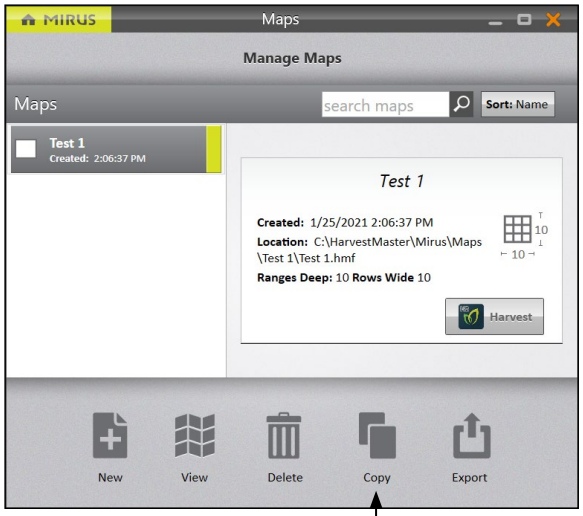
CAUTION: This cannot be undone! You cannot recover a deleted map.

If you choose to proceed, tap **Yes**.

Mirus deletes the map, and it is no longer available in the list on the Manage Maps screen.

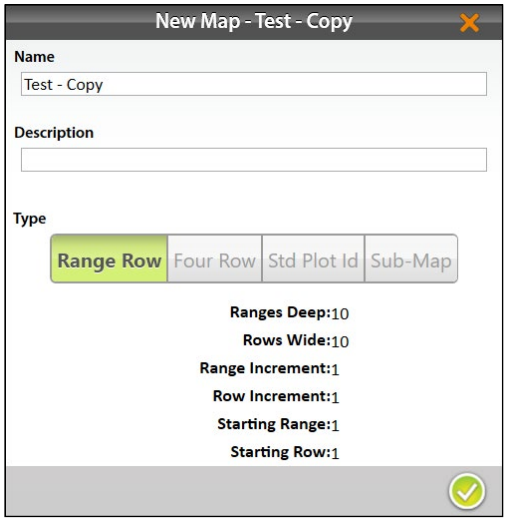
5.5 Copy a Map

Maps can be reused from year to year. To do so, simply copy the map in Mirus.



On the Manage Maps screen,

1. Select the map you want to copy.
2. Tap **Copy**.



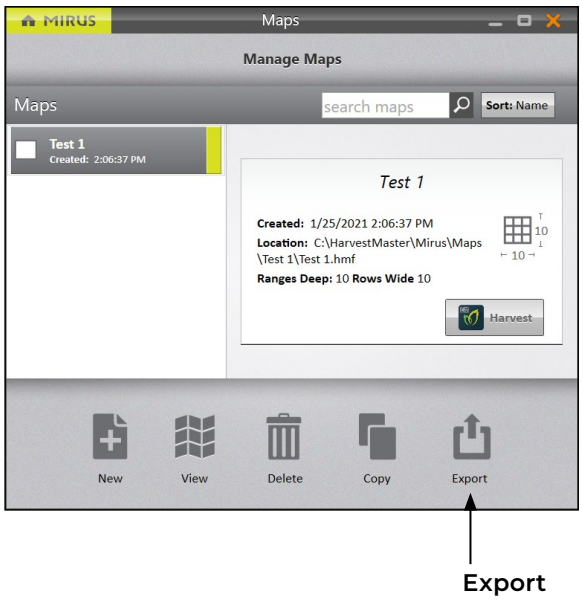
3. Enter the name and description for the map.
4. Tap the check icon to save the new copy.

Mirus adds it to the list of maps on the Manage Maps screen.

5.6 Export Map Data

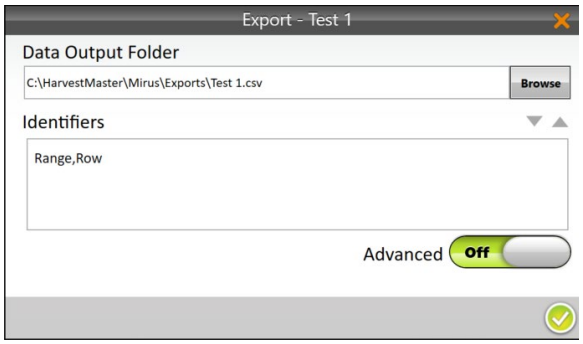
The Manage Maps screen allows you to export maps as data and as heat maps. The export data option creates a detailed spreadsheet of your data. The heat map option creates a color-coded visual map (in a spreadsheet) of the parameters you set for each color.

5.6.1 Export Data



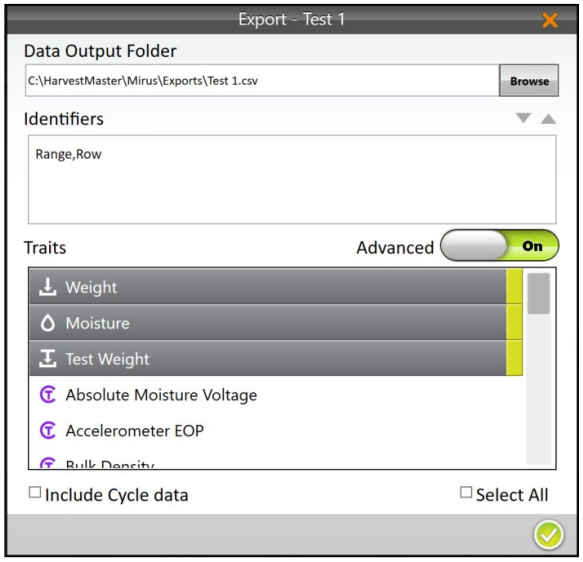
On the Manage Maps screen,

1. Select the map you want to export data from.
2. Tap **Export**.



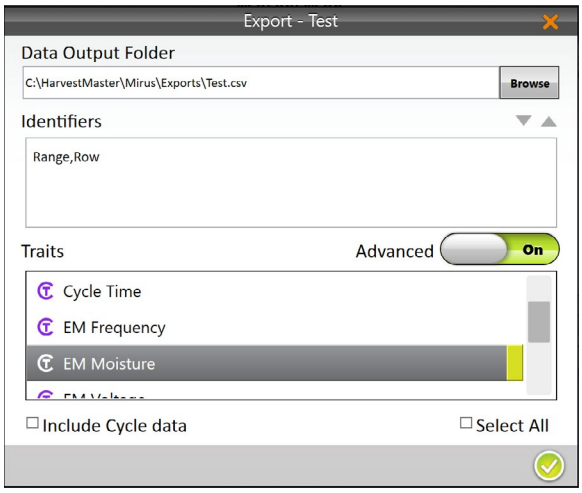
3. Enter the file path for the exported data.
4. Select your preferred Identifiers.

When **Advanced** is switched to **Off**, Mirus automatically exports the data for weight, test weight, and moisture.



5. When **Advanced** is switched to **On**, Mirus displays a list of available traits to export with the data.
6. Select your preferred Traits.

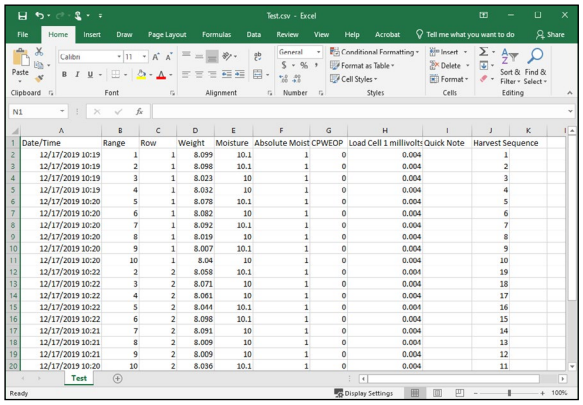
   *Note: If you check **Include Cycle Data**, the export will include sub cycle and level trip data.*



7. Select EM Moisture to export the EM moisture data.
8. Tap the check icon to finish exporting the data.

Mirus notifies of the successful export.

9. Tap **Ok** to finish the export
10. Tap **Open** to finish the export and open the CSV file.

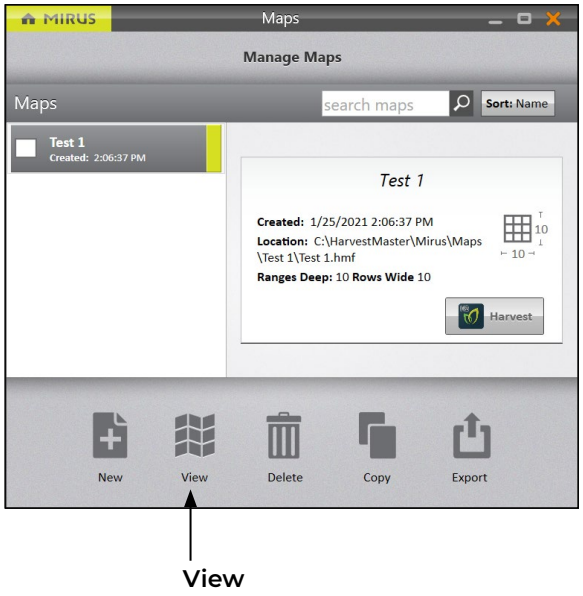


Mirus exports the data into CSV (comma delimited) form. This allows you to import the data into other programs for analysis.

5.6.2 Export a Heat Map

Exporting a heat map creates a color-coded visual map in a spreadsheet for each desired attribute. The colors in the heat map are determined by the Legend. It can be altered by changing the minimum and maximum for each attribute. For instructions, see the following sections: Weight, **6.3.7 on page 117**; Moisture, **6.3.8 on page 118**; Test Weight, **6.3.9 on page 119**; Yield, **6.3.10 on page 120**.

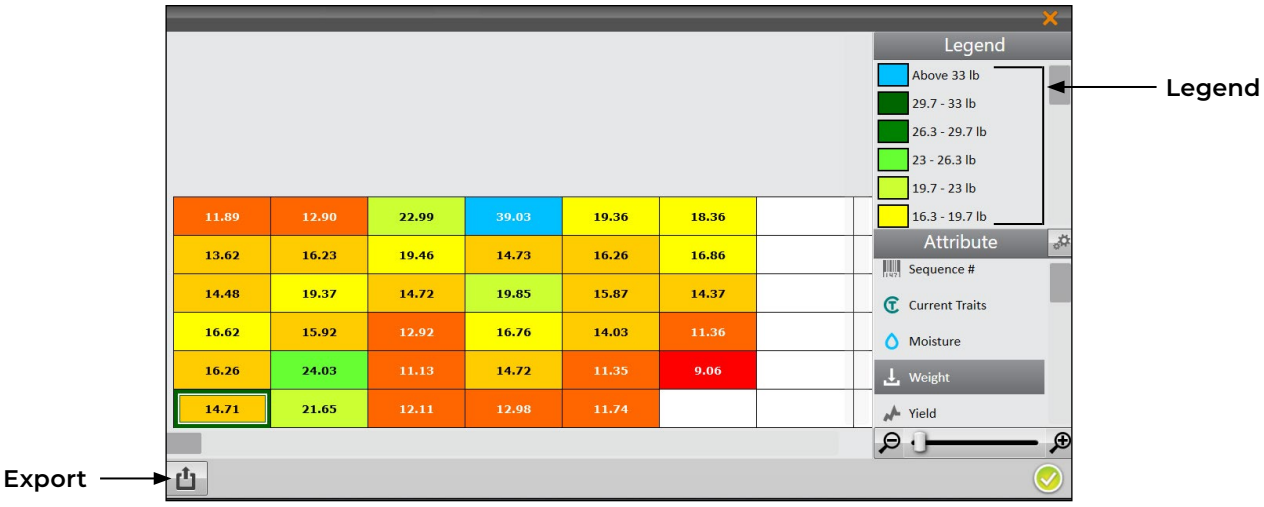
The following steps explain how to export a heat map.

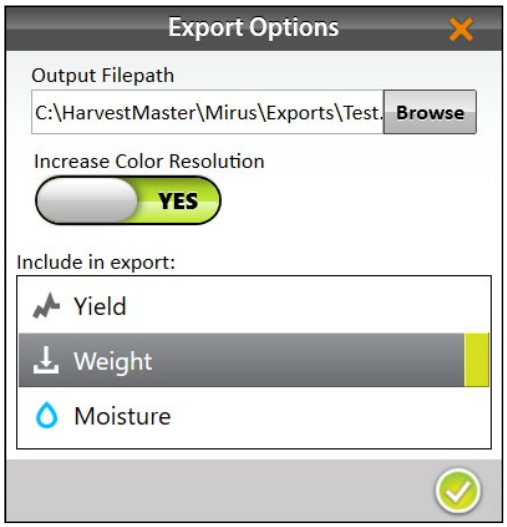


On the Manage Maps screen,

1. Select the map you want to export.
2. Tap **View**.

3. Tap the export icon .



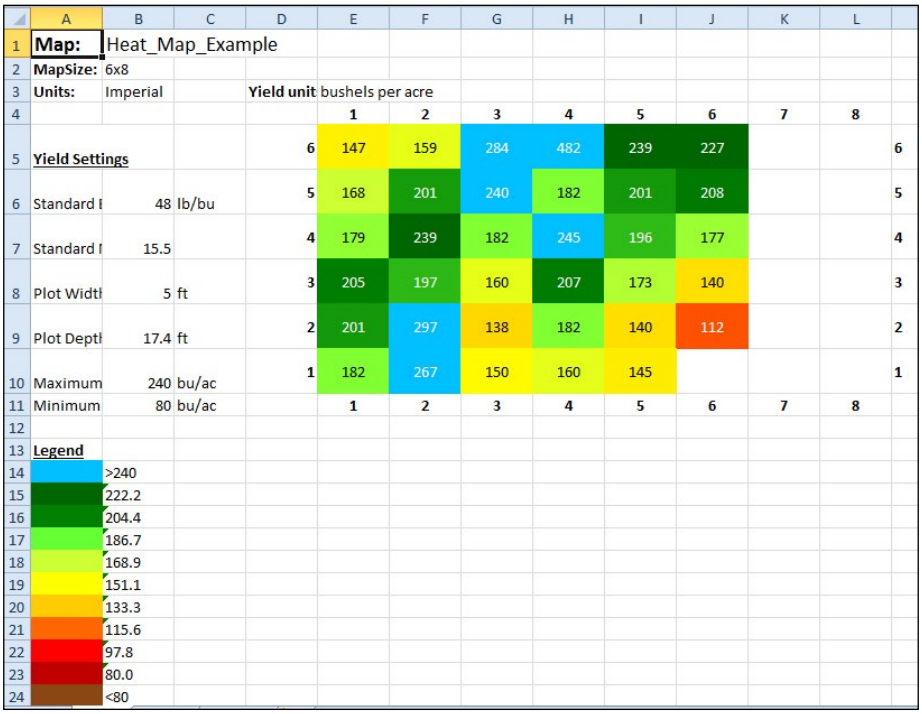


4. Enter the file path for the exported map.
5. Select whether or not you want to increase color resolution.
6. Select the attributes you want included in the export. Multiple attributes are OK.
7. Tap the check icon to finish exporting the map.

Mirus notifies of the successful export.

8. Tap **Ok** to finish the export

If Microsoft Excel is installed, a spreadsheet opens automatically, showing the exported heat map.



	A	B	C	D	E	F	G	H	I	J	K	L	
1	**Map:**	Heat_Map_Example											
2	**MapSize:**	6x8											
3	**Units:**	Imperial		**Yield unit**	bushels per acre								
4					**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	
5	**Yield Settings**			**6**	147	159	284	482	239	227			**6**
6	Standard I	48	lb/bu	**5**	168	201	240	182	201	208			**5**
7	Standard I	15.5		**4**	179	239	182	245	196	177			**4**
8	Plot Width	5	ft	**3**	205	197	160	207	173	140			**3**
9	Plot Depth	17.4	ft	**2**	201	297	138	182	140	112			**2**
10	Maximum	240	bu/ac	**1**	182	267	150	160	145				**1**
11	Minimum	80	bu/ac		**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	
12													
13	**Legend**												
14		>240											
15		222.2											
16		204.4											
17		186.7											
18		168.9											
19		151.1											
20		133.3											
21		115.6											
22		97.8											
23		80.0											
24		<80											

mirus™

H2 Triple GrainGage

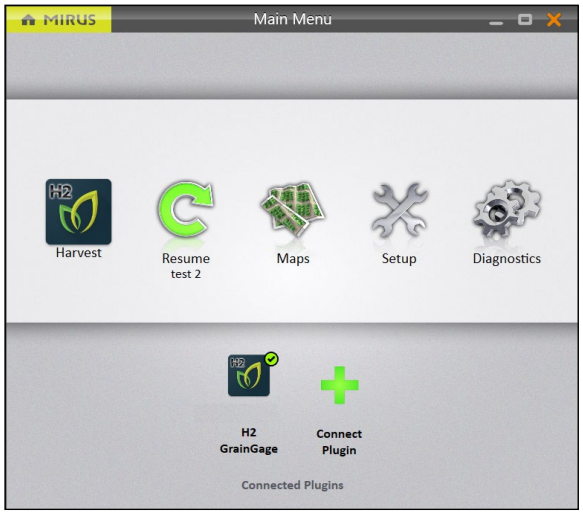
CHAPTER SIX

Harvest Mode

6 Harvest Mode

6.1 Options for Opening Harvest Mode

You must create or import a map before you can harvest. Mirus offers three different routes for initiating or re-entering Harvest Mode.



On the Mirus Home screen,

- Tap **Harvest**. Mirus asks you to select from a list of previously created maps for this harvest.
  Note: If the Harvest icon is not visible, see page 12 for instructions on loading the H2 GrainGage plugin.

Or

- Tap **Maps**. Mirus opens the Manage Maps screen. From there, select a map and tap **Harvest**.

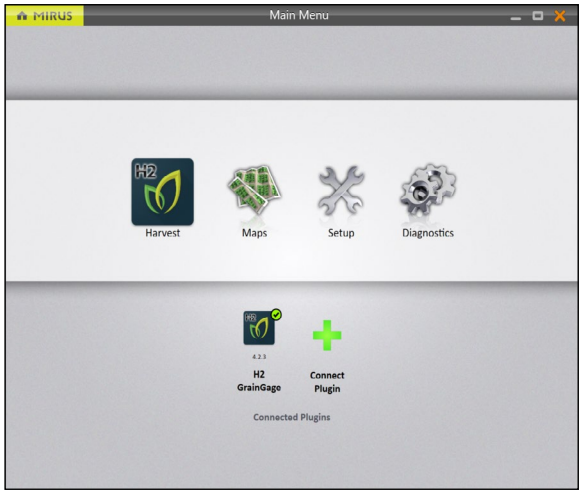
Or

- Tap **Resume**. Mirus resumes harvest in the last map used (including the direction, navigation type, and moisture curve).

If you have already begun to harvest a particular map, Mirus displays that map name below the Resume icon.

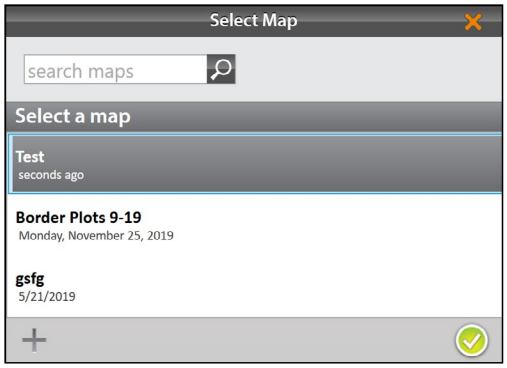
6.2 Open Harvest Mode

This section describes the first option for opening Harvest Mode.

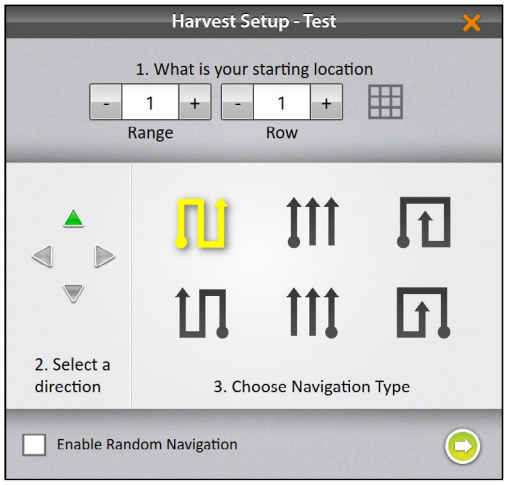


On the Mirus Home screen,

1. Tap **Harvest**.

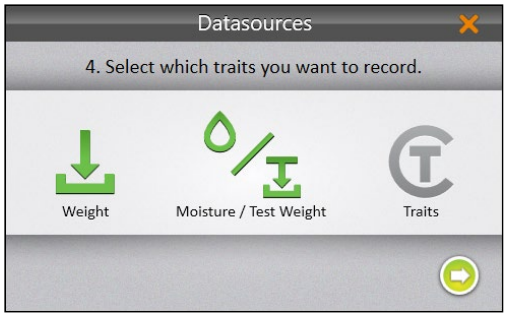


2. Select a map or tap the plus icon to create a new map.
3. Tap the check icon.

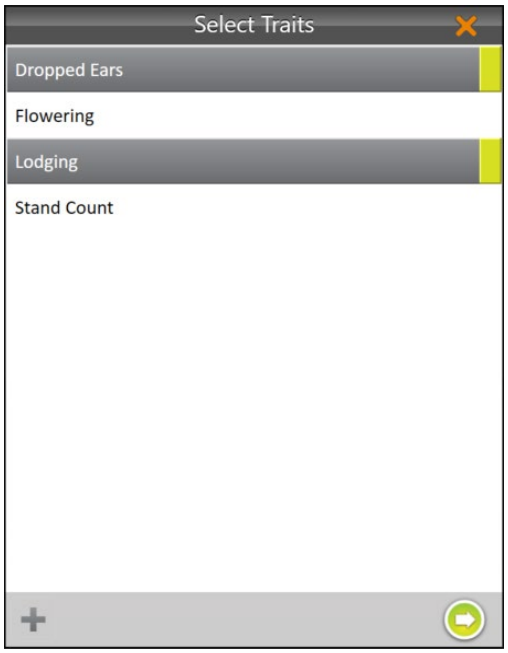


4. Enter the starting location.
5. Select the direction of harvest.
6. Choose a navigation type.
7. Tap the next arrow.

*Note: If you check **Enable Random Navigation**, you will be able to change your location on the main Harvest screen just by tapping on the desired plot. This is mostly used for note taking.*



8. Select which attributes you plan to record.



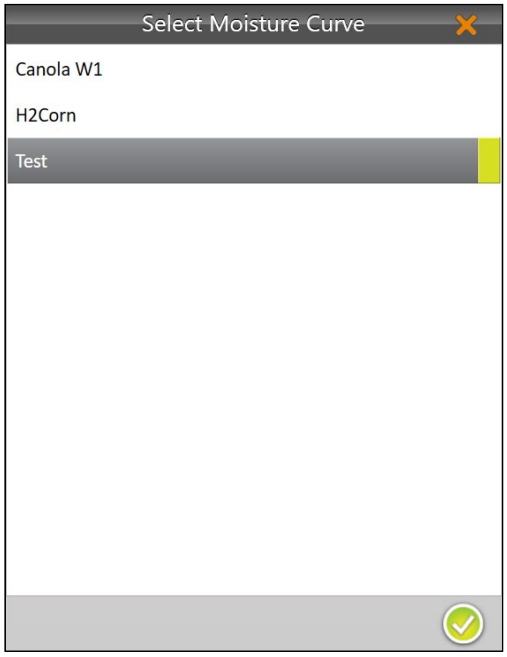
If **Traits** are enabled the Select Traits dialog box will appear. You will be prompted to choose a previously configured trait or create a new one. For more information about configuring Traits from the Setup screen, see **2.3.11 Create and Record Traits on page 31**.

9. Select one or all of the traits to include.
10. Tap the next arrow.

11. Choose **Plot Mode** or **Strip Mode**.

Plot Mode has one cycle per plot. Strip Mode allows for more than one cycle per plot.

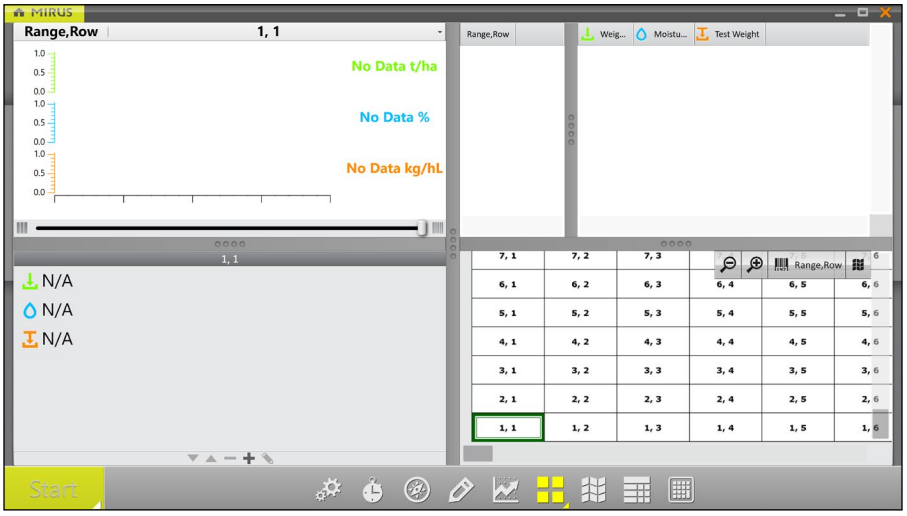
12. Tap the next arrow.



If you selected **Moisture/Test Weight**, Mirus prompts you to select a moisture curve. For more information about calibrating moisture curves, go to **4.4.3 Chamber Calibration Overview on page 54**.

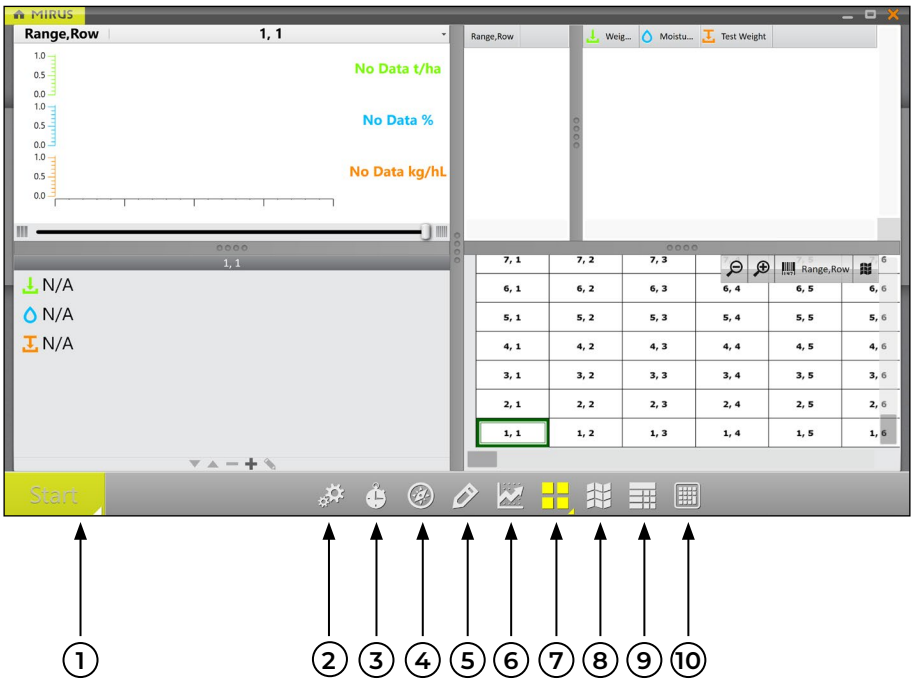
13. Select a **Moisture Curve**.
14. Tap the check icon .

Mirus opens the Harvest screen and is ready to be configured or to collect data.



6.3 Configure Harvest Screen Options

The Harvest screen provides several options for configuring how data is collected and presented during harvest.



1. **Start/Cycle/Go Button**: **Start** initiates harvest. **Cycle** initiates measurements and data collection for a specific plot. **Go** indicates it's time to move to the next plot.
2. **Diagnostics**: Opens the **Diagnostics** dialog box for monitoring during harvest.
3. **Cycle Settings**: Allows the operator to change the settings for the **Start/Cycle/Go** button.
4. **Navigation**: Opens the **Change Location** dialog box and allows the operator to make changes to location, direction, and navigation type.
5. **Observations**: Opens a dialog box in which the operator can record notes for each plot during harvest. This is also where you can add information about any traits that you configured.
6. **Graph View**: Displays accumulating data as a graph.
7. **Quad View**: Divides the display into four smaller windows. The operator can adjust the size of each window and customize them each to display data in **Diagnostics**, **Graph**, **Info**, **List**, **Spatial**, or **Real Time Weight** view.
8. **Map View**: Opens the **Spatial Display**, also referred to as a **heat map**. This display can be configured to show attribute data plot by plot.
9. **List View**: Displays accumulating data as a list.
10. **Ten Key**: Numeric keypad for fast entry of trait and note data.

6.3.1 Quad View

Mirus provides the option of viewing four screens at once when **Quad View** is selected. Each screen can be configured to display the data differently. The screen options are as follows:

- **Diagnostics**: Displays the Diagnostics dialog box for monitoring during harvest.
- **Graph**: Shows the plot progression of weight, moisture, and test weight in a graph.
- **Info**: Displays the weight, moisture, and test weight of the most recent plot.
- **List**: Displays accumulating data as a list.
- **Spatial**: Also referred to as a heat map, shows attribute data plot by plot.
- **Real Time Weight**: Displays the real time weight of the weigh bucket.

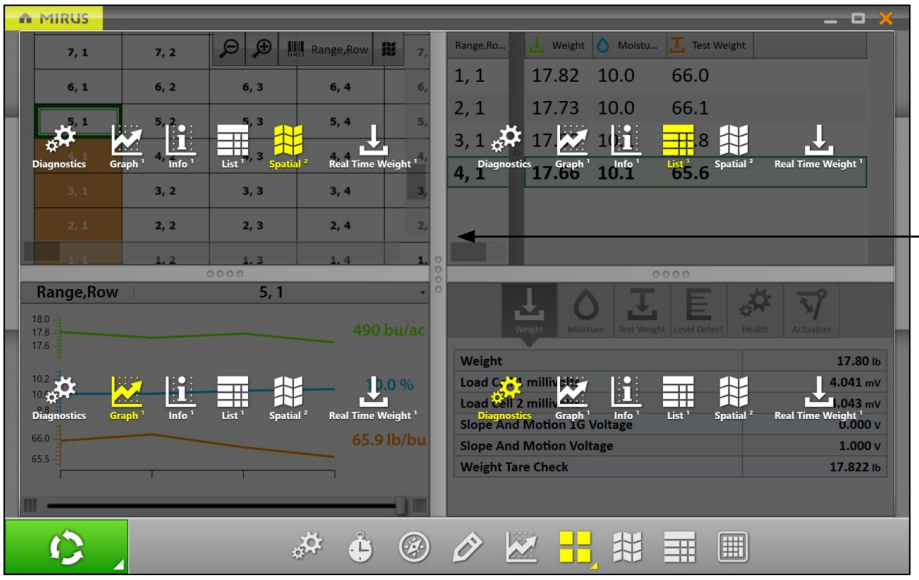
Each of the above options are available on the main toolbar in Harvest Mode except for the options to view **Real Time Weight** and **Info**.

To configure Quad View screens:

1. Enter **Quad View** by tapping the Quad View icon .

If desired, enlarge and shrink specific screens by dragging the borders of the Quad View screens.

2. Tap the Quad View icon a second time. Mirus displays options for each of the four screens.



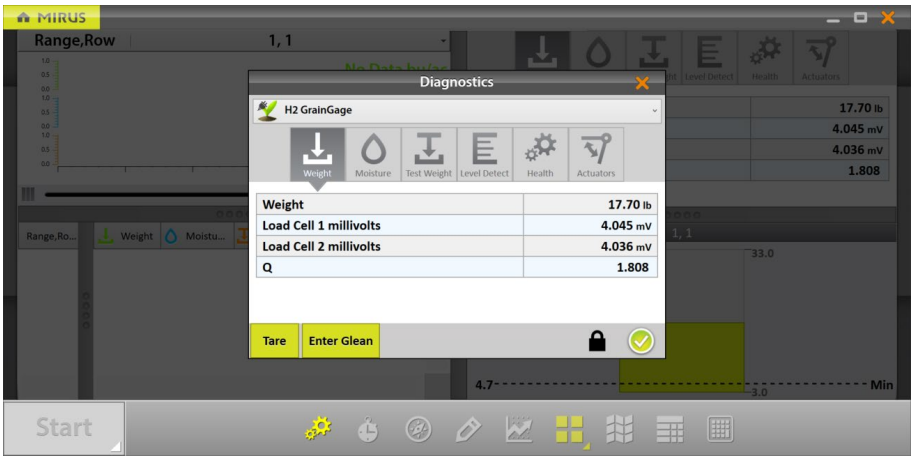
3. Tap the Quad View icon again. Mirus exits the configuration screens.

6.3.2 Diagnostics Screen

To access the Diagnostics screen in Harvest Mode,

1. Tap the gear icon on the toolbar.

Note: The Diagnostics screen will not open while the GrainGage is cycling.



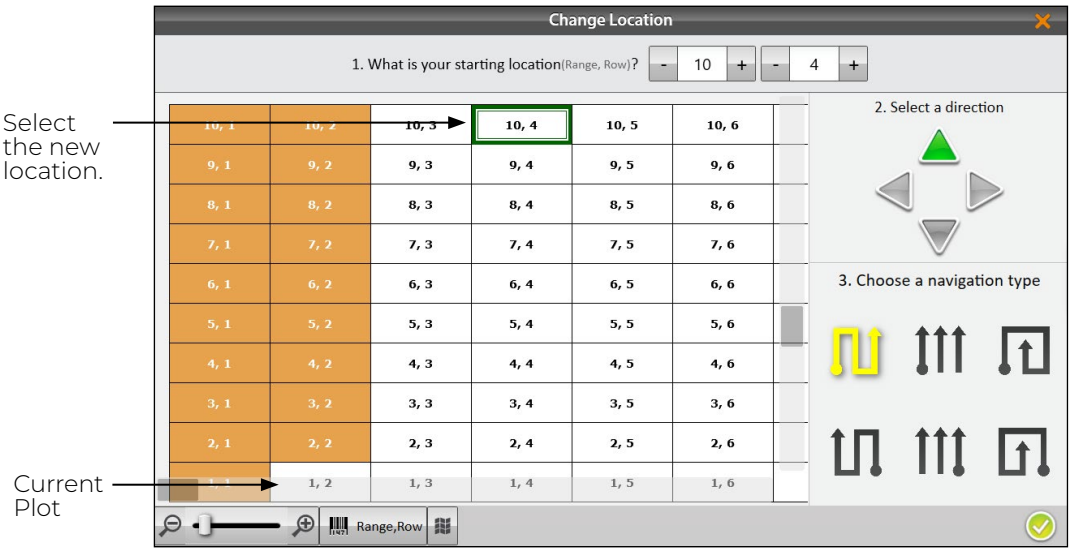
6.3.3 Navigation Screen

To change your location, direction, or navigation type,

1. Tap the navigation icon  to open the Change Location dialog box.
2. Select the location on the map where you wish to resume data collection in one of two ways:
   - Tap on the plot in the map.

   Or

   - Enter the range and row in the fields at the top of the dialog box.

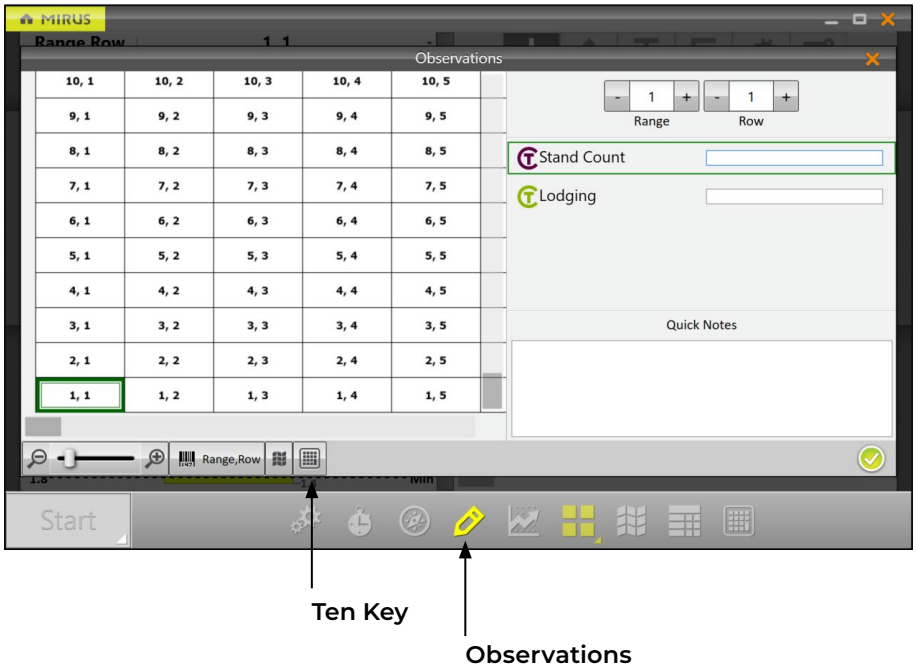


3. Select an arrow to change direction.
4. Select a navigation pattern by clicking on one of the options in the lower right portion of the window.
5. Tap the check icon .

6.3.4 Observations Screen

On the Harvest screen,

1. Tap the pencil icon to open the Observations window.



The Observations screen shows plot position and provides character fields for notes on each trait and a Quick Notes text box to record any other observations for each plot. Mirus stores the quick notes and trait notes alongside harvest data.

1. Tap the Ten Key icon for a floating dialog box that can also enter trait notes and quick notes.

The Ten Key dialog box can also be found on the main toolbar.

6.3.5 Graph View

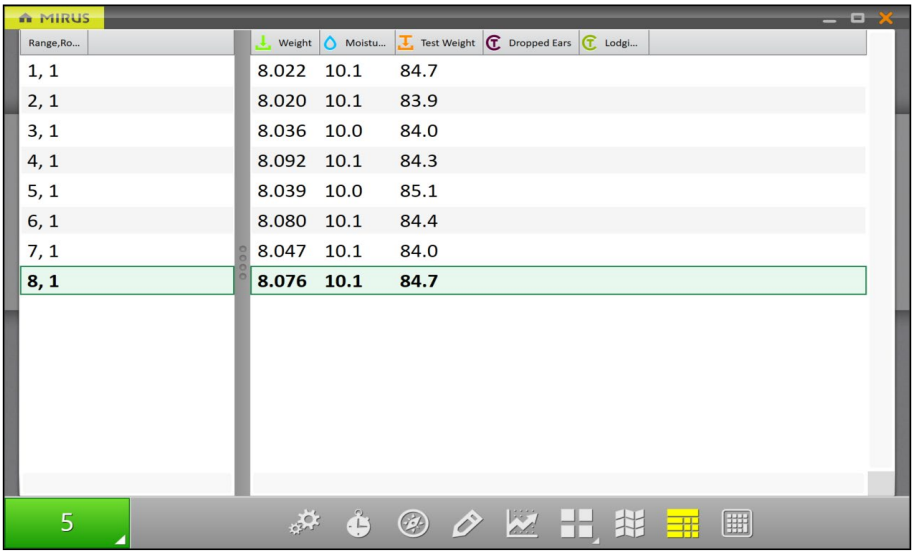
To view the harvest data in graph form, tap the graph icon in the toolbar.

The column to the right of the graph shows the data for the current plot.

In the graph, each bar (or point in the line graph) represents a plot. Each graph represents the map for three different traits: green for weight, blue for moisture, and orange for test weight. The values shown at the end of the graphs show the averages. The green average shows the yield based on the weight measurements and plot size. To set the yield parameters see **6.3.10 Configure Plot Size and Yield in Spatial Display on page 120**.

6.3.6 List View

In List View, you can see the data in the form of a chart.

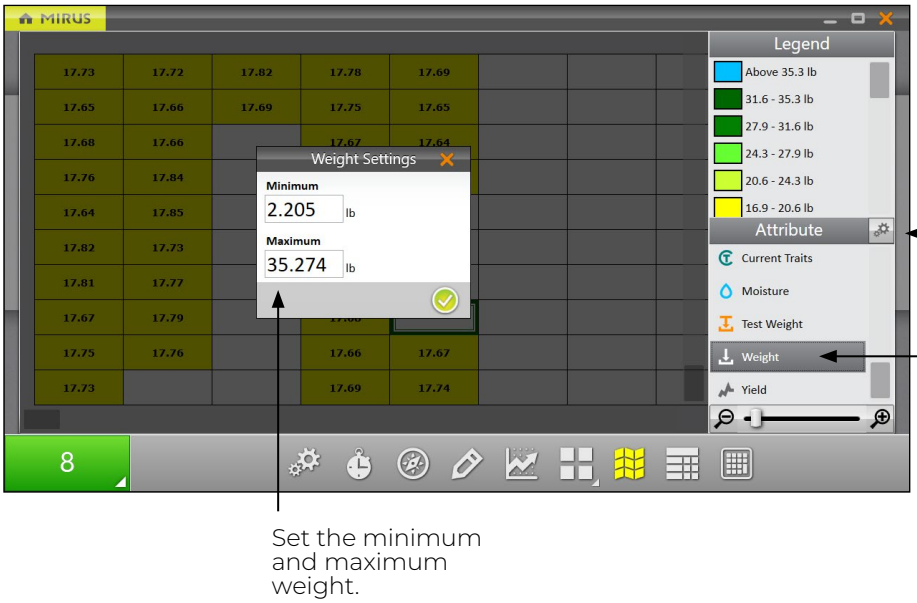


6.3.7 Configure Weight in Spatial Display

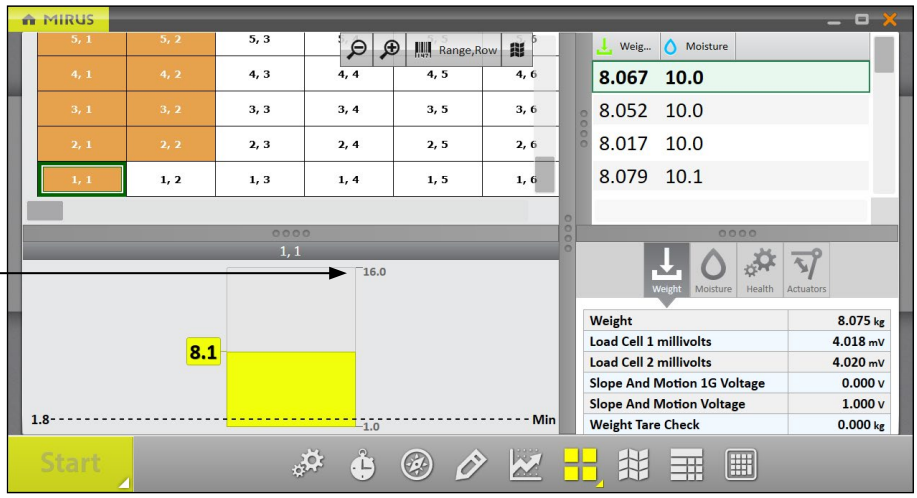
To set the minimum and maximum weight,

1. Tap the Spatial Display icon to display data in a heat map format.
2. Select the **Weight** attribute.
3. Tap the gear icon in the Attribute bar.
4. Set the **Minimum** and **Maximum** Weight.
5. Tap the check icon.

Adjusting the minimum and maximum values helps to create a more detailed legend and define the scope of the graphs and maps. The narrower the minimum and maximum range, the more detailed the information displayed becomes.



This setting adjusts the maximum weight on the Real Time Weight display, which allows you to track how full the GrainGage is getting with each plot. This is important to monitor so the GrainGage doesn't overflow.

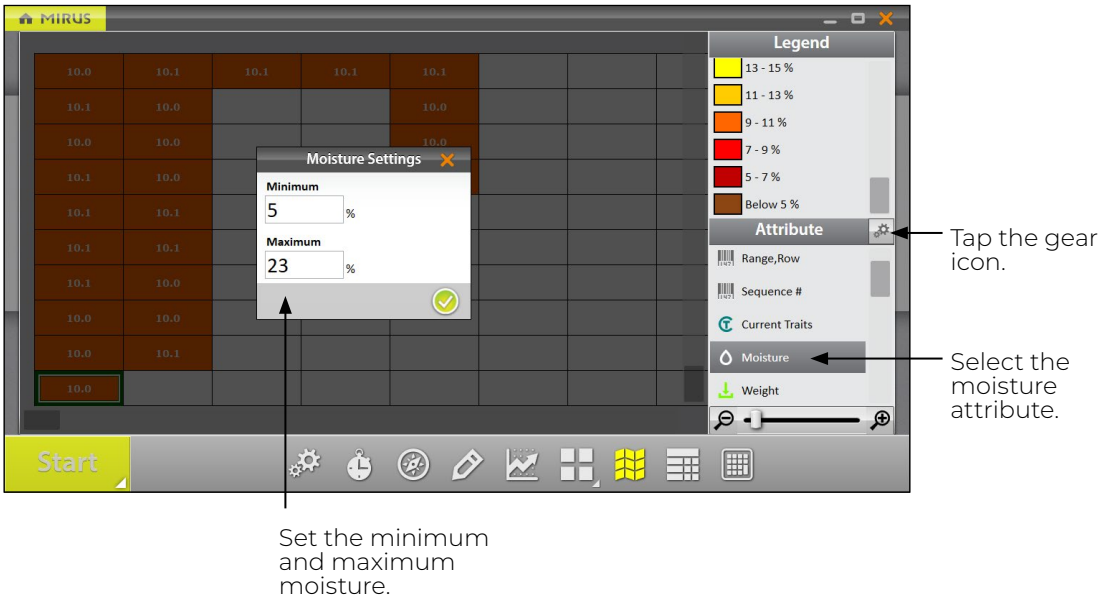


6.3.8 Configure Moisture in Spatial Display

To set the minimum and maximum moisture,

1. Tap the Spatial Display icon to display data in a heat map format.
2. Select the **Moisture** attribute.
3. Tap the gear icon in the Attribute bar.
4. Set the **Minimum** and **Maximum** moisture.
5. Tap the check icon.

Adjusting the minimum and maximum values helps to create a more detailed legend and define the scope of the graphs and maps. The narrower the minimum and maximum range, the more detailed the information displayed becomes.

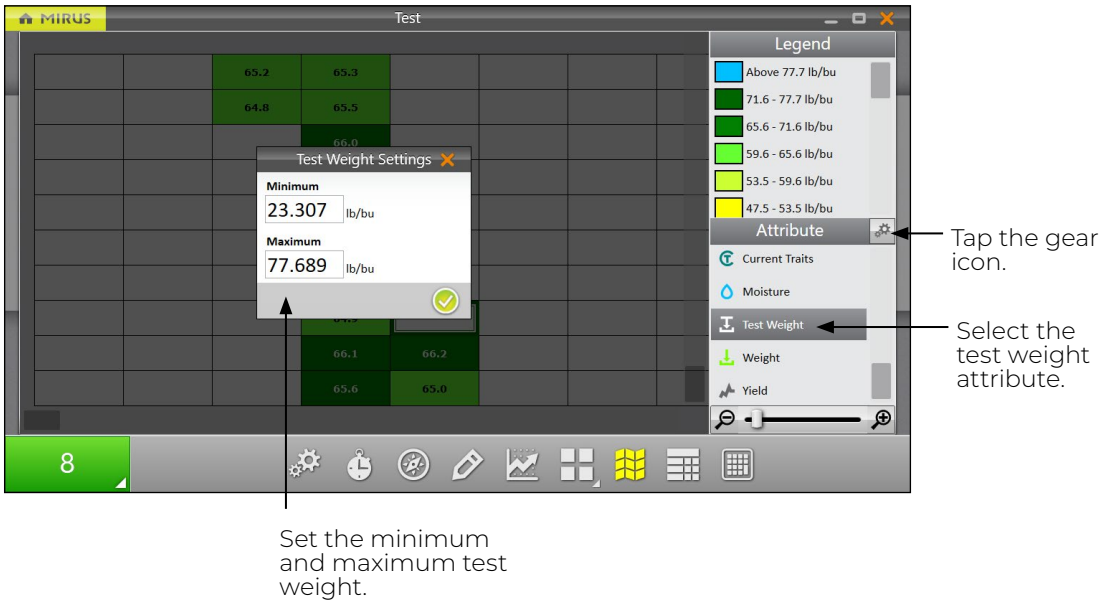


6.3.9 Configure Test Weight in Spatial Display

To set the minimum and maximum test weight,

1. Tap the Spatial Display icon to display data in a heat map format.
2. Select the **Test Weight** attribute.
3. Tap the gear icon in the Attribute bar.
4. Set the **Minimum** and **Maximum** Test Weight Settings.
5. Tap the check icon.

Adjusting the minimum and maximum values helps to create a more detailed legend and define the scope of the graphs and maps. The narrower the minimum and maximum range, the more detailed the information displayed becomes.

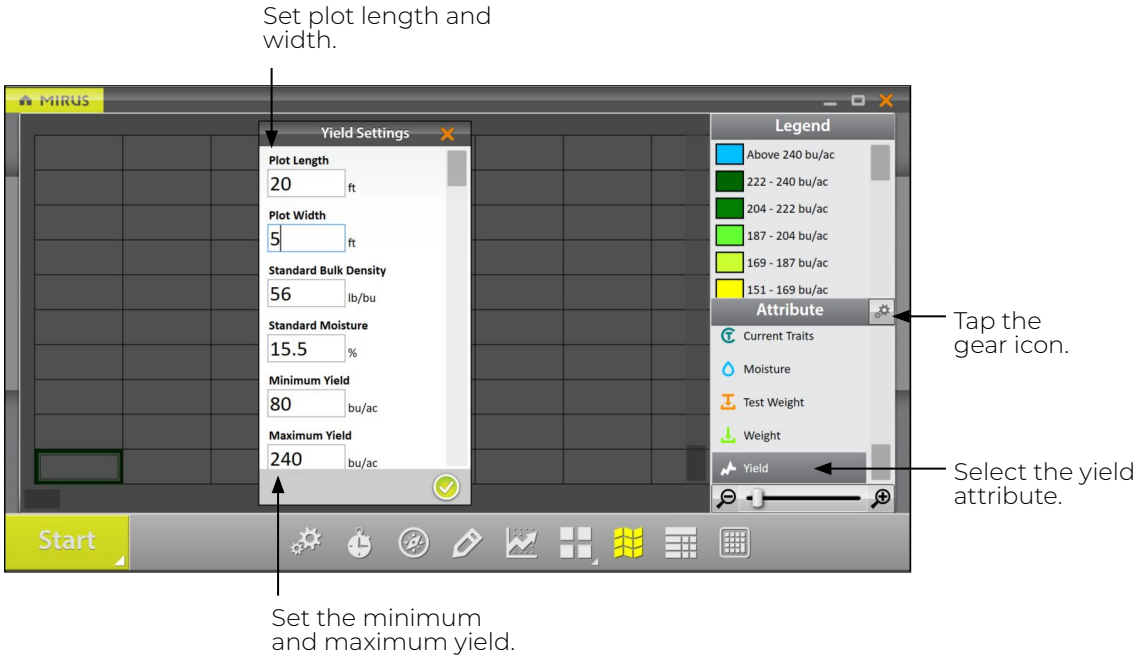


6.3.10 Configure Plot Size and Yield in Spatial Display

To set the minimum and maximum plot size and yield,

1. Tap the Spatial Display icon to display data in a heat map format.
2. Select the **Yield** attribute.
3. Tap the gear icon in the Attribute bar.
4. Set the **Plot Length** and **Width**.
5. Set the **Minimum** and **Maximum Yield**.
6. Tap the check icon.

The values set here help calculate the yield per acre (bu/ac, kg/ha) using the weight measurements divided by the plot area. For each minimum and maximum changed, the Legend will change to match the correct values.

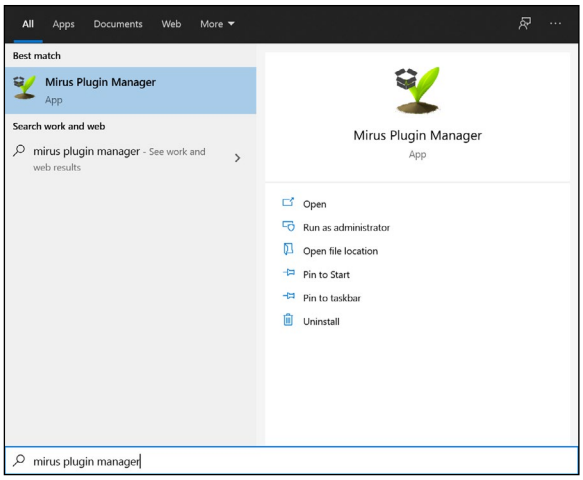


Adjusting the minimum and maximum values helps to create a more detailed legend and define the scope of the graphs and maps. The narrower the minimum and maximum range, the more detailed the information displayed becomes.

For examples of standard bulk density and standard moisture values see **7 Appendix A: Standard Grain Information on page 129**.

6.4 Collect Harvest Data

6.4.1 Install and Enable the Oxbo Plugin



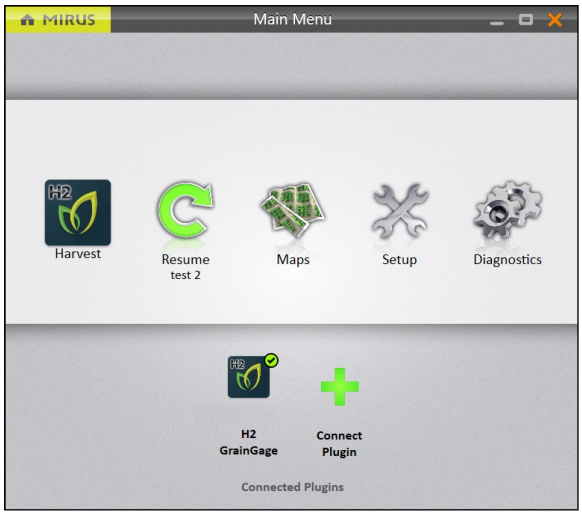
Before opening Mirus, ensure the Oxbo plugin is installed.

1. Search for Mirus Plugin Manager with the search function on your computer.
2. Open the Mirus Plugin Manager.

3. Look for the Oxbo plugin.

If the Oxbo plugin is marked with a green check, the plugin is installed and enabled. If you cannot find the plugin, contact an Oxbo Service Representative or a HarvestMaster Field Service Engineer. *See* **8.4.2 Contact a HarvestMaster Field Service Engineer** on page 136.

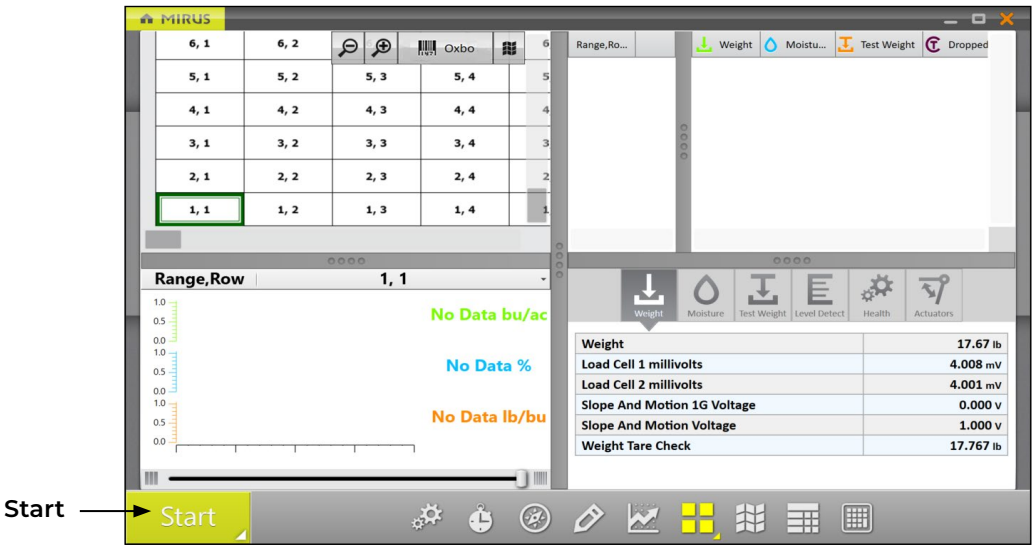
Once the plugin has been installed and enabled it will run with Mirus.



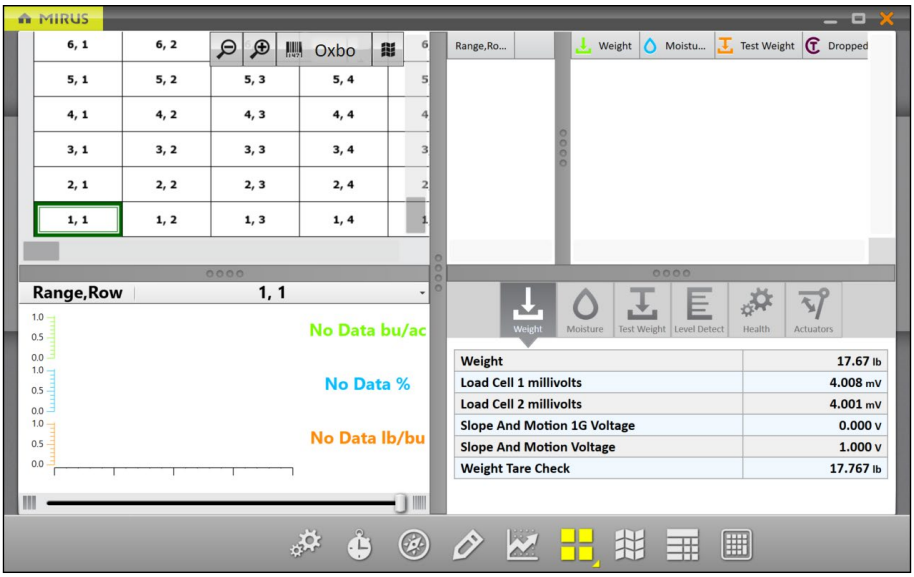
4. Connect to the H2 GrainGage.

6.4.2 Begin Harvest with the Oxbo Plugin

1. Open the Mirus Harvest screen.
2. Select a map, configure the harvest setup, and choose traits and a moisture curve. See **6.2 Open Harvest Mode on page 105** for specifics.
3. Throttle up. After the combine is at full throttle, turn the thresher on.
4. Tare the GrainGage if necessary.
5. Tap **Start**.



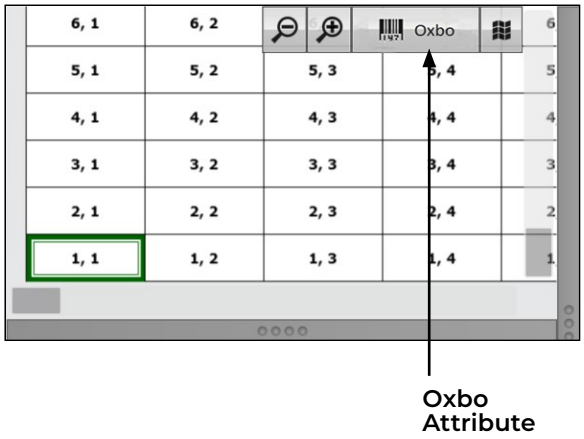
6. The **Start** button will disappear.



For the rest of harvest, use the **Pick Plot** button to begin each cycle. Do not use the **Pick Plot** button until after you have driven through the plot.

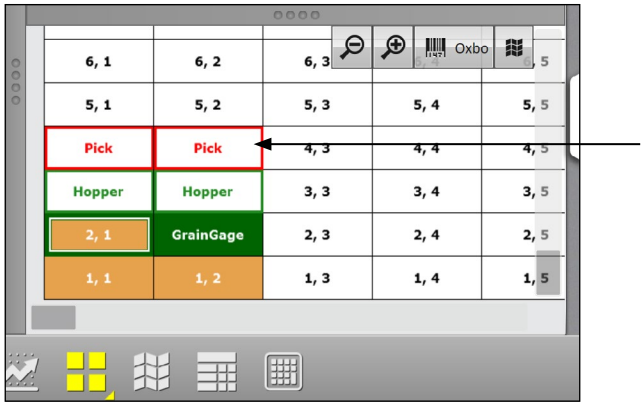
6.4.3 Use Mirus to Track the Grain through the Combine

The Spatial Display can track the progress of the grain in each plot through the combine.

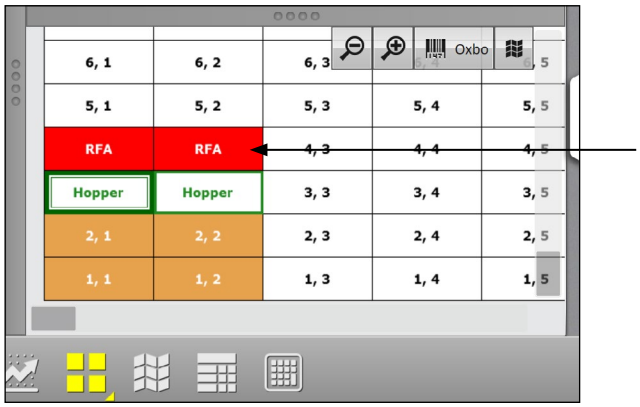


To turn on this feature, tap on the spatial attributes and select Oxbo.

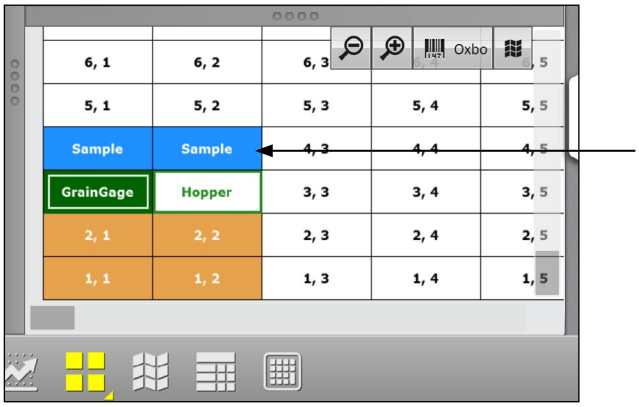
As the grain travels through the combine, Mirus will show each step of the cycle as shown below.



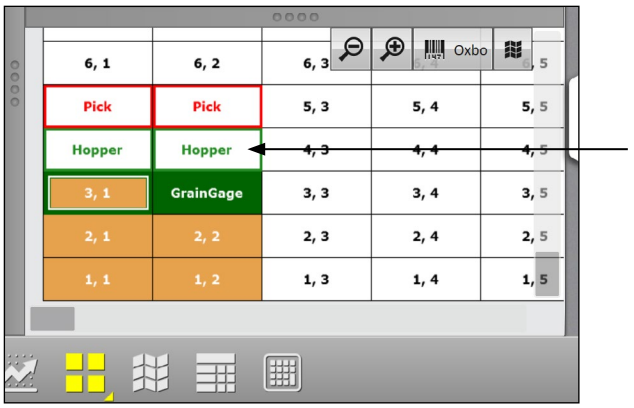
1. **Pick:** The plot has been harvested. The **Pick Plot** command has been supplied and grain is being conveyed to the Rotor Feed Augers (RFAs).



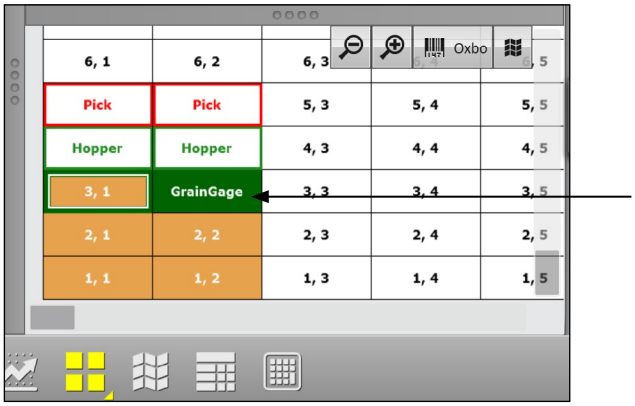
2. **RFA**: The grain is traveling to the clean grain sample bin in the RFA and thresher.



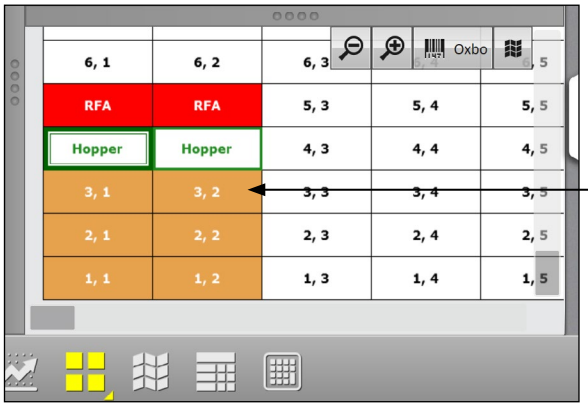
3. **Sample**: The sample augers feed the cleaned grain from the sample bin to the GrainGage hoppers.



4. **Hopper**: The grain is in the GrainGage hoppers.



5. **GrainGage**: The grain is in the GrainGage and data is collected.



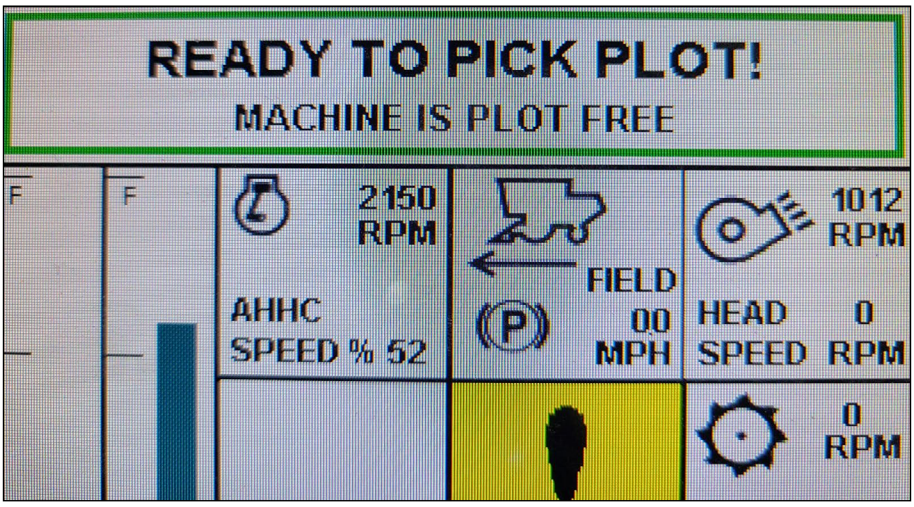
6. **Done**: The plot turns orange in the spatial screen and the data is recorded.

6.4.4 Use the Danfoss Display to Advance through Harvest

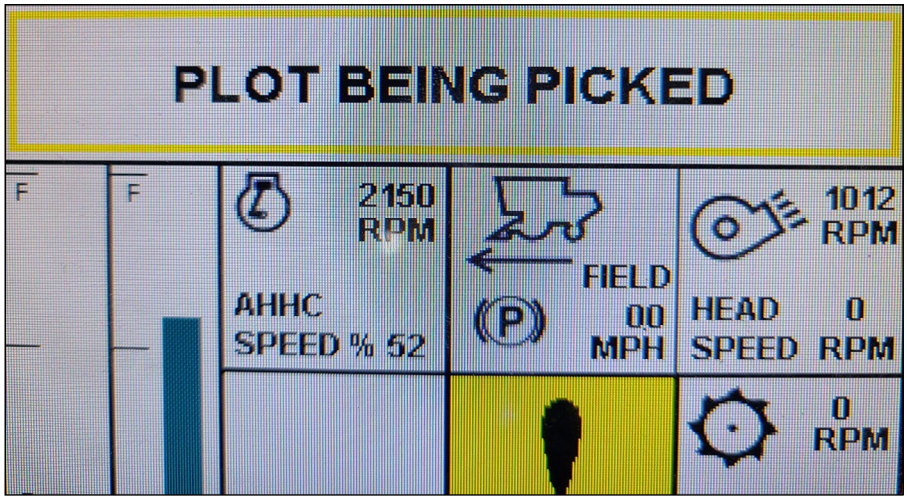
The Danfoss display shows the stages of the cycles to determine the correct time to begin harvesting the next plot.

After the **Start** button in Mirus disappears, the Danfoss display will say “Ready to Pick Plot!”

1. When this screen is displayed, begin harvesting.



While the plot is being harvested, the Plot Being Picked screen is displayed.



2. At the end of the plot, press the **Pick Plot** button.

The Please Wait screen will display while the cycle completes. Do not continue to harvest while this screen is displayed.

When the cycle is complete, the Ready to Pick Plot screen will be displayed.

3. Begin harvesting the next plot.

When the harvest is complete, do NOT turn off the thresher until the Danfoss display says “Ready to Pick Plot, Machine is Plot Free.”

mirus™

H2 Triple GrainGage

APPENDIX A

Standard Grain Information

7 Appendix A: Standard Grain Information

7.1 Insert Counts

The insert count is the number of inserts present in the chamber. It is used to select default volume for the test chamber, which is important to the accuracy of the system. The table below shows some examples of low yield inserts.

The default volumes are: 0 insert = 82.51 oz (2,440 ml); 1 insert = 63.74 oz (1885 ml); 2 inserts = 44.97 oz (1,330 ml).

Typical Weights for Test Chamber Volumes (Insert Counts)

Grain/Legume	Insert Count	Volume	Typical Weight
Wheat 60 lb/bu (77 kg/hL)	0	82.51 oz (2,440 ml)	4.05 lb (1.84 kg)
	1	63.74 oz (1,885 ml)	3.22 lb (1.46 kg)
	2	44.97 oz (1,330 ml)	2.32 lb (1.05 kg)
Canola 47 lb/bu (60 kg/hL)	0	82.51 oz (2,440 ml)	3.21 lb (1.46 kg)
	1	63.74 oz (1,885 ml)	2.56 lb (1.16 kg)
	2	44.97 oz (1,330 ml)	1.87 lb (0.85 kg)
Soybeans 55 lb/bu (71 kg/hL)	0	82.51 oz (2,440 ml)	3.88 lb (1.76 kg)
	1	63.74 oz (1,885 ml)	3.08 lb (1.40 kg)
	2	44.97 oz (1,330 ml)	2.16 lb (0.98 kg)

*These measurements are based on the United States (Winchester) bushel.

7.2 Standard Moisture and Test Weight

Test weight should always be calculated with a sample that is as close to the industry moisture standard as possible. The table below shows some examples of the industry moisture standard.

Standard Moisture and Test Weight

Grain	Moisture	Test Weight
Wheat	13.5%	60 lb/bu (77 kg/hL)
Canola	8.5%	47 lb/bu (60 kg/hL)
Soybean	13%	55 lb/bu (71 kg/hL)
Barley	14.5%	48 lb/bu (62 kg/hL)
Corn	15.5%	56 lb/bu (72 kg/hL)
Rye	14%	56 lb/bu (72 kg/hL)
Sorghum	13%	56 lb/bu (72 kg/hL)
Oats	13.5%	32 lb/bu (41 kg/hL)
Sunflower	10%	25 lb/bu (32 kg/hL)

References for Standard Moisture and Test Weight

Devkota P., & Mulvaney M. J. (2020, May). *Adjusting crop yield to a standard moisture content*. IFAS Extension, University of Florida. https://edis.ifas.ufl.edu/pdf%5CAG%5CAG44200.pdf.

Isleib, J. (2012, August 6). *Test weight in small grains*. Michigan State University Extension. https://www.canr.msu.edu/news/test_weight_in_small_grains.

mirus™

H2 Triple GrainGage

APPENDIX B

Troubleshooting Mirus

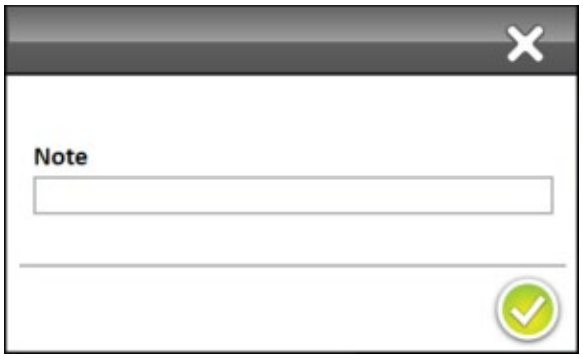
8 Appendix B: Troubleshooting Mirus

8.1 Error Logs

Error logs are used by HarvestMaster Field Service Engineers to pinpoint the problem occurring in Mirus.

8.1.1 Flag Errors

When experiencing an error, in Mirus version 4.3.0 and later, you can flag the error for the HarvestMaster Field Service Engineers. When an error has been flagged, the engineers can find it easily within the error logs.



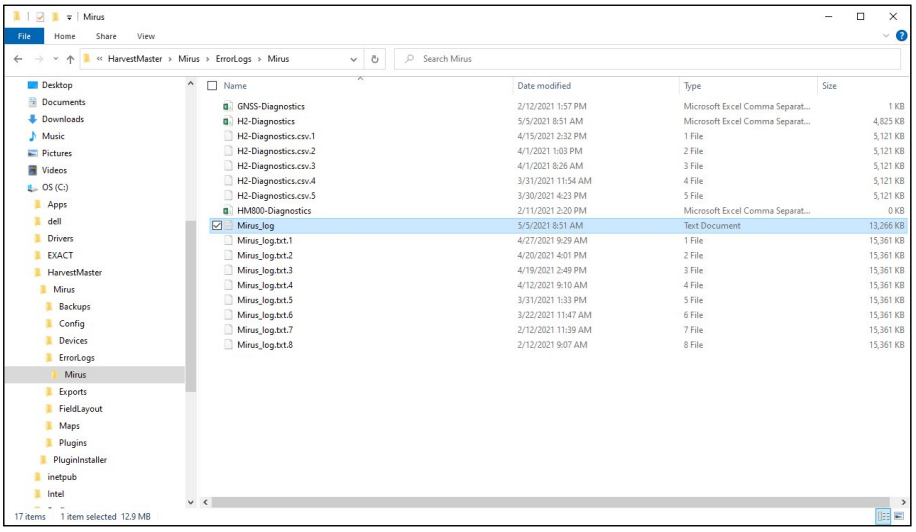
- Use F5 to flag the error in the error log.
- Use F6 to flag and leave a message in the error log.

8.1.2 Find and Send Error Logs

After an error has occurred, copy the error log file as soon as possible to send to the HarvestMaster Field Service Engineers.

To find and send the error logs to the HarvestMaster Field Service Engineers,

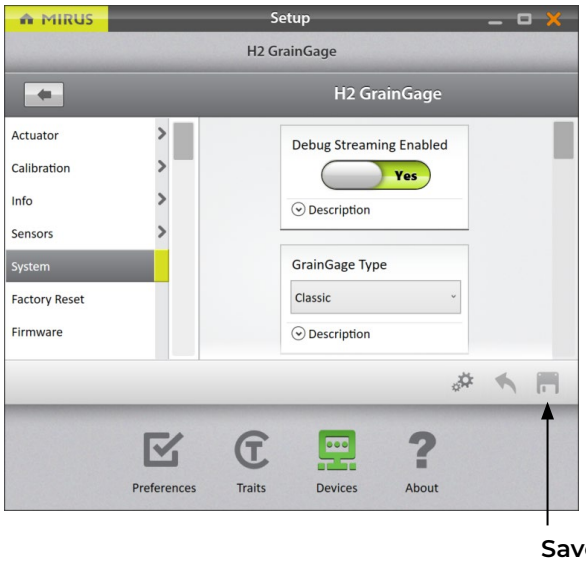
1. Open File Explorer on your device.
2. Go to C:\HarvestMaster\Mirus\Errorlogs\Mirus.
3. Send the Mirus_log text document to the HarvestMaster Field Service Engineers.



8.2 Enable Debug Streaming

This option enables debug streaming messages from the DSP module. Enabling this is only recommended when troubleshooting the GrainGage with a HarvestMaster Field Service Engineer as it provides them with a more detailed error log. Be sure to turn off debug streaming when you are not using it.

To enable debug streaming,



1. Enter the Mirus Home screen.
2. Select **Setup** > **H2 GrainGage** > **System**.
3. Change Debug Streaming Enabled to **Yes**.
4. Tap **Save**.

8.3 Common Errors

8.3.1 Inaccurate Plot Weight

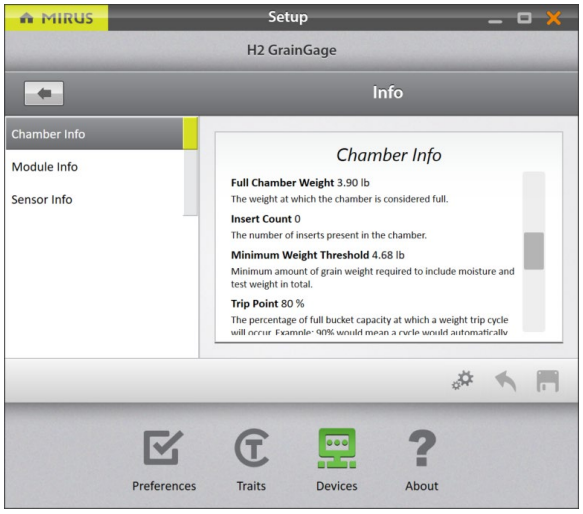
If weight values are inaccurate, open Diagnostics and follow the steps listed below.

1. Ensure the weigh bucket of the GrainGage is in the tracks.
2. Clean inside the bucket, around the bucket, and around the load cells of the GrainGage with compressed air.
3. Ensure there is nothing putting positive or negative tension on the weigh bucket/load cells (air hoses, cables, overload protection pin, etc.).
4. Apply negative and positive pressure to the bucket while watching the weight values in Diagnostics. Remove the pressure to ensure the weight returns to zero. Do this several times to ensure repeatability.
5. Put the HarvestMaster calibration weight in the bucket with the top gate closed and check it against the calibration weight in Diagnostics.
6. If the problem persists, contact the HarvestMaster Field Service Engineers.

8.3.2 Not Meeting Minimum Weight Threshold

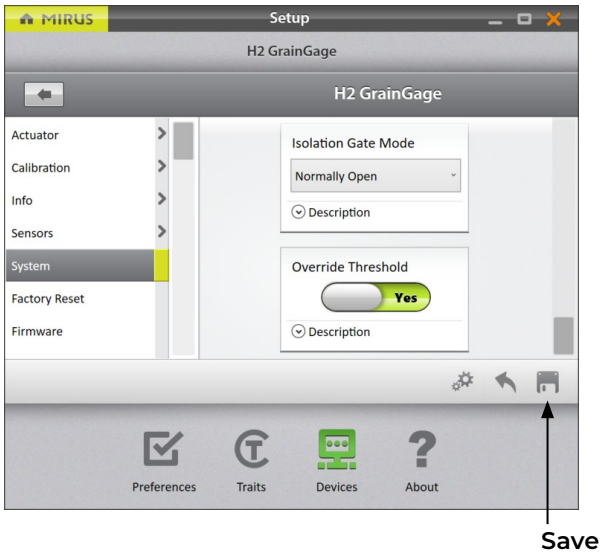
The minimum weight threshold is the minimum amount of grain required for accurate moisture and test weight data. By default, if the minimum weight threshold is not met, moisture and test weight data will be recorded as zero.

To ensure the plots are yielding enough grain to measure accurate moisture and test weight,



1. Go to **Setup** > **Info** > **Chamber Info**.
   - If the minimum weight threshold value is outside 2–6 lb., recalibrate the test weight for the chamber calibration.
   - If you are not harvesting enough grain to meet the minimum weight threshold, install low yield inserts and recalibrate the chamber. For more information about low yield inserts, see **7 Appendix A: Standard Grain Information on page 129**.
   - If installing low yield inserts doesn't work, there is an option to override the minimum weight threshold.

CAUTION: If the minimum weight threshold is overridden, the moisture and test weight is not guaranteed to be accurate.



To override the minimum weight threshold,

- Go to **Setup** > **System**.
- Change the Override Threshold option to **Yes**.
- Tap **Save**.

8.3.3 Can't Connect to GrainGage

If you are having trouble connecting to the GrainGage,

1. Ensure the H2 System Controller is turned on.
2. Ensure the H2 GrainGage plugin is enabled. For instructions on how to enable the plugin see **2.1.1 Load H2 GrainGage Plugin** on page 12.
3. Check there is a solid green power light and flashing yellow status light on each of the modules.
4. Ensure all the cables are properly connected.
   - A USB or serial cable between the dock and the H2 System Controller.
   - A CAN cable between the H2 System Controller and the H2 GrainGage.
5. Turn off the H2 System Controller, Mirus, and the tablet, leave them off for 30 seconds, then turn them back on and attempt to connect.
6. Unplug the CAN and power cables on the modules, leave them for 30 seconds, then plug them back in and attempt to connect.
7. If the problem persists, contact the HarvestMaster Field Service Engineers.

8.3.4 Tare Warnings

A tare warning can be prompted for the reasons explained in the table below.

Tare Warnings	
If	**Then**
Debris is in the bucket or test chamber.	Check the bucket and test chamber to ensure that there is nothing remaining (grain, debris, trash, etc.).
Positive or negative tension is on the weigh bucket or load cells.	Move any air hoses, cables, or overload protection pins putting tension on the weigh bucket or load cells.
Leftover grain is in the weigh system.	The evacuation time is not long enough for the grain to fully empty out of the GrainGage. • Go to **Setup** > **Sensors** > **Weight** > **Evacuation Time**. • Lengthen the evacuation time by 500 milliseconds. • Harvest another plot and check again.
Tare warning values have been adjusted.	Restore the values to the default setting. See the **Weight Sensors Settings on page 25**.

If the problem persists, contact the HarvestMaster Field Service Engineers.

8.4 Contact HarvestMaster

8.4.1 Instructional Content

Visit the *HarvestMaster YouTube* channel and the *HarvestMaster Support* page for instructional videos and help articles on Mirus and the H2 GrainGage.

This instructional content includes (but is not limited to):

- *M2.0 Moisture Calibration*
- *Recalibrate Traditional Moisture Curve to the New M2.0 Model in Mirus 4.3.0*
- *Mirus Overview*
- *Weight Tare Warnings*
- *Errors on Power Up with Mirus*
- *Mirus Locks Up*
- *GrainGage Will Not Connect*

8.4.2 Contact a HarvestMaster Field Service Engineer

Phone Number: 435-753-1881

Email: hmtechsupport@junipersys.com

Address: 1132 W 1700 N, Logan, UT 84321

mirus™

H2 Triple GrainGage

APPENDIX C

Plot-to-Plot Carryover

9 Appendix C: Plot-to-Plot Carryover

To maintain good data quality during harvest, check the amount of grain carried over from plot-to-plot. If needed, set the H2 GrainGage timers to limit the amount of grain carried over from plot-to-plot.

9.1 Carryover Overview

The ideal plot-to-plot carryover weight should be 0.00 lb. This means the combine and GrainGage are completely cleaned out between plots, reducing or eliminating the chance of data error coming from carryover.

If the weight on the diagnostics screen reads greater than 0.0 lb after you have completed a harvest cycle for a plot, it is possible you need to check the evacuation timer, open state timer, or the countdown timer.

- **Evacuation timer**: Ensure there is no grain left in the weigh bucket at the end of each cycle. Increase the evacuation timer if any grain remains in the plot bucket. For information on how to change the evacuation timer settings, see **2.3.2 Configure Actuators** on page 17.
- **Open state timer**: Ensure the upper hoppers are emptying. Increase the open state timer for each hopper if they do not empty between plots. For information on how to locate the open state timer settings, see **2.3.2 Configure Actuators** on page 17.

  Note: This is only applicable for the H2 Twin and Triple GrainGages.
- **Countdown timer**: Ensure the combine has enough time to deliver the grain to the GrainGage. Increase the time for the countdown timer if the cycle for the next plot starts too quickly..

  Note: This is only applicable for the H2 Classic, Single, and Twin GrainGages.

During the harvest, remember:

- Wet and high yielding plots take longer to travel through the combine and GrainGage than dry and low yielding plots.
- Always be aware of the changing moisture and plot weights during harvest. If you get into wet or higher yielding plots, set the timers for longer.
- Set GrainGage timers to allow the wet or high yielding plots to get through the combine and GrainGage entirely. This will reduce the data error from plot harvesting.

9.2 Check the Plot-to-Plot Carryover

To check the plot-to-plot carryover is acceptable, harvest filler rows with the same plot dimensions as your field. The moisture of the rows you harvest should be around the average maturity of the field.

1. Open Mirus.
2. Following the steps in **Chapter 5 Field Maps** on page 74 to create a test map.
3. Follow the steps in **Chapter 6 Harvest Mode** on page 105 to begin harvest.
4. Harvest the filler rows.
5. Stop after five ranges have been harvested and weighed.
6. While you are stopped, cycle the GrainGage again.

The weight of this cycle is the plot-to-plot carryover.

7. Repeat steps 5 and 6 at least three times to get an average carryover weight.

mirus™

H2 Triple GrainGage

APPENDIX D

Limited Warranty

10 Appendix D: Limited Warranty

10.1 Software

Software products that are designed by Juniper Systems for use with a hardware product and that are properly installed on that hardware product are warranted to the end user not to fail to execute their programming instructions due to defects in material or workmanship for a period of one year from the date of delivery.

If Juniper Systems receives notice of such defects during the one year warranty period, Juniper Systems shall, at its option, repair or replace the defective software media. Warranty is limited to repair or replacement of software media.

The warranties provided herein do not apply in the case of improper or inadequate maintenance or in the case of repair by any person not previously authorized in writing by Juniper Systems to do such maintenance or make such repairs.

These warranties likewise do not apply where the products have been operated outside the environmental specification of the product, where software products other than those specified by Juniper Systems have been used, or where attempts at software interface have been made by any person not previously authorized by Juniper Systems to perform such interfacing operations.

10.2 Disclaimer of Warranties

The warranties set forth herein are in lieu of all other warranties of Juniper Systems, whether written, oral or implied. Juniper Systems makes no warranties regarding its products (hardware or software), including without limitation warranties as to merchantability, fitness for a particular purpose, any warranty arising from course of performance, course of dealing, or usage of trade whether any of the foregoing warranties are either expressed or implied. Juniper Systems specifically makes no warranties as to the suitability of its products for any particular application. Juniper Systems shall in no event be liable for special, incidental, or consequential damages in connection with or arising out of the furnishing, performance or use of any product covered by this agreement whether such claim is based upon warranty (express or implied), contract, strict liability, negligence or otherwise.

10.3 Updates or Modifications

Juniper Systems shall be under no obligation to update or modify its products except as herein noted to correct program errors. Furthermore, the customer agrees that all representations and warranties contained herein shall be immediately null and void in the event of any modification, alteration or change in or to any product affected by or on behalf of the customer except for a change made by Juniper Systems.

10.4 Removal of Serial Number

Removal of the Juniper Systems serial number label from an instrument will void any warranty on the said instrument. Juniper Systems will not repair or update an instrument and return it to an individual if the instrument is without the said serial number label.

10.5 Extended Warranties

Juniper Systems offers a variety of warranty options to extend coverage beyond the standard warranty. You can contact Juniper Systems Customer Service Department for details at (435) 753-1881 (6 am - 5 pm MT, Mon-Fri).