

# Carbon Footprint calculator

**DISPLAY: Digital Information System for Product Labeling of Rice to communicate Carbon-Footprints based on Actual Yield Recovery**

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# What is a carbon footprint?

A carbon footprint is the total greenhouse gas (GHG) emissions caused directly and indirectly by an individual, organization, event or product.<sup>1</sup>

- Calculated by summing the emissions from every stage of a product's lifetime (production, handling, processing, manufacturing, transport...)
- All gases emitted over a product's lifecycle ( $\text{CO}_2$ ,  $\text{CH}_4$ ,  $\text{N}_2\text{O}$ ) are converted into units of carbon dioxide equivalents ( $\text{CO}_2\text{e}$ ) for easy comparison.

<sup>1</sup>The Carbon Trust (2012) Carbon Footprinting.



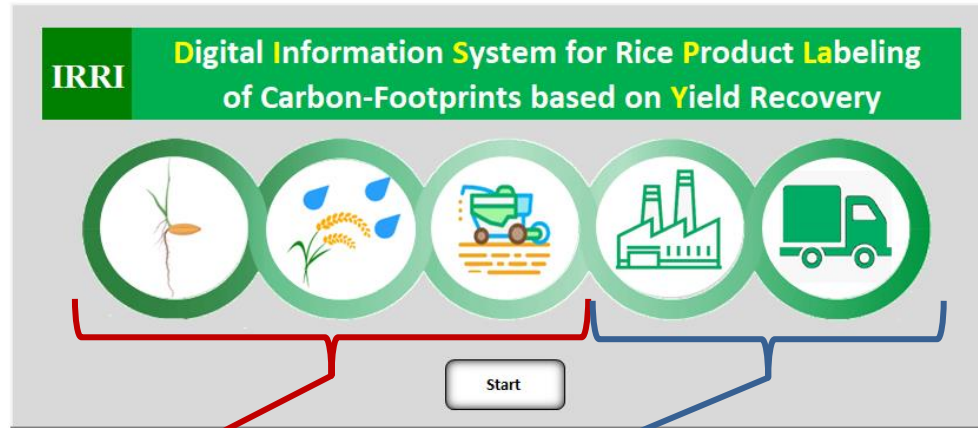
# How is DISPLAY different from SECTOR?

- **SECTOR** calculates the emissions from **field production only** and the output is provided in **t CO<sub>2</sub>e/ha**
- **DISPLAY** calculates the carbon footprint across the **entire value chain (including losses)** and provides the output in **g CO<sub>2</sub>e/kg** of packaged rice (e.g., for companies to analyze their value chain)
- **DISPLAY** allows the user to **generate a QR code** for communicating carbon footprints



# DISPLAY – Beta version

Available soon at:  
<https://ghgmitigation.irri.org/>



The screenshot shows the user interface of the system. At the top, there is a "Settings" dropdown menu set to "User's defined". To the right is a toolbar with icons for back, print, QR code, information, close, and next. Below this are two tabs: "Cultivation" (highlighted in blue) and "Harvest and post-harvest" (highlighted in blue). Under the "Cultivation" tab, there are sub-tabs: "Crop yield", "Crop establishment", "Water management", "Fertilizer application", and "Machine operations". The "Crop yield" sub-tab is active, showing a "Crop yield (Y)" section with a dropdown menu set to "Harvest yield", a text input field containing "6", and the unit "(ton/ha)". A note below the input field reads "Yield measured at sampling block or right after harvest".



# Inputs and outputs

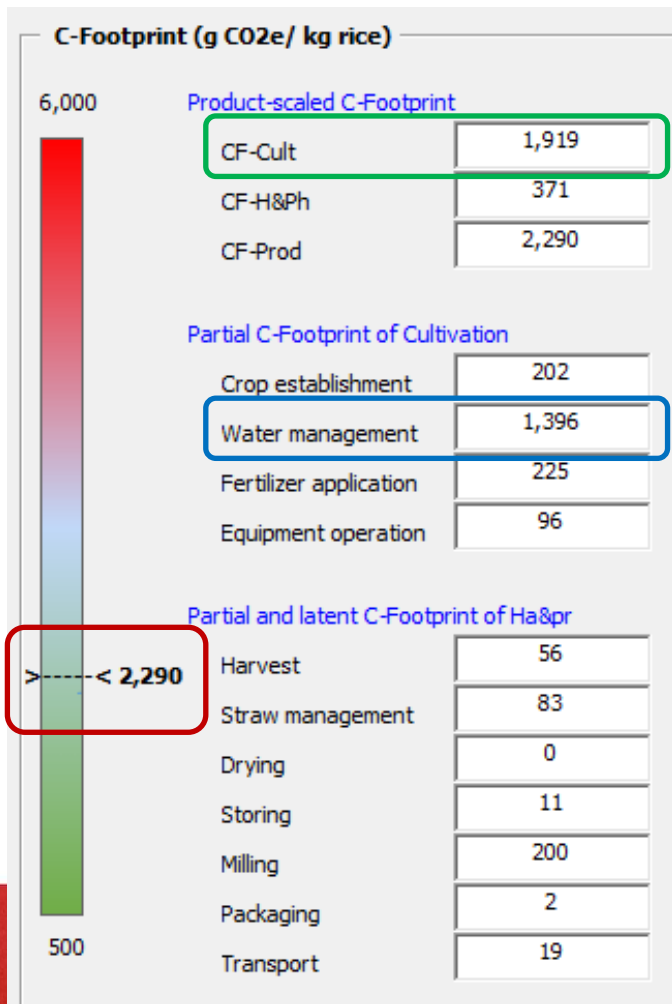
The screenshot shows a software interface with the following elements:

- Settings:** A dropdown menu set to "User's defined".
- Cultivation:** A tabbed interface with "Harvest and post-harvest" selected. Sub-tabs include "Harvesting", "Straw management", "Drying", "Storing", "Milling", "Packaging", and "Transport". The "Milling" sub-tab is highlighted with a red box.
- Milling method:** A dropdown menu set to "Basic technology (diesel or gasoline)/White rice".
- Pre-set value section:**
  - GHG emission potential:** Checked, value 210 (kg CO<sub>2</sub>e/ton of rice). Source: *CO<sub>2</sub> emissions from fuel consumed for milling. Country/Region: Not specified (Source: Standard LCA Inventory)*
  - Food loss rate:** Checked, value 0.08. Source: *Grain losses at milling. Country/Region: Not specified (Source: Aulakh and Regmi 2013)*
  - By-products:** Checked, value 0.3 (%). Source: *Rate of husk and bran (assuming 20% value as compared to rice product). Country/Region: Not specified (Source: Aulakh and Regmi 2013)*
- Navigation icons:** A row of icons including a refresh icon, a document with pencil icon, a QR code icon, an information icon, a close icon, and a right arrow icon.

Four callout boxes with arrows point to specific icons:

- Manage inventory data:** Points to the refresh icon.
- Generate QR code:** Points to the QR code icon.
- Export results:** Points to the document with pencil icon.
- Show results:** Points to the right arrow icon.





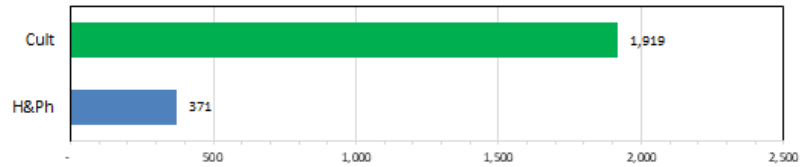
# Carbon footprint output

- Product-scaled carbon footprint of 2,290g CO<sub>2</sub>e per kg of rice
- Majority comes from cultivation
- During cultivation, majority comes from water management

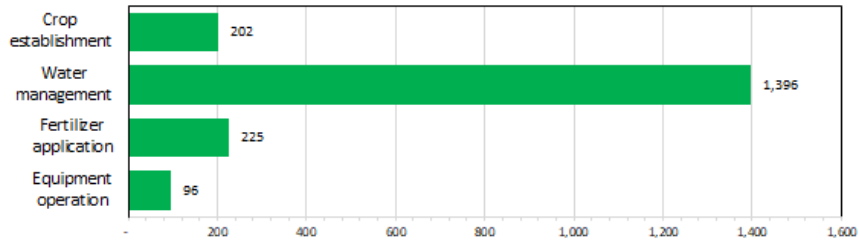


# Carbon footprint output

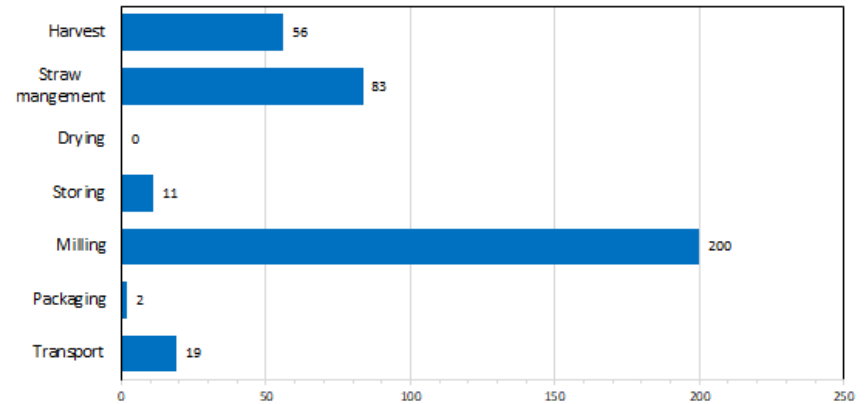
C-Footprint of Cultivation and Harvest & Post harvest  
(g CO<sub>2</sub>e/kg rice)



C-Footprint of cultivation  
(g CO<sub>2</sub>e/kg rice)



C-Footprint of Harvest & Post harvest  
(g CO<sub>2</sub>e/kg rice)



# Carbon footprint output



Generate QR

Product Description

Product ID	<input type="text" value="Katie"/>
Batch ID	<input type="text" value="test"/>
Country	<input type="text" value="VN"/>
Year	<input type="text" value="2021"/>

Optional add-on information

Sustainability auditor (if any)	<input type="text"/>
Supplemental URL (if any)	<input type="text"/>

**Generate QR**

Need to install a separate plugin from DISPLAY zip file for generating QR code



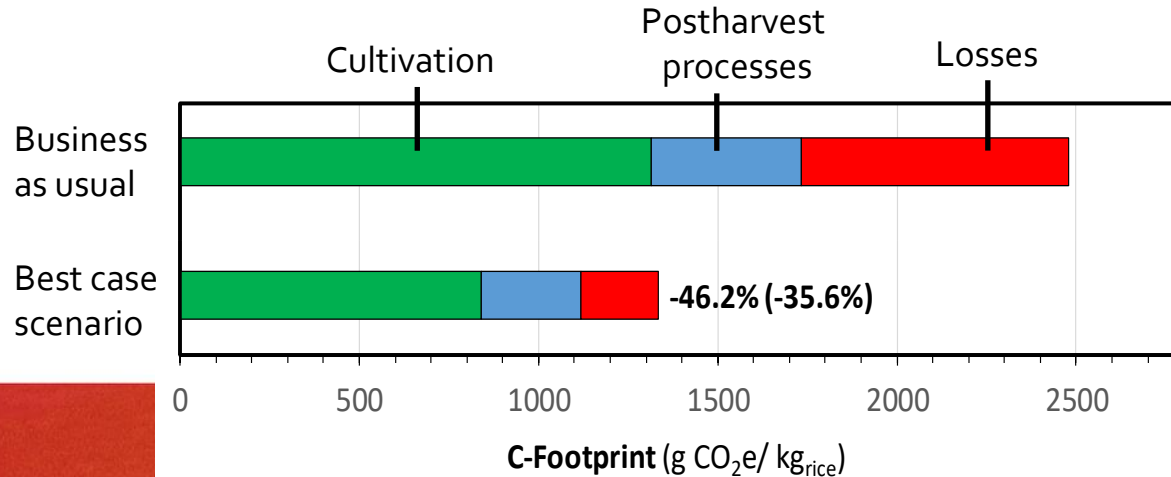
QR Generator not found. Please install the .exe file from the zip before continuing





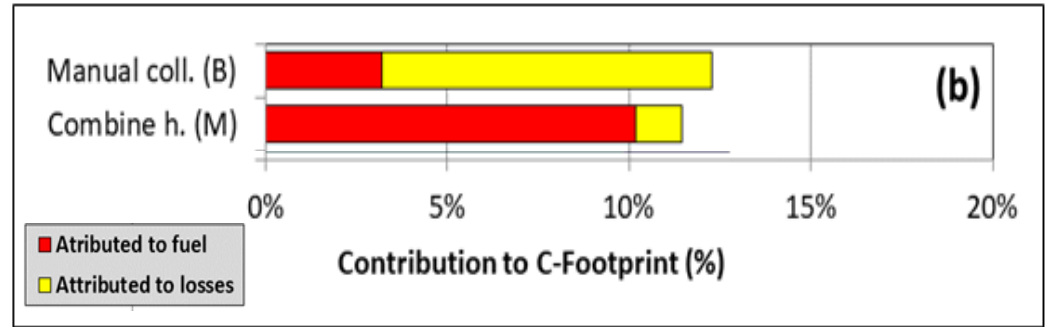
# What makes the tool novel?

- First carbon footprint tool tailored to rice that allows variation across all activities during cultivation, processing, & handling (rather than default values) - *Shows hotspots across value chain for improvement opportunities to aid decision-making and change*
- The tool considers losses along the value chain and the inherent emissions of wasted product

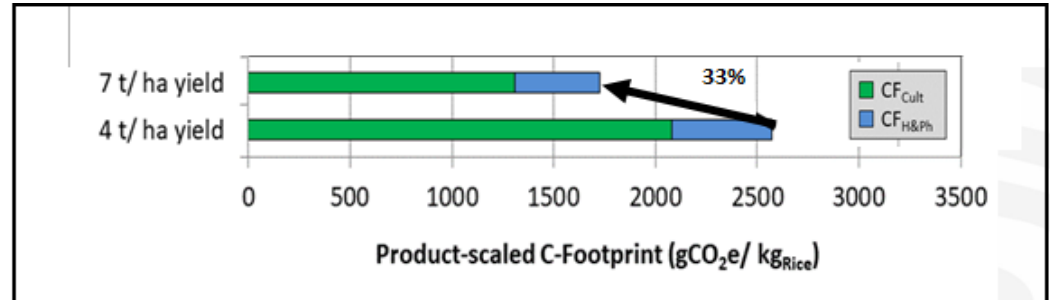


# What makes the tool novel?

- Allows for comparison across technology scenarios showing the resulting carbon footprints



- Proves and quantifies that increasing efficiency reduces carbon footprint (e.g. high yielding & climate-adapted varieties are low-emission technologies)



<https://ghgmitigation.irri.org/knowledge-products/mrv-toolbox/>

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## MRV Toolbox

**Thank you for your attention!**

