# Definition of appropriate methodology to determine the Water Footprint of the agri-food sector

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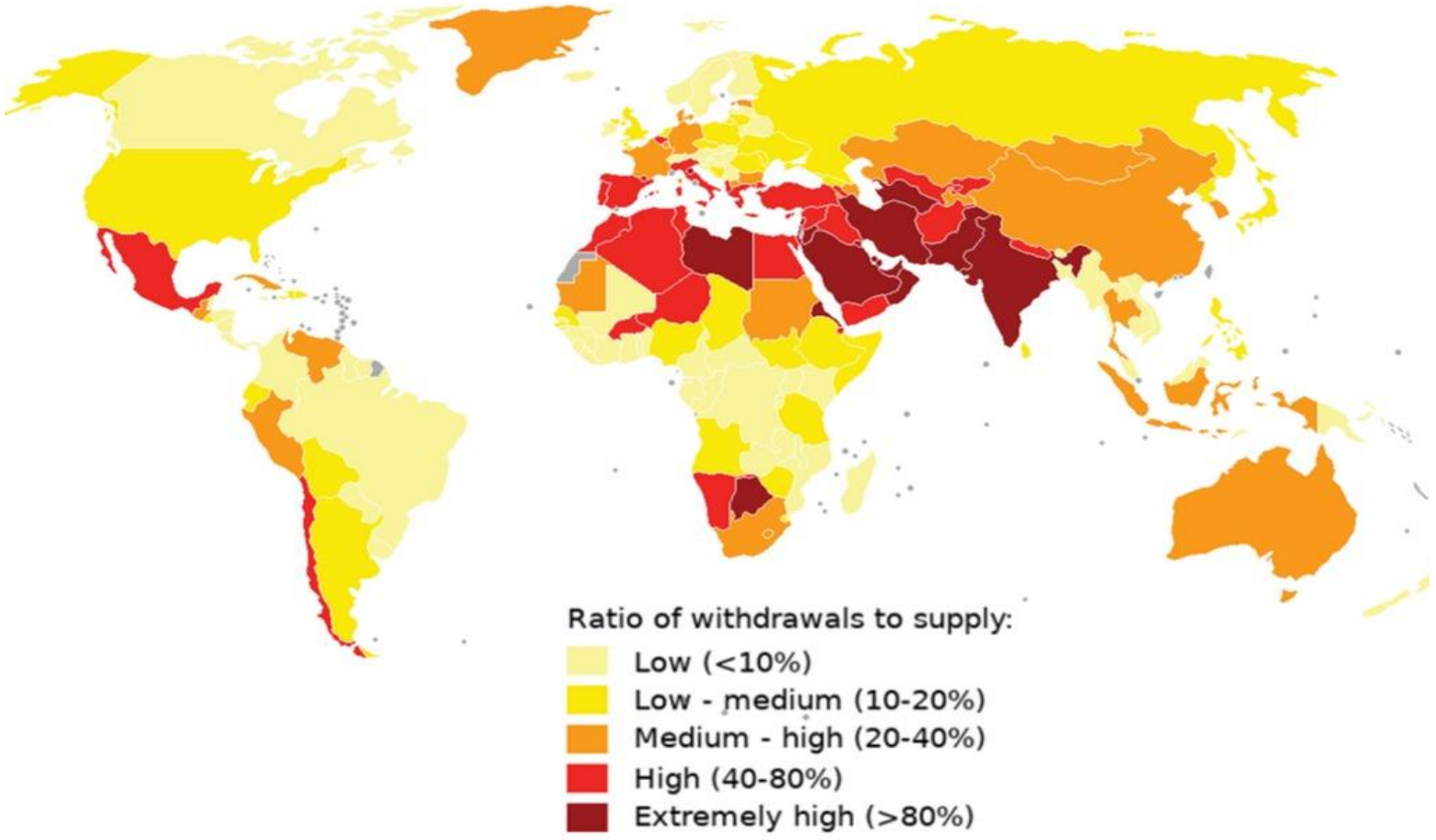
# GENERAL WATER SCARCITY




*Data: World Resources Institute - Aqueduct*

# WATER FOOTPRINT

The total volume of freshwater consumed and polluted, directly and indirectly, by people, companies or countries to produce, consume or use products and services.

# IMPORTANCE OF MEASURING THE WATER FOOTPRINT

1. **Accuracy of water knowledge and use**

2. **To incorporate internationally recognized certifications:** For example GlobalG.A.P., Sustainable Agriculture Network (SAN), y JGAP (Japan Good Agricultural Practices).

3. **To promote public-private strategic alliances for management**

4. **To promote greater awareness of water management and water footprint measurement.**

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# MAIN IMPACTS OF WATER STRESS ON THE AGRI-FOOD SECTOR

- **Agriculture:** Reduced crop yields, affecting food and economic security.
- **Human consumption:** Drinking water supply restrictions in several rural and urban communities.
- **Ecosystems:** Affecting wetlands, rivers and biodiversity as a result of reduced water availability.

# RESPONSES AND CHALLENGES

- **Investments in water technologies:** Efficient management, water footprint measurement, access to certifications that guarantee environmental sustainability, among others.
- **Agricultural adaptation:** Implementation of more efficient irrigation systems and crops resilient to water stress.
- **Public policies:** Legal and regulatory reforms to prioritize human consumption and ecosystems at the national and regional levels.

# METODOLOGÍAS EXISTENTES PARA LA MEDICIÓN DE HUELLA HÍDRICA

There are six methodologies for measuring the water footprint and they are mainly based on the Water Footprint Network and ISO 14046.



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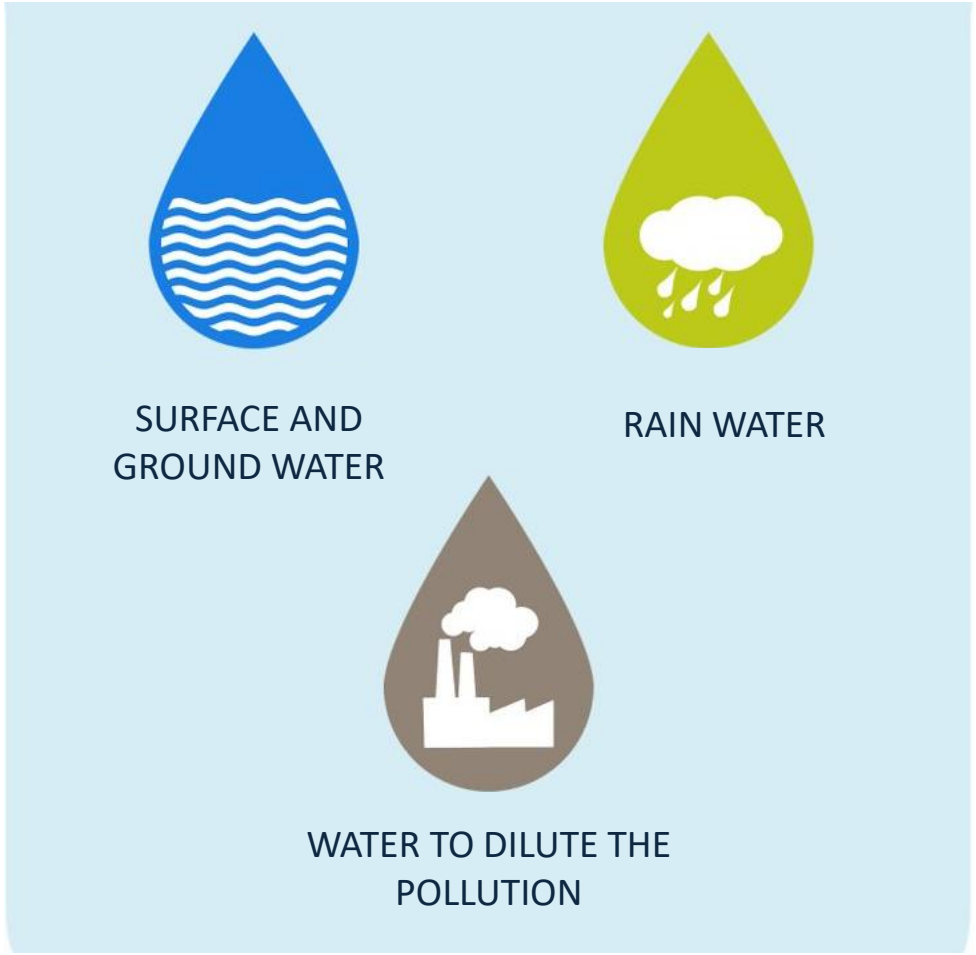
| Aspect | Water Footprint | Life Cycle Assessment (LCA) |
|---|---|---|
| General Approach | – Quantification of the water footprint (water volume).<br>– Focuses on three components: blue, green, and grey.<br>– Prioritizes sustainability and water resource management. | – Assessment of environmental impacts associated with water (volume and impacts from water use).<br>– Based on life cycle analysis (LCA).<br>– Focused on environmental impacts throughout the life cycle or value chain. |
| Methodology | – Directly measures volumes of water consumed or polluted.<br>– More direct and understandable tool. | – Quantifies environmental impacts (depletion, toxicity, etc.).<br>– Uses ISO 14040 and 14044 standards as methodological basis. |
| Objective | – Promote sustainability, equity, and efficiency in water use.<br>– Focused on raising awareness and driving action. | – Environmental certification and corporate management.<br>– Standardize the evaluation of water impacts globally. |

| Aspect | Water Footprint | Life Cycle Assessment (LCA) |
| --- | --- | --- |
| Flexibility | – Adaptable to specific sectors and projects (agricultural, urban).<br>– Applicable at different scales (local or national projects). | – Rigorous and technical, suitable for large organizations.<br>– Requires detailed data and more complex analysis. |
| Evaluated Components | – Blue, green, and grey water footprint. | – Environmental impact indicators (water scarcity, depletion, pollution, eutrophication, etc.). |
| Target Audience | – Governments, NGOs, companies, academics, farmers, and civil society. | – Mainly companies interested in certification and regulations. |
| Results | – Measures volumes and pressures on water resources. | – Assesses environmental impacts of water use. |
| Scope | – Focused on sustainability and resource management. | – Focused on sustainability, regulatory compliance, international certification, and impact management. |

# CHOSEN METHODOLOGY




# THE WATER FOOTPRINT IS COMPOSED OF THREE COLORS: BLUE, GREEN AND GRAY

# THE BLUE WATER FOOTPRINT

It is an indicator of the consumptive use of so-called “blue water”, i.e. fresh surface or groundwater. The term “consumptive use of water” refers to one of the following four cases
the following four cases:

1. Water evaporates.

2. Water is incorporated into the product.

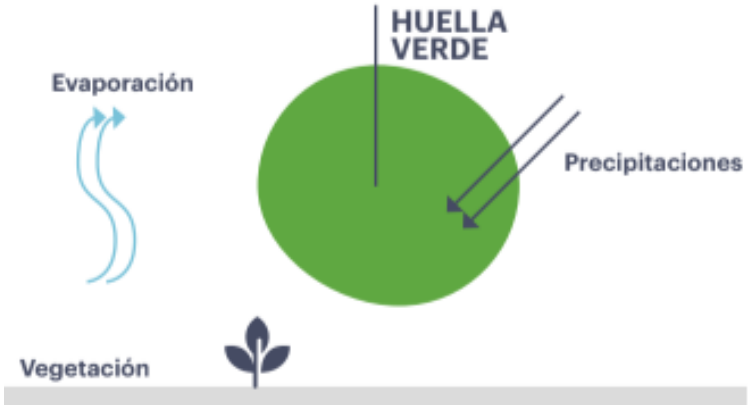
3. The water does not return to the same catchment area, for example, it returns to another catchment area or to the sea.

4. The water does not return in the same period, e.g., it is withdrawn in a dry period and returns in a wet period.

# THE GREEN WATER FOOTPRINT

The green water footprint refers to the use of rainwater that is not transformed into runoff or groundwater but is maintained by wetting the soil and is incorporated into agricultural products.

On the other hand, there is the concept of crop evapotranspiration, which corresponds to the process by which water from the soil and plants passes into the atmosphere. It is a natural phenomenon that occurs everywhere and depends on factors such as temperature, soil type and plant physiology.



# THE GRAY WATER FOOTPRINT

The gray water footprint is the volume of freshwater needed to assimilate the load of pollutants discharged into a receiving body, based on water quality standards and natural concentrations.

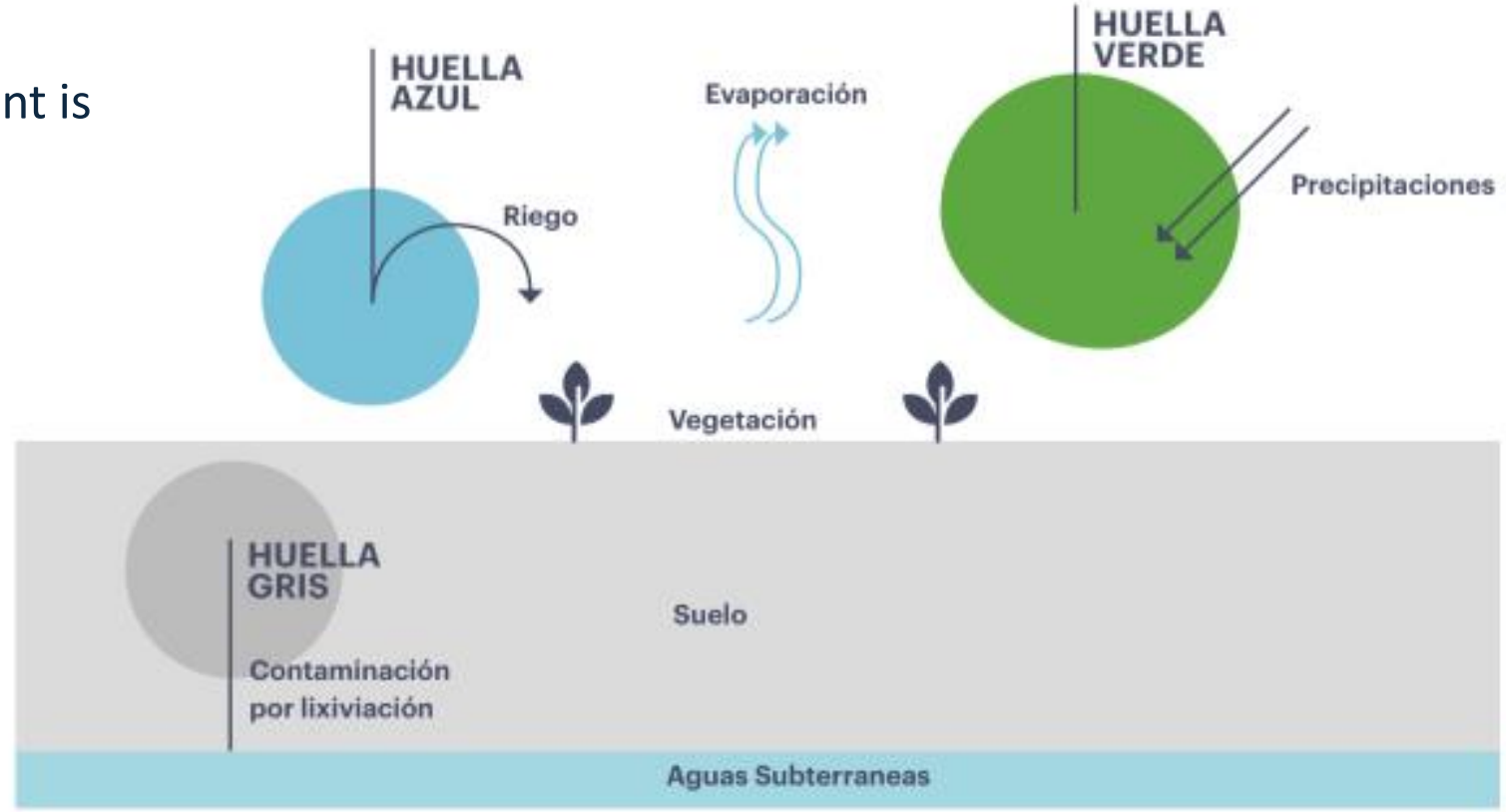
# CONSIDERATIONS FOR IMPLEMENTATION

- Coverage of water components: Blue, green and gray.
- Scale and spatial resolution: Specific location and use of regional data.
- Temporal focus: Analyze in seasonal or annual periods.
- Accuracy and availability of data: Use of accessible data: Meteorological, soil, crop types, as well as complementing with the CROPWAT tool.

# SCOPES OF USE OF THE WFN METHODOLOGY

It is necessary to identify the measurement limits:
Blue, green or gray footprints.

The figure shows how each footprint is obtained with respect to crops.



# TYPES OF WATER SOURCES CONSIDERED

Some types of water sources used have a greater impact than others, such as freshwater sources:


The agri-food sector has the particularity that all water goes to the crop for irrigation, so all water is considered “consumptive”.

# BLUE WATER FOOTPRINT MEASUREMENT

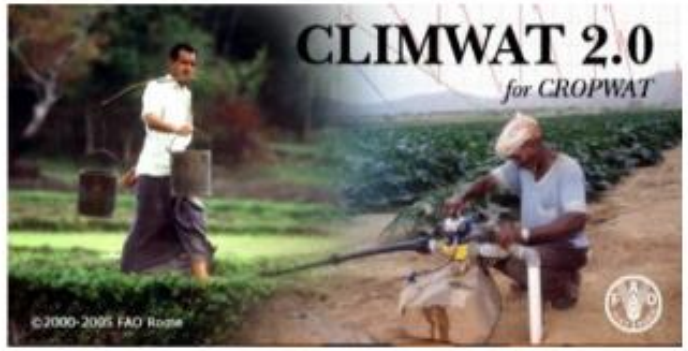
Information is required regarding irrigation that gives rise to the blue water footprint, where the river basin from which the water is extracted must be identified.

| Cultivo | Cantidad de agua ($m^3$/mes) | Ene | Feb | Mar | Abr | May | Jun | Jul | Ago | Sep | Oct | Nov | Dic |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Agua subterránea** | Afluente | | | | | | | | | | | | |
| | Efluente | | | | | | | | | | | | |
| **Red de alcantarillado** | Afluente | | | | | | | | | | | | |
| | Efluente | | | | | | | | | | | | |
| **Río (o canal)** | Afluente | | | | | | | | | | | | |
| | Efluente | | | | | | | | | | | | |
| **Vertiente** | Afluente | | | | | | | | | | | | |
| | Efluente | | | | | | | | | | | | |
| **Camión aljibe** | Afluente | | | | | | | | | | | | |
| | Efluente | | | | | | | | | | | | |

# COMPLEMENTARY SOFTWARE TOOLS FOR GREEN WATER FOOTPRINT MEASUREMENT

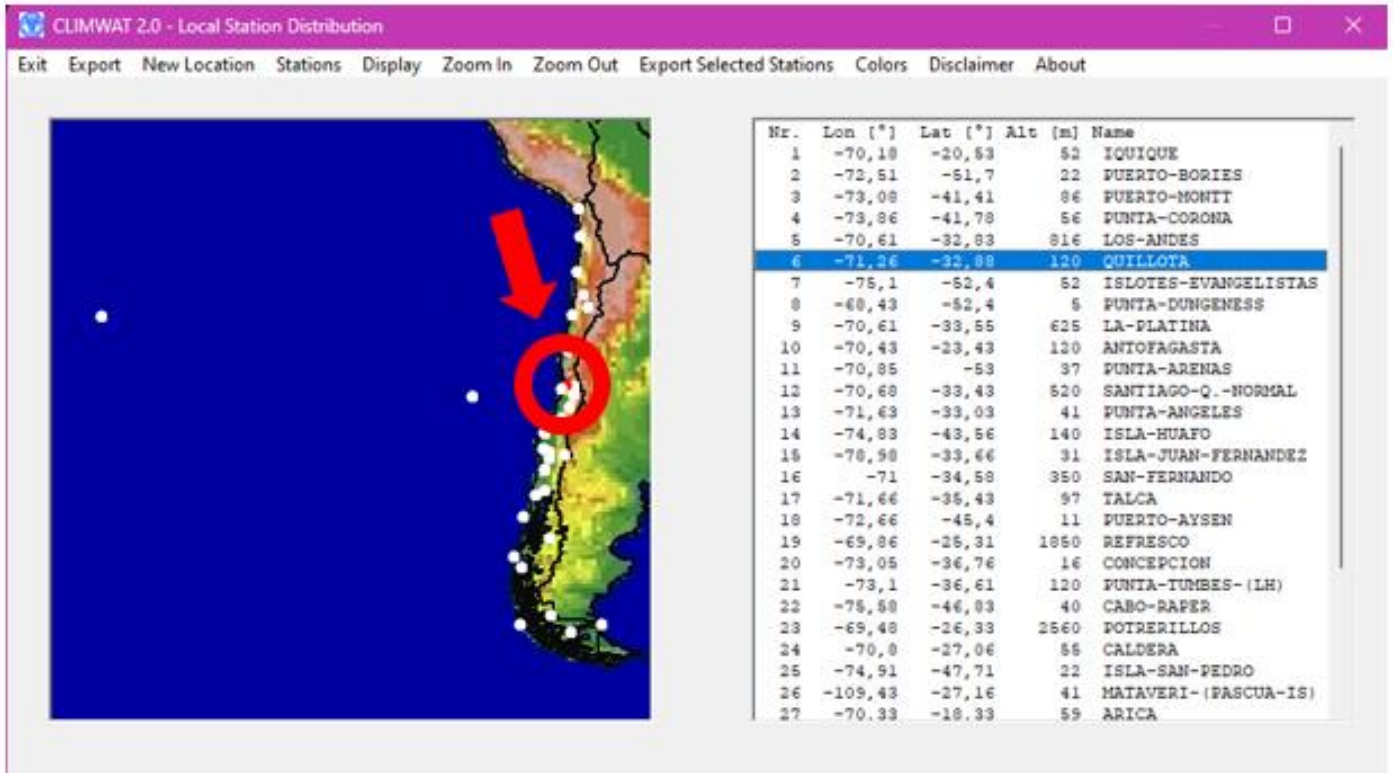
On the other hand, to obtain the green water footprint, it is convenient to use CLIMWAT and CROPWAT software.

The purpose of this is to obtain data from meteorological stations that show evapotranspiration, precipitation and main climatic conditions of the area where the crop is grown.

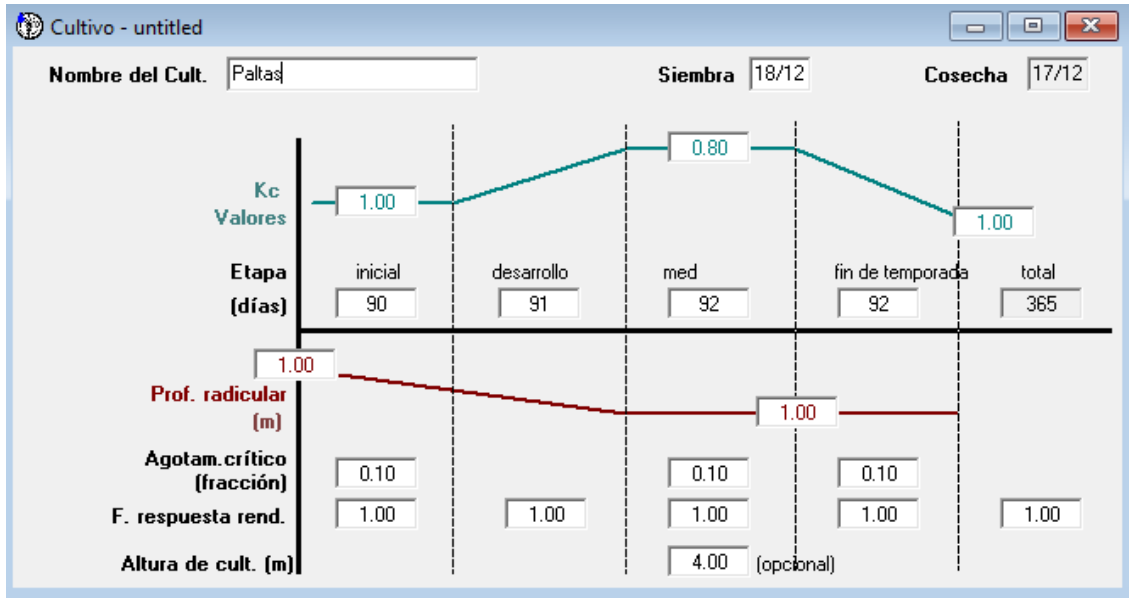



# DATA FOR GREEN WATER FOOTPRINT MEASUREMENT

With CLIMWAT, weather and precipitation data are obtained from the weather stations respective to the coordinates of the field location.



# DATA FOR GREEN WATER FOOTPRINT MEASUREMENT




Evapotranspiration oriented

It is necessary to have certain data such as:

Crop stage

Crop coefficient (Kc): Dimensionless value used to calculate crop evapotranspiration, which takes into account the characteristics of the crop and the changes it undergoes during its cycle.

Critical depletion: Percentage of total available water in the soil that a crop can extract and which varies according to the crop's stage of development.

# GRAY WATER FOOTPRINT MEASUREMENT

To measure the gray water footprint of a crop, a more detailed analysis of runoff water concentrations to groundwater is required.
Today it is not measured due to the complexity of obtaining the analysis.
There are studies that discuss the contamination caused by the use of agrochemicals and fertilizers, but it is not an easy task to carry out.

Because of this, it is suggested to make agreements with universities and research programs that help to obtain these water studies and to be able to have an integral vision of the water footprint that includes this analysis of contaminants.

# THANK YOU

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