Agricultural calendars and celebrations

GLOBE		Associated SDG	Type of Activity
Sphere	**Protocols**		
Biosphere	Land Cover Classification Leaf Green-Down Leaf Green-Up	15: Life of on Land 12: Sustainable Consumption and Production 4: Quality Education	Cognitive
Atmosphere	Temperature Precipitation		

Overview

Crop production requires three fundamental factors: fertile soil, water availability and favorable weather conditions. When a crop meets these conditions, it can grow properly. In this sense, agricultural calendars are tools that help farmers visualize the behavior of the weather month by month in a given place, as well as the activities and crops that are favored under those conditions. With this activity, students will learn a little more about agricultural calendars and will create their own to know when to find their favorite fruits and vegetables at the market.

Time

100 minutes

Prerequisites

To know the protocols for assessing temperature and precipitation (optional)

School level

All

Purpose

To create an agricultural calendar with students' favorite foods for each month, associated with temperature and precipitation values, as well as important agricultural celebrations for each location.

Students Outcomes

- Students will identify the main fruits and vegetables offered in your area and where they come from.
- Students will design an agricultural calendar, associating each month with seasonal fruits or vegetables.

LEARNING ACTIVITY

Background

Agricultural calendars (Figure 1) provide important information on the appropriate times of the year for each stage of crop development. They are very helpful tools for planning and making decisions on the use and conservation of soils, as they specify month by month when it is time for planting, harvesting, crop marketing and any other task related to food production.

Agricultural calendars are created on the basis of relationships that exist between climate variables and crop phenology. For their elaboration, precipitation (Zid et al., 2022) and the maximum and minimum temperatures of each month (García et al., 2013) are essentially considered. Therefore, climate change and climate variability represent a major challenge for agricultural activities because they usually mean an increase in the frequency and intensity of extreme events such as floods, droughts, frosts, and heat waves, which affect crop production (Yang et al., 2021) and thus the capacity of agroecosystems to meet people's needs (FAO, 2015).

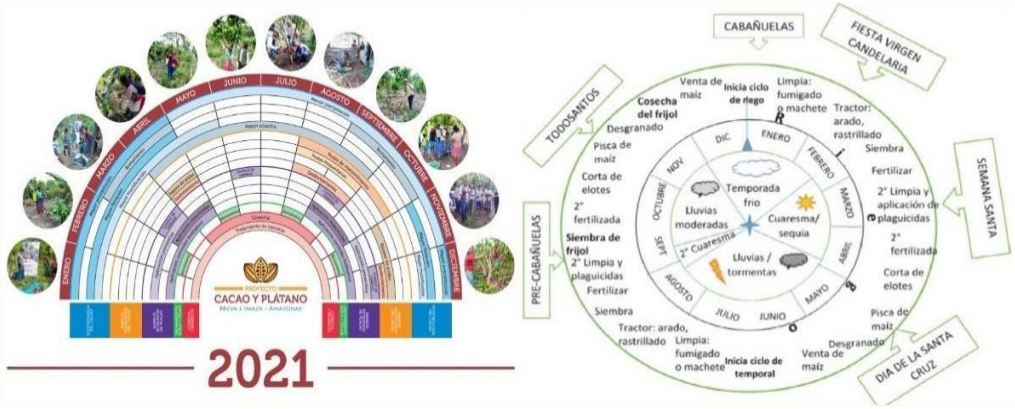

Figure 1: Examples of agricultural calendars
Source: Helvetas, 2020; Alcazar and Gomez-Martinez, 2016.

The knowledge of farmers for the development of agricultural calendars is very important, as they are the ones who have the ability to observe indicators in the environment to detect changes in temperature and precipitation and thus know the times of planting and harvesting of food (Yang et al., 2021). However, even if we are not all farmers, we can recognize the right time to consume certain products, as it is easy to find them in the market. This is how we can identify seasonal fruits.

Through this activity students will identify the appropriate months to consume some of the important fruits and vegetables for nutrition available in markets. In addition, this will serve as a way of approaching agricultural calendars and will allow them to learn more about where their favorite foods are produced and what their growing needs are.

Guiding Research Questions

- Why are agricultural calendars important?
- What is the meaning of seasonal fruit?
- What is the season for apples?
- What is the hottest month in our city and what crops can be harvested in that month?

Scientific Concepts

- Agricultural calendar
- Climate change
- Climate variability
- Phenology
- Agroecosystems

Materials and Tools

- Paper
- Colors
- Monthly temperature and precipitation data for the city

What to Do and How to Do It

- ***Beginning***
  - The teachers ask their students to go to the market and get their favorite fruit and/or vegetable.
  - The teachers ask their students to bring their favorite fruits or vegetables to class. If they can't find them at the market, they are asked to bring a picture of them.
  - Next, the teachers ask their students to use the 4 questions chart, shown in Table 1.

Table 1
4 questions chart to start organizing an Agricultural Calendar

What is my favorite fruit or vegetable?	When can I find it in my local market?	Where does it come from?	What else would I like to know about my favorite fruit or vegetable?

- ***Development***
  - Based on the list of fruits and vegetables obtained from the first column of Table 1 and its relation to column 2, a fruit or vegetable is chosen in the whole class for each month, according to its probability of finding it in the market. From then on that will be the month of the chosen fruit.
  - During the month of the selected fruit or vegetable, students research everything related to the chosen food, answering questions such as: Where does it grow? What is the temperature and precipitation where it grows? What is its market price? How is it consumed?
  - Students will also be able to take temperature and precipitation measurements throughout the month to compare whether the climate conditions in the city where they live are the same as those needed for their chosen crop.

- Finally, students can write down some important holidays on their calendar, find out planting times for some crops or harvest times. They can even put the birthdays of the researcher for each crop. A suggested format for the calendar is shown in Figure 2.

Figure 2: Suggested Agricultural Calendar for the school; the teachers and students will surely do better. Tmin: Minimum temperature of the month, Tmax: Maximum temperature of the month, Tmean: Average temperature of the month, PP: Accumulated precipitation of the month.

- ***Closing***

  - The students present the calendar they have made and discuss ideas to improve it with their group classmates.

  - Finally, they answer this question in a short paragraph: What have I learned by making my agricultural calendar?

Frequently Asked Questions

Do all farmers use agricultural calendars?
All experienced farmers know the times of planting and harvesting crops, even if they do not use a physical calendar. In many countries calendars are very present and have been made by the communities themselves, often using lunar cycles or some other indicators. However, with the challenges of climate change, it is becoming increasingly necessary to work to build and adapt agricultural calendars in the different countries of the world. This is a way to contribute to the food security of our countries.

Instead of going to the market, could we work the calendars based on the plants we grow in a bio garden?
Of course, that would be highly recommended, as well as an enriching experience for the students.

How often is it advisable to make an agricultural calendar?
Students may make a seasonal calendar (spring, summer, fall, or winter) either by school year or by academic semester.

What is the relationship between phenology and agricultural calendars?

Phenology is the study of the life cycle of organisms in response to seasonal changes (mainly temperature, precipitation, and daylight hours) in a given location (Liang, 2019). Plant dynamics includes a series of phases (phenophases) encompassing germination, bud burst, leaf emergence, flowering, fruiting, fruit ripening, seed formation, seed drop and leaf wilting (Caparros-Santiago et al., 2021). Agricultural calendars help to know the appropriate time for each phenophase, recognizing the moments in which products should be sown, fertilized, and harvested in agricultural systems or agroecosystems.

Is climate change the same as climate variability?

No, climate change is the modification of weather patterns, usually temperature and precipitation, over a long period of time on a regional or global scale, while climate variability refers to short-term fluctuations in the prevailing conditions of an area (NASA, 2014). Additionally, the United Nations Framework Convention on Climate Change (UN, 1992) defines climate change as "A change of climate which is attributed directly or indirectly to human activity that alters the composition of the global atmosphere and which is in addition to natural climate variability observed over comparable time periods."

Suggested Resources

- Canva to Organize Calendars: https://www.canva.com/
- Climate Change Information: Climate Change | United Nations
- Agricultural Calendars and Maps of Peru Calendar (midagri.gob.pe)

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