



# Sustainable Food Production

*Building community resilience through small-scale storage solutions*

Funded by



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**HUMANA**  
PEOPLE TO PEOPLE **BELIZE**

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# INTRODUCTION

**As crops and the livelihood of small farmers are being affected daily by climate change, there is a great need to increase their economic, ecological, and sustainable resilience to these impacts.**



This series of three training manuals encompasses the various training topics that will be covered by the **Building community resilience through small-scale storage solutions project**. The project will train 40 women to install and use simple silos for grain storage or water storage to contribute to the sustainability and resilience of their individual family gardens, as well as to strengthen their food, economic, and nutritional security. The women will be able to:

- Better secure food from damage due to insects and humidity.
- Reduce losses from storms and floods, which are regular occurrences in San Isidro, San Roman, Trio, Red Bank, and Cowpen villages in Southern Belize.
- Utilize small systems to collect and filter water that will be used for crop irrigation.

This, in turn, will support women farmers to enhance their livelihoods and be more resilient to natural disasters. The project is co-funded by CCRIF SPC and implemented by Humana People to People Belize.



**CCRIF SPC (formerly the Caribbean Catastrophe Risk Insurance Facility) is the world's first multi-country, multi-peril risk pool based on parametric insurance.** CCRIF provides parametric catastrophe insurance for Caribbean and Central American governments, and for electric utility companies.

CCRIF offers parametric insurance for tropical cyclones, excess rainfall, and earthquakes and for the fisheries and electric utilities sectors – insurance products not readily available in traditional insurance markets. The Facility operates as a development insurance company – as the goods and services it provides are designed to enhance the overall developmental prospects of its members. CCRIF has 24 members – 19 Caribbean governments, 3 Central American governments and 2 Caribbean electric utility company. Since its inception in 2007, CCRIF has made 58 payouts totalling US\$260 million to 16 of its members. All payouts are paid within 14 days of the event. CCRIF SPC also has a small grants programme for non-governmental organizations and community-based organizations in Caribbean member countries to support community-based disaster risk reduction projects. Since 2015, the programme has supported over 30 projects in the region.

**Humana People to People Belize (HPPBZ) is a non-governmental organization dedicated to empowering and mobilizing individuals, families, and communities to reduce poverty and vulnerability through local actions and capacity building.** We believe in the power of collective action to effect positive change and development in our communities. Our approach is based on open dialogue, active participation, and collaborative work between individuals, groups, local leaders, government bodies, and the private sector.



# VEGETABLE PRODUCTION

*Activity: let women farmers come together and share their experiences about their gardens, what were the challenges they faced, and how they overcame them. Let the women make a plan about what they will do with their products.*

**Vegetable production** is a type of crop production intended primarily for human consumption of the crop's edible parts such as the shoot, leaves, fruits, and roots. According to the consumer part of the crop, vegetables are divided into the following groups.

- Leaf vegetables (lettuce, cabbage, spinach)
- Fruit vegetables (pepper, cucumber, tomato)
- Root vegetables (carrot, radish, sweet potato)
- Bulb vegetables (garlic, onion)
- Flower vegetables (artichoke, cauliflower, broccoli)



Fruit vegetables

Root vegetables



Leaf vegetables

Growing vegetables is a preferable farm practice, since vegetables are rich in vitamins, minerals, and fibers, and they play an important role in diet improvement.

## Tips for starting a vegetable garden

One of the best steps you can take to improve your diet is to increase your regular consumption of healthy fruits and vegetables. Not only are fruits and veggies loaded with the kinds of healthy nutrients and minerals that aren't as readily available from pre-packaged, overly processed alternatives, but they can be low on calories and high on taste. Whether you don't have easy access to a local farmer's market or organic grocery options, or you simply want to indulge your green thumb, we're providing six tips for starting a vegetable garden.

- **Start small.** Walk before you run. Resist the urge to start growing a wide variety of fruits, vegetables, and herbs by starting with just one or two plants to get some experience under your (green) belt. Tomato plants, for example, are forgiving, making them an excellent choice for beginners and offering versatile culinary options. If space is an option for your garden, consider vining plants, such as green beans and peas, to make use of your available vertical space.
- **Choose a location for your garden.** You may be tempted to place your garden where you feel it will add the most significant aesthetic to your backyard but set your fruits and veggies up for success by choosing the best location for their needs. Most vegetable and fruit plants require at least five hours of direct sunlight daily, while herbs and root vegetables will grow in partial shade.
- **Build raised beds.** Depending on the size available to you in your backyard or patio, build raised beds for your plants. Raised beds create a physical barrier that protects your plants from weeds and keeps food and moisture dedicated to your crops. Raised beds also prevent your crops from being damaged due to flooding.
- **Feed your organic garden with organic matter.** Keep your garden and yourself healthy by avoiding harsh synthetic pesticides, fertilizers, and growth agents. While mineral nutrients such as agricultural lime, rock phosphate, and greensand can be added to your garden more safely than chemicals, the best fertilizer is organic matter, such as compost, manure, coffee grounds, and shredded leaves.

<sup>1</sup> This section has been extracted and adapted from [www.aqrivi.com/blog/vegetable-farming](http://www.aqrivi.com/blog/vegetable-farming), [www.thespruce.com/companion-planting-with-chart-5025124](http://www.thespruce.com/companion-planting-with-chart-5025124), [www.bestmedclinics.com/health-blog/six-tips-for-starting-a-backyard-garden/](http://www.bestmedclinics.com/health-blog/six-tips-for-starting-a-backyard-garden/).

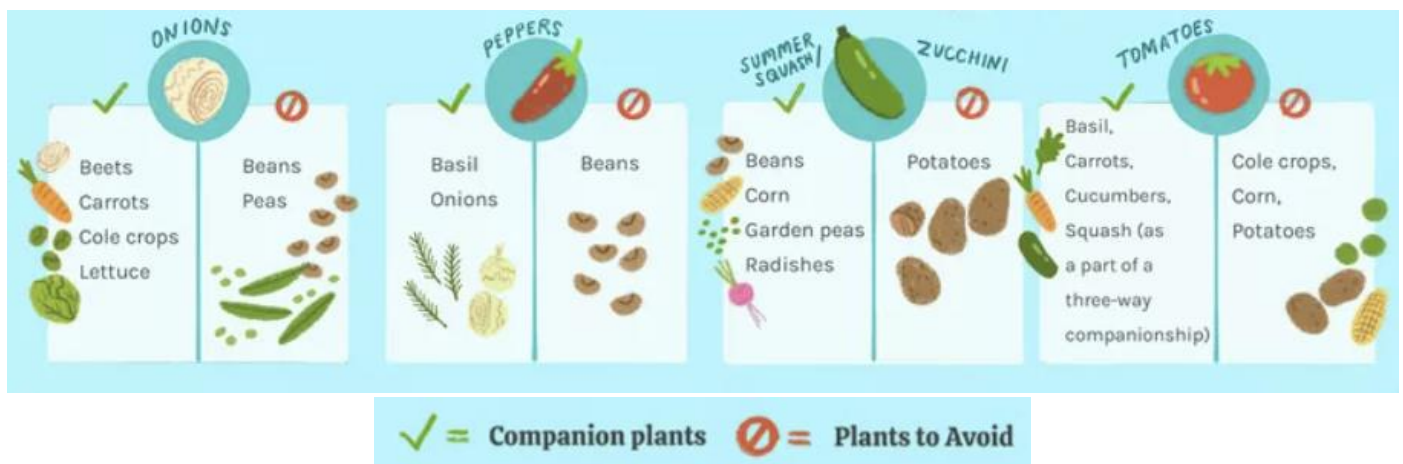
- **Water wisely.** If you start with seeds, know that they should never be dried out, so make time to water your plants daily. As your plants grow, they will need less water but don't think you can rely on Mother Nature alone. The amount of water your fruits and vegetables need will depend on rainfall, humidity, and soil. Clay soil, for example, dries out more quickly than sandy soil and will require more regular watering. Make sure you understand the unique needs of the plants you selected and accommodate them accordingly.
- **Rotate your crops.** If you're successful (and you will be!), you'll find plants you enjoy cultivating and that you are confident growing year after year. Once you are committed to a seasonal cyclicity, plan to rotate your crops. Only plant the same crop in the same soil (or box) once every three years for the best results.

## Companion planting

**Companion planting is the practice of growing different plants together for mutual benefit.**

There are numerous advantages to companion planting. Plants can attract beneficial insects and pollinators, deter pests, and act as insect repellents. They can fend off predators and undesirable wildlife. Raccoons, for example, dislike the smell of cucumbers. Plants also play a role in soil fertility by improving the nutrient supply, availability, and uptake from the soil. Tall plants such as corn can provide shade for crops like lettuce which does not do well in the hot sun, and they can serve as support for crops that need trellising. Interplanting different crops can help mark garden rows and distinguish fast-germinating plants like radishes from slower-germinating plants like lettuce. Proper companion planting can even help suppress weeds.

Some vegetable combinations are superstars in bringing out the best in one another or in preventing common pest and disease problems. Among these outstanding combinations:



## Types of seedlings

There are two types of seedlings:

1. **Bare root seedlings** are grown in the field from the seed. As the name implies, their roots are separated from the soil when they are moved to the planting site.
2. **Root ball seedlings** are grown in pots or blocks and moved to the planting site with the soil attached to the roots.



# ORGANIC FARMING

*Activity: Create an organic pesticide along with the women farmers.*

During these 10 months, you will be able to gain rich knowledge about organic farming.

**All nutritious foods your body needs can be grown locally and organically at your house.**



Illustration: EUFIC

Drought, pests, and crop disease have always threatened food security. Today, we live in the age of global warming and a changing climate. We already feel the consequence of this, with rain coming late or at times when it is not expected. Crops die from lack of water or when they drown in rain. Everything is now very expensive therefore the more you can produce the better it is for the family's health and economy and depending on your produce you can even sell them to increase your family income.

*When your garden is up and running you can expect to get better quality and more varied food for half the price you pay in local stores and markets. A healthy family is a resourceful family!*

## What is organic farming?

- It is a **farming system** that uses environmentally friendly methods of weed, pest, and disease control. Organic production methods are those where at least 95% of the ingredients of agricultural origin are organic.
- It is an **agricultural approach** that advocates healthy products free from components that may harm humans and nature.
- It is a **method of growing** crops, fruits, vegetables, etc. maintaining the quality of soil and ecological balance in the environment. It relies on local natural conditions of the surroundings, rather than using inputs (like synthetic fertilizers, harsh pesticides, etc.) that may lead to adverse effects on the environment.
- It is a **combined production system** that involves tradition, innovation, and science to promote a good quality of life for us and benefits the ecosystem equally. It is an advanced technique that uses natural ways of cultivation to minimize pollution and wastage in the environment.

## Main organic farming methods

The principal methods of organic farming include:

- **Crop rotation** is the practice of planting different crops sequentially on the same plot of land to improve soil health, optimize nutrients in the soil, and combat pests and weed pressure.
- **Green manures.** Green manures are fast-growing plants sown to cover bare



soil. Often used in the vegetable garden, their foliage smothers weeds and their roots prevent soil erosion. When dug into the ground while still green, they return valuable nutrients to the soil and improve soil structure. Green manures include clover, beans, and peas.

- **Biological pest control** is the use of living organisms to suppress pest populations, making them less damaging than they would otherwise be.
- **Mechanical cultivation** requires repeated operations for effective weed control, reducing the efficiency of weeding over other conventional methods (chemical and manual control).

## Organic farming benefits

- Supports healthier soil and pollinators.
- Does not use genetically modified food items.
- Is a healthy environment for the farmers to work.
- Farmers use natural fertilizers.
- Produces healthier food.
- Offers profitable niche crop opportunities to organic farmers.
- It's an eco-friendly method of cultivation.



### Activity 1: Sharing our experience

1. Explain why organic gardens can have a great impact in securing food during these times of climate change.
2. Let the participants share their own experiences with growing food.
3. Discuss how it could be possible for each family to have backyard gardens.
4. Share with participants that it takes some time to become a skilled gardener and that there can also be many problems to overcome. That is why the group is formed and we are here to support each other.

### Activity 2: Identifying a convenient site for the backyard garden

Vegetables need a lot of sunlight. Choose a sunny spot, if your garden does not get sun all day, make sure that you put the garden where there is morning sun. Remember that trees, hedges, and buildings may cast shadows on your garden, so your plants will get less sunlight.

- The vegetable garden should be close to your house so that it is easy to look after it.
- It should be close to water.
- Choose a place with the best possible soil, but even if you have poor soil, it is easy to improve it by working with plenty of organic matter (compost and well-rotted manure).
- Once you have chosen the site, remove all grass, bushes, trees, and their roots. Keep all this plant material for composting, mulching, and filling trench beds.
- Participants should be able to fence the garden, you can pile up sticky branches around the garden. If you want to have a living fence, you can plant sisal, prickly pears, jatropha, or mulberry inside the fence. They will grow up with time, or you can make a fence of poles or wires when you can afford it.

# COMPOSTING

Composting is the process of recycling organic matter, such as leaves and food scraps, into fertilizer to enrich the soil.

## The benefits of composting

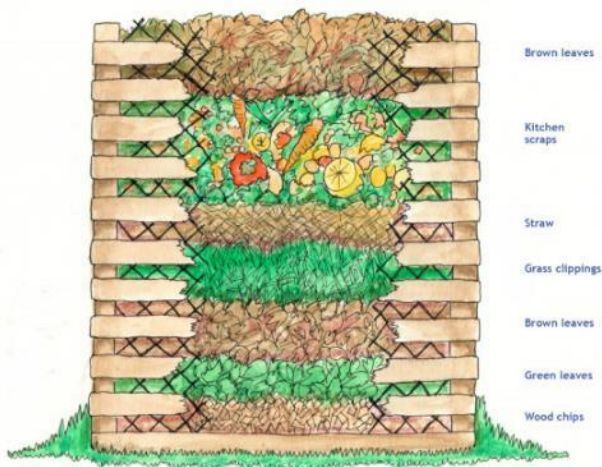
These are some of the main benefits of composting:

- Composting **reduces waste**, making us less dependent on landfills. Many items that would usually be thrown away can be composted instead.
- Compost can be added to gardens to **enrich the soil**. This reduces the need to buy synthetic fertilizers.
- Plants grown in compost-rich soil tend to be more resistant to diseases and pests. This **reduces the need for pesticides** that may contain harmful chemicals.
- Adding compost to gardens **helps combat nutrient deficiencies** in the soil. This adds more nutrients to the crops, resulting in healthier food.
- Compost **attracts worms and microorganisms** that are good for soil and plants. These organisms break down matter, improve soil structure, and help create a fertile environment for plants.
- Composting **helps conserve water**. This is because adding organic matter to soil increases its water-retaining abilities.



## The compost pile

Compost is made from green and brown matter in the following proportion:



**30 % greens + 70 % browns = compost**

**Greens** are materials rich in nitrogen such as fresh leaves, green grass, and food scraps. They are colourful and wet.

**Browns** are woody materials rich in carbon, such as dry leaves and grasses, newspaper, dead plant clippings, wood branches, hay, straw, sawdust, and pine needles. They are good for absorbing excess moisture and giving structural strength to your pile while keeping it porous, facilitating airflow, and preventing its compaction.

## What NOT to put in the compost pile

Learning what not to put in the bin is just as important as knowing what can be composted. These are some examples of things that should not go in the compost bin:

<sup>2</sup> This section has been extracted and adapted from [www.freedomhomeschooling.com/teaching-kids-to-compost-and-its-benefits/](http://www.freedomhomeschooling.com/teaching-kids-to-compost-and-its-benefits/), [www.kids.kiddle.co/Compost](http://www.kids.kiddle.co/Compost), [www.landscapeforlife.colostate.edu/use-compost/](http://www.landscapeforlife.colostate.edu/use-compost/)



- Meat, poultry, fish, dairy products, and eggs – they smell and attract pests.
- Oils and greasy foods – they slow the composting process and attract pests.
- Pet waste – they may carry diseases or parasites.
- Diseased plants – they may spread disease to new plants when the compost is used.
- Inorganic materials – glass, plastic, and metal will not break down and may hurt you.

## Activity: Make your compost pile

Materials: buckets, spade, wheelbarrow

1. Break into 3 groups to source the following materials:
  - Browns: 6 buckets of topsoil, 6 buckets of cow manure, 6 buckets of dried leaves (crushed)
  - Greens: 3 buckets of plantain stalks, 3 buckets of Madre cacao/ Inga Leaves
  - Other materials: 3 buckets of sand (screened)
2. For the first layer add 2 buckets of topsoil, 1 bucket of plantain stalks, 2 buckets of cow manure, 1 bucket of Madre cacao leaves, 2 buckets of dried leaves, and 1 bucket of fine sand.
3. Repeat this application, until you have used all your materials.
4. Share experiences about the ACTIVITY!

## Maintaining the compost pile

The compost should be turned every three or four days to aerate it and prevent compaction using a pitchfork or shovel.

**Your compost should be moist like a wrung-out sponge.**



If the contents are too dry, it will take a long time for the contents to break down. In this case, you can add some water with a garden hose or watering can and mix thoroughly.

On the other hand, if the compost becomes too wet, it will start to smell. If this happens, they can mix in more dry brown materials to help dry it out. Consider putting a small roof over your compost to prevent it from getting too wet.

**Warning:** Excessive nitrogen can cause your compost to heat up very quickly and even spontaneously combust, which becomes an obvious fire risk. Monitor your compost every day and use the correct proportions.

## When is the compost ready?

How long it takes for the compost to mature will depend on many factors, including the compost's materials, where is located, and how often it was turned.

**Compost is ready to be used when it is a rich dark brown color, smells like earth, and crumbles in your hand.**

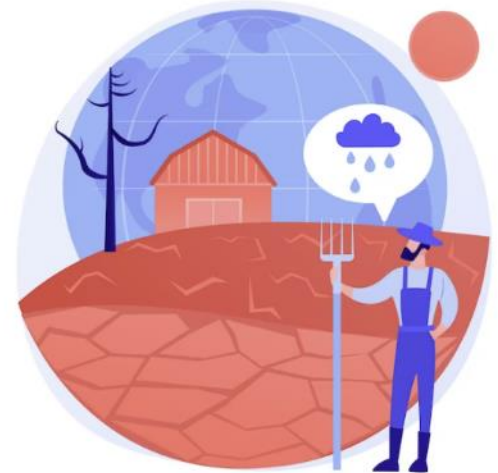


Your compost is not ready yet if you still see recognizable food scraps, it has large lumps, or it is still warm.

# WATER MANAGEMENT

*Activity: In this session, women farmers will learn how to use, maintain, and install a silo, which can be used for water storage for irrigation or grain storage.*

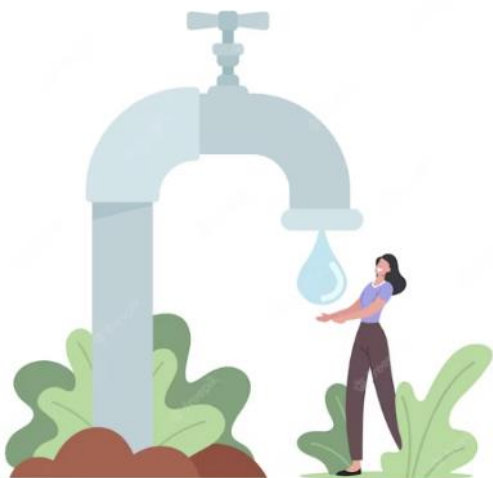
**Water keeps us alive.** We use it daily, in a myriad of ways. Some common uses are obvious, but others are harder to see, like the hidden water in our food—the water going into the vegetables and fruits on our tables. For farmers across the world, having the right amount of water for their crops can make or break their livelihoods, and ultimately decides food security. When it comes to water in agriculture, both too much and too little are undesirable.



- **Too much water** in agricultural areas can affect how the soil functions, hinder plant growth, and increase the risk of nutrient runoff.
- **Too little water**, on the other hand, can have devastating effects on crops and their ability to take up nutrients from the soil.

Water management practices and their objectives are diverse. Practices include leading excess water away from fields, slowing down water flow with natural stream beds, forming buffer areas for flood water, and storing water for irrigation. By ensuring the correct amount of water in the fields, water management helps to achieve good yields, which also contributes to good nutrient balances. Furthermore, these practices support climate adaptation by preventing large fluctuations between water excess and dry periods.

## Why is water management important?



- **Water is a limited resource.** By conserving water, we can also ensure there is enough for everyone now and in the future.
- **Water is a vital part of the Earth’s ecosystem**, and overuse or mismanagement of water can negatively impact the environment. By conserving water, we can help to protect rivers, lakes, and other bodies of water, as well as the plants and animals that depend on them.
- **Water conservation can also help mitigate the impacts of climate change.** Water treatment and distribution systems require energy. Using less water can reduce the energy needed to transport and treat it, which can help reduce greenhouse gas emissions.

<sup>3</sup> This section has been extracted and adapted from [www.reliefweb.int/report/world/holding-water-through-climate-smart-agriculture](http://www.reliefweb.int/report/world/holding-water-through-climate-smart-agriculture), [www.wfbalticfarmer.org/farming-practices/water-management/](http://www.wfbalticfarmer.org/farming-practices/water-management/), [www.theleafyagenda.wordpress.com/2014/06/04/rainwater-harvesting/](http://www.theleafyagenda.wordpress.com/2014/06/04/rainwater-harvesting/).

## Irrigation

Irrigation is the artificial application of water to the soil through various systems of tubes, pumps, and sprays. Irrigation is usually used in areas where rainfall is irregular or dry times or drought is expected. There are different types of water irrigation, however the most common for a backyard garden is manual irrigation. Water is distributed across land through manual labour and watering cans. This system is very labour-intensive but is economical and helpful as any other.



**The main goal of irrigation is to provide plants with the proper amount of water at the best time.**

Adequate soil water will influence the entire growth process from seedbed preparation, germination, root growth, nutrient utilization, plant growth, regrowth, yield, and quality.



## Storing water for irrigation

Rainwater harvesting is a sustainable and environment-friendly practice that involves collecting and storing rainwater for later use. It reduces dependence on public water supply, conserves natural resources, and reduces the risk of flooding.



Rainwater harvesting involves collecting and storing rainwater that falls on rooftops, driveways, and other surfaces. In households, rainwater is usually stored in rain barrels and cisterns. This water can be used to irrigate your crops. However, without additional treatment, rainwater is generally not safe for human consumption. You can either filtrate, boil, or disinfect it to make it safe enough for drinking and cooking.

**Remember to cover your water collection tanks to avoid the breeding of mosquitos.**



# CLIMATE-SMART AGRICULTURE

Activity: Train women on the topic and instruct them on how to plant seeds that are adequate for the area and climate.

Climate change is turning the lives of farmers upside down. Unpredictable weather patterns, shorter growing seasons, droughts, extreme temperatures, and increased exposure to pests and crop diseases pose daunting problems to smallholder farmers around the world—especially in the tropics, where people tend to be more reliant on natural resources. Climate-smart agriculture techniques can help farmers adapt to and prepare for impacts to preserve - and even improve - their livelihoods.

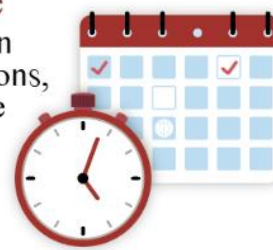
## The difference between Global Warming and Climate Change

**Global warming** refers to the unusually rapid increase in Earth's average surface temperature over the last 100 years



v.s

**Climate change** describes changes in the average conditions, such as temperature and rainfall, in a region over a long period of time



## Causes and effects of Global Warming and Climate Change (GWCC)

### CAUSES OF GWCC

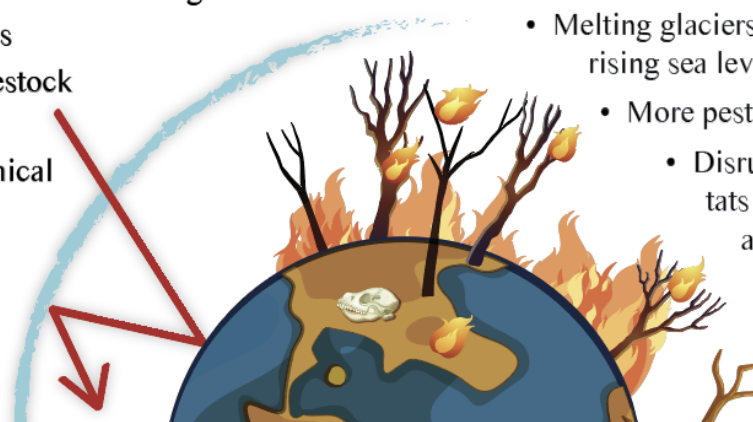
Greenhouse gases trap the sun's heat in the Earth's atmosphere and, in high concentrations, lead to GWCC.

Human actions that release greenhouse gases include:

- Burning of fossil fuels (coal, oil and gas) to create electricity and to power our cars
- Deforestation and tree-clearing
- Burning of plots
- Large scale livestock production
- Misuse of chemical fertilizers and pesticides
- Among others

### EFFECTS OF GLOBAL WARMING

- Unpredictable seasons
- Increased rainfall and flooding
- Severe droughts
- Increased heat waves and wildfires
- Melting glaciers (sea ice) and rising sea levels
- More pests and diseases
- Disrupted natural habitats and extinction of animals and plants
- Among others



**Natural resources are diminishing, ecosystems are compromised, biodiversity is being lost, the climate is changing!**

<sup>4</sup> This section has been extracted and adapted from [www.rainforest-alliance.org/insights/what-is-climate-smart-agriculture/](http://www.rainforest-alliance.org/insights/what-is-climate-smart-agriculture/), [www.climatekids.nasa.gov/climate-change-meaning](http://www.climatekids.nasa.gov/climate-change-meaning), [www.treeaid.org/blogs-updates/climate-smart-agriculture/](http://www.treeaid.org/blogs-updates/climate-smart-agriculture/).

## What is climate-smart agriculture?

Climate-smart agriculture (CSA) isn't different from sustainable agriculture; rather it's a way of combining various sustainable methods to tackle the specific climate challenges of a specific farming community.

**Finding the right combination to manage a specific farm's climate challenges - and to build resilience to future impacts - is what makes climate-smart agriculture "smart."**



## Pillars of climate-smart agriculture

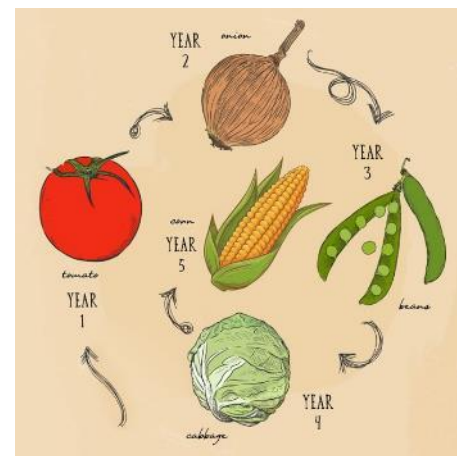
Climate change is likely to reduce agricultural productivity, production stability, and incomes in some areas that already have high levels of food insecurity. Climate-smart agriculture is centered on three pillars:



## Climate-smart practices

Climate-smart practices include:

- Crop management: intercropping with legumes, crop rotation, and new crop varieties. (e.g., drought resistant), improved storage and processing techniques, greater crop diversity
- Livestock management
- Soil and water management
- Agroforestry
- Integrated food energy systems



**Done right, climate-smart agriculture can benefit much more than the land's productivity, helping to strengthen communities, grow incomes, and take steps to create a more just and equitable society – meeting many of the UN Sustainable Development Goals.**



# CLIMATE-RESILIENT AGRICULTURE

*Activity: Train participants on the topic and together construct raised beds/boxes for the soil to be placed.*

Solving the climate crisis isn't just about cutting carbon emissions. It's about protecting people from harm. **We're in a climate crisis.** As the world warms, people across the globe face frightening new challenges, on a scale never seen before. To withstand those challenges—and to thrive—we need climate resilience.

**Climate resilience is about successfully coping with and managing the impacts of climate change while preventing those impacts from growing worse. A climate-resilient society would be low-carbon and equipped to deal with the realities of a warmer world.**



In other words, climate-resilient agriculture practices look at adaptive agricultural methods that can withstand the **shocks of climate change and weather extremes**. These practices must be flexible enough to prepare and tackle long-term climate change as well as short-term weather shocks such as storms, excessive rainfalls, droughts, etc. Climate change often results in deficit or excess water, and adverse events require working around them to achieve a win-win situation.

## The triple-win approach

Climate-resilient agriculture manages aspects of agriculture and food security that are interlinked and directly affected by climate change. The “triple win” approach aims to tackle and achieve the following three results:



1. **Enhanced productivity.** Increase quality and quantity of crops, leading to improved nutrition and farmer income.
2. **Resilience.** Reduce susceptibility to water scarcity, pests, and other climate-related adverse events, and improve the capacity to adapt and grow in the face of longer-term stresses like shortened seasons and erratic weather patterns.
3. **Carbon sequestration.** Reduce emissions in the process of food production, avoid deforestation, and promote methods to capture and remove carbon dioxide from the atmosphere.

<sup>5</sup> This section has been extracted and adapted from [www.worldbank.org/en/topic/climate-smart-agriculture](http://www.worldbank.org/en/topic/climate-smart-agriculture), [www.ecologic.org/our-impact/challenges/slash-and-burn-agriculture](http://www.ecologic.org/our-impact/challenges/slash-and-burn-agriculture), [www.smsfoundation.org/climate-resilient-agriculture-practices/](http://www.smsfoundation.org/climate-resilient-agriculture-practices/), [www.wotr.org/2023/03/13/why-climate-resilient-agriculture-foodsecurity/](http://www.wotr.org/2023/03/13/why-climate-resilient-agriculture-foodsecurity/).

## Climate-resilient agriculture and food security

Climate-resilient agriculture is an essential component of food security. Food security is defined as:

**“a situation that exists when all people, at all times, have physical, social, and economic access to sufficient, safe, and nutritious food that meets their dietary needs and food preferences for an active and healthy life.”**

- Food and Agriculture Organization (FAO) of the United Nations



This definition highlights the importance of not only access to food but also its safety and nutritional adequacy, as well as the economic and social conditions that enable people to obtain and utilize it. **A food-secure community or region is one that has access to a sustainable supply of food at all times**, with the ability to acquire it through purchase, production, or other means. Food security is a crucial aspect of human development, as inadequate access to food can lead to malnutrition, hunger, and other health problems.

## Climate-resilient agriculture in action

Some practices that can be followed include:



- 1. Soil resilience.** Improve soil health, a key property in building crop resilience under climate change. Building soil carbon, reducing erosion, and increasing the water retention capacity of the soil are important factors that improve resilience.
- 2. Adaptation in crop varieties.** Introduce seed varieties that are drought, heat, and flood-resistant to achieve consistency in yields and better productivity.
- 3. Water management.** Increase water reservoirs and recharge water tables with rainwater harvesting, recycling of rainwater, and reduction of polluted groundwater. These can be creating new or restoring traditional rainwater harvesting structures, percolating ponds, check dams, etc. The objective is to enhance water storage and availability at the farm level.

- 4. Conservation tillage.** Adapt to the use of conservation tillage practices for minimal physical loosening of the soil. This leads to an increase in soil organic matter and creates an ecosystem for crops to thrive. The net result is reduced greenhouse emissions, leading to a reduced carbon footprint.
- 5. No slash and burn.** Although the ash from burning vegetation provides the newly cleared land with a nutrient-rich layer to help fertilize crops. This method makes the land fertile for a couple of years before the nutrients are used up. Farmers must abandon the land, now degraded, and move to a new plot—clearing more forest to do so; expanding the cycle of deforestation, soil erosion, and contamination. There are better ways you can use to make the soil more fertile, such as composting and crop rotation.

# DISASTER RISK REDUCTION AND PREPAREDNESS

Activity: Let women Farmers create a plan in case of emergency.

## What is a threat?

Farmers face many natural threats including droughts, floods, storms, and pests which can have devastating impacts on crops.

**A threat is an event or a process, either natural or human-made, that can cause harm to people, their belongings, and their environment if they do not take precautions.**

There are different types of threats. Some are natural, such as earthquakes, hurricanes, volcanoes, floods, droughts, and landslides. Others are caused by people, known as technological or human-made threats. These include pollution and traffic or factory accidents.

## What is a disaster?

A threat can turn into a disaster, but not necessarily. Several things must happen at the same time. Let's take the example of a mudslide:



1. **People build their houses near a threat.** Such as, at the foot of a volcano, on a muddy and unstable slope, or right on the beach.
2. **The threat occurs.** For example, heavy rains and then an earthquake, lead to a landslide.
3. **The threat turns into a disaster, causing lots of damage to people and their belongings.**

In other words: **A disaster IS A REALLY BAD EVENT, when lots of people are hurt or killed, and their belongings are damaged or destroyed.**

When a disaster happens, local communities often can't cope on their own. When this happens, we say that the community's capacity has been exceeded. **Capacity** means all the strengths, resources, and ideas that community members have to protect themselves and their belongings **AGAINST THE EFFECTS OF A DISASTER.**



## What is a risk?

**Risk is the chance that a threat will turn into a disaster.**

We can't always prevent threats. But we can reduce the chances of threats becoming disasters: **this is what disaster risk reduction is about.**

<sup>6</sup> This section has been extracted and adapted from [www.preventionweb.net/files/46959\\_cfsdrrforwebrasterizedsm.pdf](http://www.preventionweb.net/files/46959_cfsdrrforwebrasterizedsm.pdf).

For example, we can build in certain ways or with certain materials that will make houses and schools less likely to fall in a hurricane or stop cutting down trees, so landslides are less likely to happen. **It is vital to prevent new risks and reduce the risks that are already there.**

## Understanding risk reduction

**Disaster risk reduction and preparedness are critical for farmers to ensure their safety, protect their livelihood and maintain their food security.**

To effectively manage disaster risk, farmers must first understand the threats they face and the potential impacts on their farming operations, this requires conducting a comprehensive risk assessment that considers factors such as location, climate, soil type, and crop selection.

The following actions can help farmers reduce risks:

- **Building resilience:** Building resilience is key to reducing the impact of disasters in farming communities, this involves implementing measures to mitigate risk and enhance preparedness. Examples of resilience-building measures include improving irrigation systems, diversifying crops, and investing in weather-resistant infrastructures.
- **Emergency planning:** Developing an emergency plan is essential for farmers to respond quickly and effectively to disasters. This includes identifying evacuation routes, stockpiling emergency supplies, and establishing communication networks. Regular training and drills can help ensure farmers are prepared to implement their emergency and disaster strikes.
- **Collaboration and coordination:** Effective disaster risk reduction and preparedness require collaboration and coordination among small farmers, government agencies, and community organizations. This includes sharing information about potential threats, developing joint emergency plans, and pooling resources to enhance resilience and response capacity.
- **Seek financial protection:** Farmers can purchase insurance such as the microinsurance product - the Livelihood Protection Policy - which will be available in Belize soon. Through the Climate Risk Adaptation and Insurance in the Caribbean project (CRAIC), CCRIF SPC and partners, the Munich Climate Insurance Initiative and ILO Impact Insurance, have developed a microinsurance product, the Livelihood Protection Policy (LPP), which offers individuals such as farmers and day labourers access to financial protection against losses that result from heavy rainfall and strong winds. The LPP provides quick pay-outs (within 14 days) after a policy is triggered.



**Disaster risk reduction and preparedness are critical for farmers to protect their livelihoods and maintain food security in the face of natural threats.**

A community that meets and works together to talk about the threats they face is less vulnerable to disasters than a community that doesn't discuss possible dangers or leaves people out.

By understanding their risk, building resilience by developing emergency plans, and collaborating with others, farmers can reduce the impact of disasters on their communities and ensure a more sustainable future.



# POST-HARVESTING

Activity: Let women farmers do a campaign (the importance of organic farming) on how it has benefited them and their families and take advantage of the time to let them sell their produce.

**Post-harvesting is the process of handling and storing crops after they have been harvested from the field.**



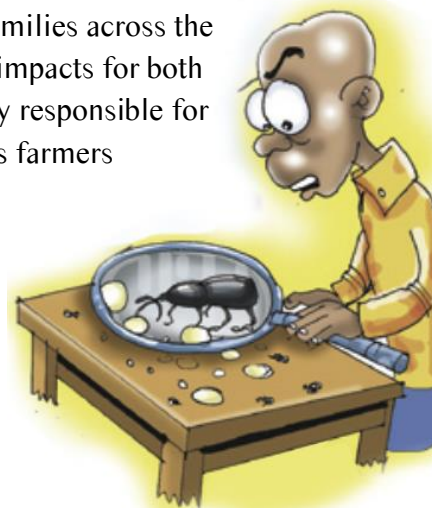
**Post-harvest** includes several activities. Post-harvesting activities vary depending on the crop type. Below, is an example of post-harvesting activities for grains:

<b>1</b>	<b>Harvesting</b> <ul style="list-style-type: none"><li>➤ Collecting in the crop at the right time</li><li>➤ Avoiding bad weather</li><li>➤ Avoiding contamination with soil</li></ul>	<b>4</b>	<b>Cleaning/Winnowing</b> <ul style="list-style-type: none"><li>➤ Removing the foreign matter</li><li>➤ Increases purity and market value</li></ul>
<b>2</b>	<b>Drying</b> <ul style="list-style-type: none"><li>➤ Give value add to the grains</li><li>➤ Retain maximum quality of crop</li><li>➤ Reduce moisture levels for safe storage</li></ul>	<b>5</b>	<b>Storage</b> <ul style="list-style-type: none"><li>➤ Protecting the grain with different store types</li><li>➤ Keeping the grain until a good time for market</li></ul>
<b>3</b>	<b>Threshing/Shelling</b> <ul style="list-style-type: none"><li>➤ Reduce required storage capacity</li><li>➤ Reduce grain susceptibility to pests</li></ul>	<b>6</b>	<b>What happens after farm</b> <ul style="list-style-type: none"><li>➤ Sale to different buyers</li><li>➤ Transport to warehouse</li></ul>

Each activity plays an important role in ensuring that the crop is preserved and protected from damage or spoilage. **Post-harvesting is crucial in ensuring the quality and quantity of the crop are maintained.**

Post-harvest food loss is a leading cause of food insecurity for millions of families across the world. Post-harvest losses have significant nutritional, health, and financial impacts for both consumers and farmers, disproportionately affecting women, who are largely responsible for managing post-harvest drying, cleaning, and storage. Lost food also deprives farmers of the opportunity to grow and strengthen their businesses.

In some developing countries, smallholder farmers regularly lose 40 percent of their harvest due to inadequate storage. Consequently, many farmers sell their produce immediately after harvest-at a time when prices are low due to high supply – only to buy back the same produce later at increased prices.



<sup>7</sup> This section has been extracted and adapted from [www.innovation.wfp.org/project/post-harvest-loss-prevention](http://www.innovation.wfp.org/project/post-harvest-loss-prevention), [www.fao.org/food-loss-reduction/background/ethiopia/en/](http://www.fao.org/food-loss-reduction/background/ethiopia/en/), [www.shareweb.ch/site/Agriculture-and-Food-Security/focusareas/Documents/phm\\_wfp\\_nri\\_training\\_manual.pdf](http://www.shareweb.ch/site/Agriculture-and-Food-Security/focusareas/Documents/phm_wfp_nri_training_manual.pdf).





## Cleaning and sorting

Cleaning and sorting are the first steps in post-harvesting.

- Cleaning involves removing any dirt, debris, or foreign material from the crop.
- Sorting involves separating the crop into different categories based on its size, shape, color, and quality. Cleaning and sorting can be done manually.

## Storing

It's important to properly store the harvested crops to ensure their long life and quality. There are various storage techniques farmers can use depending on the type of crop, climate, and available resources.

In many small-scale farming communities, traditional storing techniques have been passed from generation to generation, these techniques often involve using natural materials such as clay pots, woven baskets, or underground pits to keep the harvest cool and dry, with advancements in technology modern storage techniques have become more accessible to small scale farmers, this includes using refrigerators, airtight containers (silos) or controlled atmosphere storage to extend the shelf life of crops and reduce spoilage.



**For better results, remember to store your crops away from walls, preferably raised from the ground, and to check regularly for any problems.**

## Activity

1. In small groups, share experience in storing food and vegetables.
2. Consider if you should visit local people who have good storage systems.
3. Agree to celebrate the end of the program after the last session by making an exhibition of homemade foods, snacks, oils, storage systems, and preserved foods.

Post-harvesting is a critical process in agriculture that ensures that crops are preserved and protected from damage or spoilage. While post-harvesting presents some challenges it is essential for ensuring that farmers have enough food to eat while maximizing their profits and meeting the growing demand for high-quality crops in local markets.



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