



# Stories from the field

COVID-19 Special Edition



# **The Climakers Stories from the field**

**COVID-19 Special Edition**



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ZOWART

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## Foreword

The efficiency of the agricultural production model has always depended on the capacity of farmers to interpret nature and respond and adapt to changing conditions. Farmers are innovators by nature and necessity: they have always looked for better ways to manage their work, save time and resources and adapt to a changing environment.

This efficiency and capacity is under the threat of the negative effects of climate change, that, compared to the past, are spreading with a rapidity not compatible with natural rhythms of ecosystems and of economic actors. Farmers must cope up with a completely different climate scenario from the one in which they have historically built their professional planning experience in use resources and ensure the economic survival of their activity.

Climate change is a huge burden on the shoulders of farmers and the agricultural sector: farmers are called to feed the world facing immense impacts from a rapidly changing climate, while sudden shocks can hamper the survival of many of them across the globe.

The COVID-19 pandemic outbreak arrives at a time when many Countries in the world are already confronted with serious pre-existing burdens of climate change and food insecurity. Many farmers experienced and are still experiencing huge losses due to natural disasters – droughts, floods, insects' invasion – and the pandemic outbreak exacerbated existing critic conditions.

While the world is struggling to flatten the curve on COVID-19, climate change effects have not disappeared, and neither should actions to fight climate change.

We can consider COVID-19 as a turning point in the history of food systems: it has demonstrated that agriculture is at the centre and farmers are key actors of the food systems and that the system is fragile.

However, COVID-19 also has demonstrated that speedy, collective action is possible where all the actors are capable of immediate changes when called upon to act.

The way farmers and all the stakeholders of the food value chain responded to the resulting shocks of the pandemic outbreak could be considered as a best practice to react resiliently to current and future climate change ripple effects: when the world came to a standstill, holding its breath for the COVID-19 pandemic to pass, farmers and the broader agricultural sector have been working to ensure food and nutrition security for the world population.

Always at the forefront of dealing with nature, farmers have embraced the necessary risks, and stood up for their families, communities and home countries. But farmers are not alone in this: bringing nutritious food in a sustainable way onto the tables of billions of people is a joint effort of the entire value chain. Now, more than ever, it is important to ensure that we are not breaking this chain and we are sending a strong message of smooth collaboration and joined-up thinking.

That is why, this year, we, The Climakers Alliance members, decided to raise the voice of farmers in their struggle to fight climate change and the pandemic outbreak, by asking them two questions:

***In the actions of mitigating climate change effects and adapt it to, how does COVID-19 affect the capacity of the farmers in your country?***

***Which are the best practices you are implementing to adapt to it and/or mitigate its effects considering the need to continue working during the health emergency?***

The experiences we gathered are collected in this special edition of The Climakers publication "Stories from the field": farmers and their partners have been sharing their solutions to deal with climate change and COVID-19 while CCAFS, the CGIAR Research Program on Climate Change, Agriculture and Food Security, Scientific member of the Alliance, ensures from practice to practice that these actions are science - based.

We are proudly sharing this knowledge to showcase how resilient and strong the agricultural community is.



## Introduction

Farmers are the only economic actors in the world who are able to mitigate and adapt to climate change at the same time. None in the world is more vulnerable to climate change than the farmers and no other economic actor can do more in a short window of time to address it than the farmers: they are at risk because of extreme weather events, which threaten their production and revenues, especially in some areas that experience high levels of food insecurity already.

At the same time, farmers must feed the planet, produce energy and clothes and ensure the survival of humankind. Although the agricultural sector is often identified as one of the causes of the climate change, farmers hold an important part of the solution.

In fact, they have a unique practical expertise, a combination of formal education, traditional knowledge and experience from living and working on the land and with nature that allow them to be key actors in successfully tackling the climate change challenge.

The Farmers Driven Climate Change Agenda promotes a bottom-up paradigm in the policy-making process on climate change in agriculture, where the Nationally Determined Contributions, NDCs, are based on the best practices that farmers have already identified as successful, built on new science-based solutions and are aligned with farmers' needs to achieve the economic, social and environmental viability of the wider agricultural sector.

The Climakers are the members of the Farmers Driven Climate Change Alliance, namely the farmers of the world, who are leading this initiative and other stakeholders – including private sector, civil society, research centres, multilateral organizations – that are committed to provide bottom-up, pragmatic and successful solutions to climate change.

In 2018 at COP24 “The Climakers” initiative was launched as the first ever climate action led by the farmers.



# Stories from the Field



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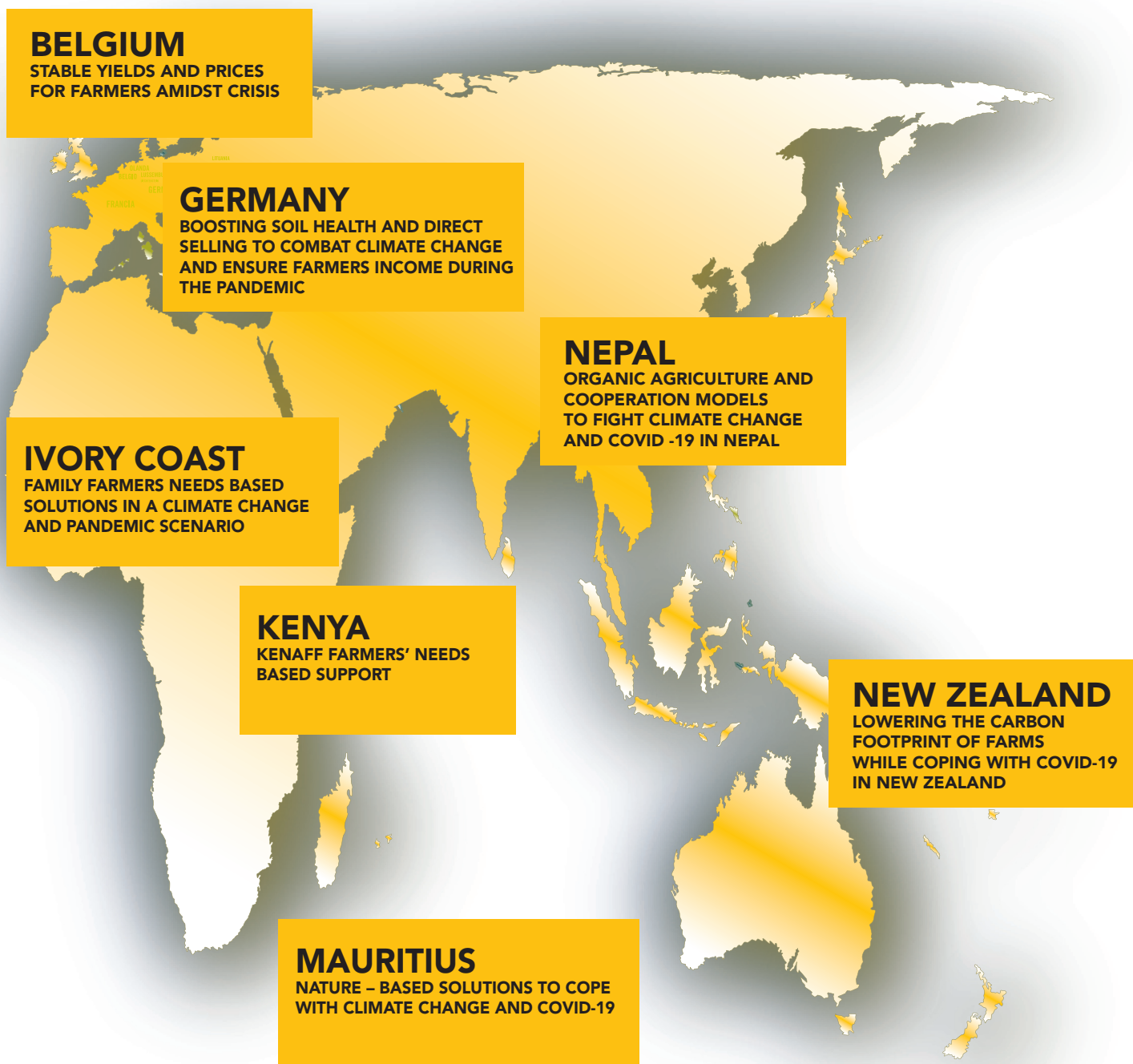
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## STABLE YIELDS AND PRICES FOR FARMERS AMIDST CRISIS

### Presenter

Groene Kring - The Flemish Young Farmers Association

### Description

Drought is becoming an issue in Flanders, in fact, over the last years, there have been long dry periods. Although the amount of rain per year remains stable, the periods of drought get longer.

The impacts of the COVID-19 pandemic are mostly a significant drop of prices in the sectors that rely on world markets (poultry, pork, potatoes, some vegetables, milk...) as well as the flower sector. Furthermore, the search for seasonal workers in the horticultural sectors was difficult during the travel bans in the first lockdown.

To make sure the yield and quality of crops remains adequate, farmers started irrigating. Because of the cost of irrigation, smart irrigation techniques that use water extremely efficiently are being implemented. An example is the reuse



of water of a vegetable processing plant for the irrigation of the vegetables nearby through a smart tubing network. Another technique is precision irrigation that is used in the fruit sector and makes sure only the necessary water is being added to the tree, immediately at the roots.

To mitigate the price effects of the COVID-19 crisis, a lot of market buffering systems have been introduced. In Flanders, an organisation that helps farmers ensure their dairy income by working with future contracts has been introduced.

### Results

- Farmers are more secure of a stable and high-quality yield, even though periods of drought, while using water efficiently.
- Prices of farmers are more buffered and farming families can keep their income up.

### Climate smartness<sup>1</sup>

The practices presented in this experience are framed within the concept of Climate-Smart Agriculture (CSA), since they meet two of its three pillars (adaptation and productivity increase).

The practices related to the efficient use of water, such as the use of water recycling systems, high-efficiency irrigation systems, and localized irrigation, help increasing climate adaptation and productivity. On the other hand, the practice related to new forms of marketing enable farmers to increase their income.

Given that prolonged droughts are the most recurring climatic problem in Flanders, all those practices related to the capture, storage, and efficient use of water are relevant. Because of this, it is recommended to take into account the practices mentioned, as well as the use of improved, drought-resistant genetic materials.

<sup>1</sup> This is done in the framework of climate-smart agriculture (CSA) approach. Climate-smartness in agriculture means understanding impacts of climate change and variability along the agricultural activity, which includes planning of what crop to plant, when to plant, what variety to plant and what type of management practices are needed to reduce impact on the environment (e.g. emissions reduction), maintain or increase productivity (e.g. yields) while increasing resilience and improving livelihoods.

## CAYO FARMERS ADAPTING TO CLIMATE CHANGE AND COVID-19

### Presenter

Cayo Rural Farmers Alliance - CRFA

### Description

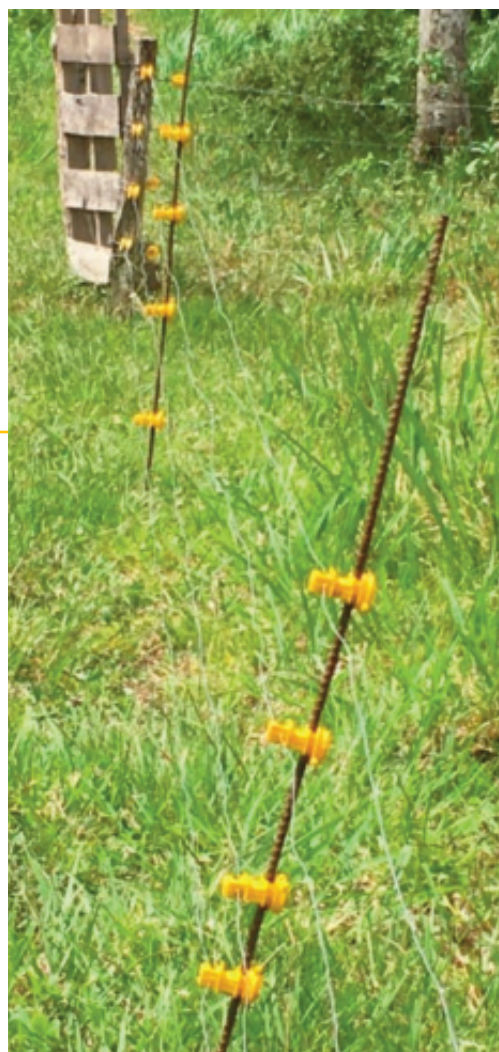
54.7 % and 45.3 % of Belize's population is rural and urban respectively. In Cayo, 47 % of the population is composed of rural families, although most agricultural enterprises are limited to men. Even though a significant percentage of the population is involved in agriculture (17.8%), there is a high unemployment rate of 15 % and also the poverty rate is very high. The agriculture enterprises include beef cattle, dairy cattle, sheep, pigs, poultry, citrus, sugar cane, grains and vegetable crops.

The major challenges faced by farmers include:

- Drought of 2019 to present.
- Forest fires.
- Lack of extension services for livestock farmers.
- Lack of vets specialized in sheep and goats.
- Lack of organization.
- Covid-19-19 has reduced consumer purchasing power.
- High reliance on imported farm inputs.

Farmers are coping with some of the challenges by:

- Downsizing production: many farmers have been forced to sell animals with the consequent fall of cattle prices by 40 – 60 % in domestic market. Most beef cattle farmers who relied entirely on export market to Guatemala are stockpiling cattle and fear droughts and bankruptcy.
- Diversifying production: farmers who supplemented income with tourism are selling off horses and diversifying into sheeps. Many small farmers sold their entire sheep flock because the price dropped from \$ 3.00/lb. to below \$ 2.00/lb. (live weight). Moreover, a number of new farmers are introducing sheeps into their farms as a result of cheaper prices. However, the concern is that many new farmers are inexperienced.
- Implementing best practices: farmers are making silage and experimenting with making their own pellet feeds. Farmers are planting different forage species and are also baling hay to feed animals in confinement.
- Investing in cheaper solutions: cheap electric fence chargers are easy to install and improve pasture use efficiency.
- Developing marketing techniques.
- Changing their animal genetics: some are culling Dorper genes and introducing purebred BBB sires (heat tolerant and offer better *Haemonchus contortus* resistance) available from the Sheep and Goat Genetic Project at the Taiwan Technical Mission in Belize.
- Investing in water harvesting: some have heavily invested in building ponds, but the drought has thus far prevented any rainwater harvesting. Most farmers still resort to harvesting water from the river. This is a time consuming and expensive task.
- Organizing: a group of livestock and crop farmers formed the CRFA Association.



# BELIZE

## Results

- Increased forage use efficiency.
- Animals under sheds better cope with heat stress and reduces operation costs – primarily for small ruminants.
- Technical workshop on sheep production.
- Taiwanese Technical mission in Belize grant: drought relief fund for sheep and goat farmers.
- Farmer to farmer technical and farm input support.

## Climate smartness

Most of the practices presented in this project are framed within the concept of Climate-Smart Agriculture (CSA), since they meet at least two of the three pillars, which are adaptation, mitigation, and increase of productivity. Several of the practices promoted in the project are identified within the global evaluation of Climate-Smart Agriculture carried out by Sova et al., 2018.

With respect to adaptation, key practices are productive diversification, establishment of water reservoirs, implementation of improved pastures, and the use of alternative forages such as silage. These practices allow improving production in dry seasons through adaptation capacity increase of the livestock systems, and better management of climate risks. Likewise, the new breeds' introduction guarantees enhanced milk and meat production during dry spells, and periods of high temperature and relative humidity.

Several practices of the project also contribute to greenhouse gases reduction, given that by improving the quality of animal feed, the methane emission by product is reduced. In addition, an improved grasslands management increases the soil carbon sequestration.

It is recommended for this project to create strategies to strengthen the knowledge of the farmers as regards access to and use of agro-climate information<sup>2</sup>. This kind of information may enable them to make short-term decisions that are linked to climate variability, such as diseases and weed management in paddocks. Likewise, it is recommended to assess the implementation of additional practices recommended by CIAT and the World Bank, 2018.



<sup>2</sup> It is advisable to use climate information from official institutions. However, in case this information cannot be accessed, it is possible to use global secondary information such as CHIRPS (<https://climateserv.servirglobal.net/>). To transfer agroclimatic information, it is advisable to create spaces such as the Local Technical Agroclimatic Committees (LTACs) (<https://www.sciencedirect.com/science/article/pii/S2212096316300298>) and use methodologies such as PICSA (<https://climateserv.servirglobal.net/>).

## THE RESILIENCE OF FARMERS IN QUÉBEC IN THE FIGHT AGAINST CLIMATE CHANGE AND COVID-19

### Presenter

Fédération de la relève agricole du Québec (FRAQ)

### Description



Climate change has already started affecting farming in Québec. Warmer temperatures have permitted agricultural activities to start earlier in the spring and end later in the fall. In the winter, the snow coverage has diminished, and farmers have less continuous days of extreme cold which, unfortunately, increases the winter survival of certain crop-damaging insects and diminishes the protective effect of thick snow on our fields. Winters are getting shorter. Farmers also experience more frequent extreme weather conditions such as heavy precipitations and seasonal droughts. Moreover, farmers have to cope with new insects and weeds that have migrated from the south because they can now survive with this climate.

Many Québec's farmers depend greatly on seasonal foreign workers for tilling the soil, sowing the seeds, weeding and harvesting. The COVID-19 pandemic greatly threatened the number of available seasonal workers but the union representation (UPA) has negotiated quickly with the government in order to open the borders to seasonal workers. When workers arrived, they had to isolate for two weeks before actually starting to work. Many farms also had to adapt workers' housing units in order to respect the COVID-19 restrictions, often requiring additional housing be made available.

Quebec has an environmental legislation regarding farming. Producers must respect rules with regards to manure spreading to limit the amount that could leach into the groundwater. Agronomists have to calculate the amount of manure that can be spread on a certain surface to protect the ecosystem while still providing the nutrients that the crop can absorb. Farmers are also encouraged to plant trees between their fields to form wind breaking hedges. These hedges limit wind erosion by diminishing the wind's speed, they reduce pesticide drift, and in the winter, they also help to keep the snow on the ground longer. Farmers also have to respect riparian strips. These strips are a minimum distance of 10 to 15 meters that the farmer has to respect if the crop is next to a lake or river. It's a wooded zone where it is not possible to apply any pesticides and it serves as a buffer zone between the farming activities and the aquatic environment.

Quebec has a lot of dairy farmers. The cows' nutrition is composed mainly of corn silage and alfalfa, either in silage or in hay. The alfalfa fields are normally sown once every 4 years. The crop is mowed 3 times a year (during the production season) and the harvest is dried or silage to last all year. There is normally enough snow in the winter to isolate the crop, thus it survives and grow back the following year. This is good for the environment because it is low maintenance and alfalfa fixes a lot of nitrogen in the soil.

As discussed while describing climate change effects, shorter and warmer winters decrease the survival rate of this crop.

Some farmers use cover crops in the fall, after they have harvested the main crop. A cover crop is a crop that grows quickly, to cover and protect the soil from the wind and increase biomass. It is destroyed in the spring before sowing the crop.

Healthwise, the pandemic is an added stress for the farmers because if they get sick, they don't necessarily have employees or family members that can take over for them.

In Quebec, the pandemic has mainly affected the meat processing chain because the volume of slaughters had to be diminished in

# CANADA

order for the workers to respect the distancing measures. Slaughter and meat processing are managed by a few companies and one of them had a COVID-19 outbreak and had to close for a few weeks. The impact on the farmers was important. Many of the pig farmers had to keep their animals a lot longer than expected and the situation is still not fully resorbed even though the slaughterhouse has been reopened for many weeks.

Most of the restaurants and hotels are closed or have very little clients. This has impacted the dairy industry because 30% of the milk products (fresh milk, yogurt, cheese) is destined to that market. Fortunately, the supply management has allowed the farmers to reduce their production rather quickly. Restaurants and hotels closings have also impacted niche product markets as veal, boar, rabbit and deer.

On a positive note, when it comes to food, COVID-19 has had an encouraging impact on a lot of local businesses thank to the increase in local purchases. The citizens want to encourage local growers, thus many of the smaller farmers have seen an increase in their revenue this year.



## Results

During this pandemic, Québec's government and citizens have seen the importance of growing food locally. New programs have been announced to help local farms adapt to the environmental and animal welfare standards.

Farmers throughout the Québec province organized a virtual seminar on climate changes impacts on farming during the year 2020. The seminar was held in each region: some farmers talked about the impacts they are already seeing and prepare for what is coming next. In the case of dairy farmers, the challenges raised were about the increase of the temperature in the barn and at pasture. It has been recommended investing in good ventilation equipment in the barn and plant trees around it to prevent the sun rays from entering. For the pasture, the farmers will have to provide shade for the cows and more fresh water.

## Climate smartness

The various practices promoted in the project significantly contribute to the three pillars of CSA (Climate-Smart Agriculture), since they are focused on both climate mitigation and adaptation, and increase productivity of crops. The project includes practices assessed in the global evaluation of Climate-Smart Agriculture carried out by Sova et al., 2018.

It is worth noting that practices such as the use of organic fertilizers based on soil analysis and the use of plant covers with nitrogen-fixing species are especially related to mitigation, which is understood as the reduction of greenhouse gas emissions. Likewise, sowing of living barriers with hedges can be considered to be a practice that contributes to mitigation, due to trees potential for carbon sequestration, thus helping to reduce greenhouse gases in the atmosphere.

On the other hand, practices focused on the use and conservation of water sources increase the adaptive capacity of productive systems. Practices such as covering the soil and planting hedges to retain humidity are also important for adaptation purposes.

It is recommended for the optimal implementation of climate-smart agriculture to strengthen the flow of climate information<sup>3</sup> to the producers, as well as empowerment regarding that information. The participatory spaces mentioned in the project, where farmers join training sessions, could be useful to build capacity on climate information used and its link with crop management and development.

<sup>3</sup> It is advisable to use climate information from official institutions. However, in case this information cannot be accessed, it is possible to use global secondary information such as CHIRPS (<https://climateserv.servirglobal.net/>). To transfer agroclimatic information, it is advisable to create spaces such as the Local Technical Agroclimatic Committees (LTACs) (<https://www.sciencedirect.com/science/article/pii/S2212096316300298>) and use methodologies such as PICSa (<https://climateserv.servirglobal.net/>).

## OYSTER CULTIVATION CONTINGENCY MEASURES TO FACE CLIMATE CHANGE AND THE IMPACTS OF THE PANDEMIC

### Presenter

Cooperativa de Pescadores Artesanales «Virgen de Regla»

### Description

Among the main challenges farmers face due to climate change, there is the increase of the seawater temperature and the increase of the marine currents, which then lead to a prolonged presence of predators (i.e. Chancho, "Perforador") in the sea, with increased mortality of oysters.



Unfortunately, also the spread of COVID-19 had many negative impacts on the production of farmers: it mainly caused a decrease in their work activities and sales, thus causing the lack of maintenance of cages, which consequently caused loss of production due to lack of cleaning, which attracts predators, and also loss of sales of oysters' production.

In order to cope with the pandemic and to try to mitigate its negative impacts as much as possible, farmers had to carry out the work activities with all the protection measures, but also to carry out the labor activities with less personnel to cover their remunerations in this crisis, as well as, to do cleaning activities to combat predators and maintain future production of oysters for sale. Moreover, several methods were implemented to sell the product through internet with social networks and telephone communication in general.

Because of COVID-19 farmers experienced a drop in sales, but they are looking for the best measures to maintain their product. It united them as workers, making them more supportive and it strengthened their social relations. The pandemic helped farmers realize that together they can overcome their needs and survive such a difficult situation.

### Results

- Maintenance of activities with fewer resources: mainly cleaning of cages to lower the chance of attack from predators.
- Several work methods to maintain and preserve the production that will be kept after the pandemic.
- Diversification of sales channels.



### Climate smartness

The major challenge is the increase of oyster predators, which is due to climate change. In addition to promoting climate adaptation, the initiative has supported producers to access new markets, thus improving their incomes. The Cooperativa de Pescadores Artesanales «Virgen de Regla» initiative includes a set of practices that contributes to Climate-Smart Agriculture (CSA) main objectives of adaptation and productivity through income increase.

## BOOSTING SOIL HEALTH AND DIRECT SELLING TO COMBAT CLIMATE CHANGE AND ENSURE FARMERS INCOME DURING THE PANDEMIC

### Presenter

Brenkenhagener Gemuesehof Farm – Member of The German Rural Youth Association (Bund der Deutschen Landjugend - BDL)

### Description

The climate change effects on farming in the region where “Brenkenhagener Gemuesehof” farm is based have been tremendous in the last couple of years. In 2017 during seeding time, they were facing high rainfalls followed by a drought in spring and summer. These extreme weather events tend to happen more often and cause yield losses.

The COVID-19 pandemic has caused higher fluctuation of prices on agricultural products, as the pandemic has affected the global market. The combined risks of yield losses, due to severe weather events caused by climate change, and the fluctuation of prices have put the farming sector in Germany under high pressure. Especially the meat and milk sector are threatened by low prices, which forces farmers to quit farming.

For Brenkenhagener Gemuesehof farmers, being crop farming the main activity, the best possible way to mitigate the effects of climate change is through improving soil quality. On their farm, farmers used to have a three-year crop rotation. Throughout the last years they have experienced that this three-year crop rotation was vulnerable to external effects such as weather conditions, thus they have changed this crop rotation towards a more diverse one, alternating summer and winter crops. Farmers have also included cover crops in between the main crops. Another part of the farm’s climate friendly practice is the reduced tillage, a practice implemented during the last 5 years, which is also improving soil health. Secondly, through their vegetable production for direct markets, farmers were able to achieve higher prices.

Throughout the pandemic of COVID-19, farmers made leverage of this potential, observing that among the consumers there was a rising awareness on how food is produced: they tried to deliver most of the produce by themselves, so not to rely on transportation companies, choosing nearby processing companies for grains and vegetables.

Within these regional markets, farmers were also able to impart knowledge on climate friendly production towards the population. Their vegetables as well are produced in a climate friendly way: tomatoes are grown in a greenhouse under controlled conditions using drip irrigation. As they are sold in the region, they have not long transportation as most other vegetables have.

### Results

The main results of the practices implemented are:

- Secured yields reducing inputs on crops.
- Secured prices on products.

Enriching organic matter in soils has stabilised yields, minimized the risk related to droughts and lead towards a more efficient use of chemical plant protection.



## Climate smartness

The set of practices promoted in the project significantly contribute to the three pillars of Climate-Smart Agriculture (CSA), as these are focused on mitigation and adaptation to climate change, as well as crop productivity. Most of the practices promoted in the project have been identified in a global evaluation of CSA carried out by Sova et al., 2018.

The practices related to the improvement of soil quality, such as crop rotation, implementation of cover crops, and minimal tilling, help improving water retention in the soil, generating a greater adaptation of the productive systems to drought events. Likewise, those practices promote the increase of soil organic matter, which contributes to carbon sequestration and greenhouse gas emission reduction.

On the other hand, the use of greenhouses and drip irrigation systems are practices that, in addition to improving the producers' incomes all year long, increase climate adaptation of the agricultural systems. Finally, those practices related to new markets access contribute to the increase of farmers' incomes.

For the optimal implementation of CSA, it is crucial to strengthen climate information flows<sup>4</sup> to the producers, as well as empowering them as regards the use of climate information in order to ensure better decisions in the future, adjusted to their socioeconomic conditions and environmental conditions.

<sup>4</sup> It is advisable to use climate information from official institutions. However, in case this information cannot be accessed, it is possible to use global secondary information such as CHIRPS (<https://climateserv.servirglobal.net/>). To transfer agroclimatic information, it is advisable to create spaces such as the Local Technical Agroclimatic Committees (LTACs) (<https://www.sciencedirect.com/science/article/pii/S2212096316300298>) and use methodologies such as PICSA (<https://climateserv.servirglobal.net/>).

## STRATEGIES OF RESILIENCE AND ADAPTATION TO CLIMATE CHANGE AND COVID-19 IN GUATEMALA

### Presenter

Alianza Agroindustrial y Artesanal Rural - ALIAR

### Description

In Guatemala, usually there are two main seasons: the rainy season and the dry period. Nevertheless, in the last couple of decades there have been changes due to climate change and this has taken a toll on agriculture. In addition to this, there was a notable change during the pandemic in relation to market demand for agricultural products. Strategies of resilience and adaptation to climate change had to be implemented.

Three are the pillars upon which the best practices implemented are based: diversification, efficiency and sustainability.

One of the best practices implemented is diversification to minimize the risk, in particular farmers introduced improved varieties, crop diversification and also market diversification.

Furthermore, farmers established experimental plots, with adaptable crops to climate change. Locally, it has been sought to implement new crops for local farmers with the objective of diversifying productive plots and increase family income. As for the improvement of profitability and efficiency, farmers used sustainable infrastructures and applied crops traceability systems, in order to collect more information to take better decisions and improve the adaptability of crops.

Finally, in order to be more sustainable and eco-friendlier, farmers promoted organic agriculture and implemented a cleaner production process in the packaging house. Moreover, they used organic fertilizers for soil reduction and conservation: they have observed that organic fertilizers and biopesticides take care of soil's health and biodiversity while increasing productivity. In addition to these solutions, the implementation of living barriers was promoted, as well as the implementation of irrigation systems and of macro and micro tunnels.

As far as health is concerned, ALIAR had to implement security protocols and the necessary security measures including: chlorination systems, Personal Protective Equipment (PPE), temperature control of personnel.

Moreover, given the impact of the pandemic, ALIAR is exporting its production to Central American trading partners. However, due to the economic recession, exports to international markets (USA and Europe) have been stopped, and local sales strategies were established.

## Results

### Main results:

- Introduction with Improved Varieties
- Crop Diversification
- Market Diversification
- Security measures and controls were implemented
- Chlorination systems were installed
- Personal Protective Equipment (PPE) was provided
- Temperature control of the personnel
- Implementation of living barriers
- Irrigation systems
- Implementation of macro and micro tunnels

## Climate smartness

The practices in this project are framed within Climate-Smart Agriculture (CSA), as they contribute to increasing adaptation and productivity, and reducing greenhouse gas emissions.

Practices, such as productive diversification, the establishment of trials to introduce better adapted varieties or species to micro climatic conditions, the use of irrigation systems, and the construction of structures such as macro tunnels increase climate adaptation capacity of production systems.

On the other hand, the implementation of organic agricultural practices, living fences, and soil conservation, helps to reduce the emission of greenhouse gases and to capture carbon in the agricultural systems, while they are also contributing to climate adaptation and productivity increase. Finally, practices such as the use of organic packaging and diversification of the market are practices more focused on value added increase which improves farmers' incomes.

It is worth highlighting that the collection of information that is being done by the farmers linked to the project to make better decisions. In that regard, for those who are not doing that, it is recommended to train these producers to monitor the climatic conditions within their plots, using low-cost rain gauges and thermometers, as well as hygrometers that enables them to learn the humidity of their soils. This information will be useful to plan the construction of water reservoirs so that they can have this resource during the dry seasons, and determine the periodicity and the quantity of water that they should use for irrigation.

Additionally, it is recommended to establish a training program for understanding and using agro climatic information<sup>5</sup> that would enable the farmers to make decisions about planting dates, the species and varieties to plant, and the place on their farm that is best for planting, among others.

<sup>5</sup> It is advisable to use climate information from official institutions. However, in case this information cannot be accessed, it is possible to use global secondary information such as CHIRPS (<https://climateserv.servirglobal.net/>). To transfer agroclimatic information, it is advisable to create spaces such as the Local Technical Agroclimatic Committees (LTACs) (<https://www.sciencedirect.com/science/article/pii/S2212096316300298>) and use methodologies such as PICA (<https://climateserv.servirglobal.net/>).

## ROOF GARDENS, WATER HARVESTING AND BIOPREPARATIONS TO PROMOTE FARMERS' RESILIENCE IN GUATEMALA AND HONDURAS

### Presenter

CGIAR research programme "Climate Change, Agriculture and Food Security" - CCAFS<sup>6</sup>

### Description

This best practice refers to the framework of the projects carried out by CCAFS: the Sustainable Territories Adapted to Climate in Central America (in Spanish, Territorios Sostenibles Adaptados al Clima or TeSAC), which are being developed in Olopa (Guatemala) and Santa Rita (Honduras).

Although TeSAC communities in Central America have always been immersed in constant climate variability, this year, in addition to COVID-19, they have been faced with major challenges such as:

- The reduction in the supply of labour to harvest coffee, which has led to a reduction in their income. This is a consequence of the closure of borders, since during the coffee harvest there is a great deal of mobility of people looking for a job.
- The reduction in access to food, given that at some times urban centres were closed.
- Reduced supply or increased costs of agricultural inputs.

From a climate point of view, recently as a result of the passage of tropical storm Eta, several crops were lost due to excess rainfall, therefore some families may soon be affected by the food crisis.

Below some best practices implemented:

- **Roofed gardens and rainwater harvesting:** This consists of the establishment under a structure covered with transparent plastic of gardens with a diversity of crops (mainly vegetables), which are managed using bio-preparations. These gardens have a system for capturing and storing rainwater that falls on the roof, which is used for watering the plants. This practice helps to improve the adaptation of the species cultivated within the garden and improves the food security of the families, since with the implementation of this practice they largely guarantee their food security in both winter and summer seasons. As it is a low-cost practice, it helps to reduce the family's expenses corresponding to the purchase of food.
- **Rainwater harvesting ponds for fish production and irrigation:** this consists of digging a hole in the ground, which must be repaired or lined with geo-membrane, cement or plastic, so that water can be stored. These ponds are filled with rainwater and/or captured by runoff. The stored water is used for fish production (tilapia) in winter periods, when water resources are abundant, and for irrigation of small plots in dry periods. This practice serves to adapt farming areas to prolonged droughts, ensures the diversification of food for communities, introducing animal protein into the diet of some producers, and improves the food security of families. As it is a low-cost practice, it helps to reduce the family's expenditure on food purchases.
- **Elaboration of bio-preparations (Fertilizers and insecticides):** This consists of the preparation and application of agro-ecological inputs for the integrated management of pests and crop diseases and the improvement of the soil through the application of organic fertilizers that are produced with local resources in the community. It reduces costs, increases the physical-chemical and biological characteristics of the soil, reduces contamination by the use of agrochemicals and produces cleaner food. This practice contributes to the reduction of greenhouse gas emissions and, by increasing production potential, helps to ensure food security for families. As a low-cost practice, it helps reducing the family's expenses for the purchase of agricultural inputs.



## Results

Roofed gardens and water harvesting, along with ponds for fish production, have helped producers to be more resilient in times of drought. Similarly, especially in the case of vegetable gardens, they also improve adaptation in times of heavy rain, as being covered prevents the destruction of crops. Both practices contribute to the diversification of the diets of the families and improve their nutrition. Currently, these two practices have been very useful in mitigating the impacts of lockdown caused by COVID-19, as they have helped the families who have implemented them to have food available and in some cases to supply other neighbouring farmers.

With regard to bio-preparations, in addition to reducing farmers' production costs and contributing to the reduction of emissions, mainly of nitrogenous compounds, they have also been important during the lockdown due to COVID-19, as they have allowed farmers to carry out their agricultural activities despite the reduction in access to agro-inputs in traditional markets and the high prices that have occurred.



## CLIMATE CHANGE, COVID-19 AND THEIR EFFECTS ON AVOCADO, POTATO, STRAWBERRY AND BASIC GRAIN CROPS

### Presenter

Asociación de Productores Agropecuarios de Intibucá - APRAIN

### Description



In Honduras climate change is affecting farmers mainly by lowering the chances to know with exact timing what is happening with the climate and what are its effects. Strong storms with hurricane winds have worsened the current state of rural roads, causing landslides on main roads, damaging the transport of producers and production from farms to local and national markets. Municipal and national economic and human resources that could support the improvement of these roads are focused on serving the health sector due to the pandemic.

#### Below a description of the effects of climate change and COVID-19, on several crops:

##### Avocado:

Climate change impacts:

- Increase in fungal diseases due to sudden changes in precipitation, temperature and relative humidity present in the environment. For Example: *Phytophthora*.
- Presence of new insect pests, like: *Schistocerca cancellata*.

COVID-19 impacts:

- Loss of plants in nurseries due to the fact that producers cannot circulate due to quarantine.
- Considerable decline in established areas of new plantations.
- Difficulties in marketing and selling the fruit to the main businesses in the country.

##### Potato:

Climate change impacts: it has been seen that important pests, such as Paratuberculosis, is no longer appearing only during the summer but also in the winter, which shows us that the pests have been adapting to climate change. This pest increases the production costs of this tuber and reduces its price in the market.

COVID-19 impacts: in the first months of quarantine the commercial houses closed, the means of transport and the flow of inputs was reduced, causing considerable losses in the cultivation of this and other vegetables.

##### Strawberry:

Climate change impacts:

- In 2018, 4.9 hectares of this crop were lost in Honduras due to agroclimatic factors that favored a high proliferation of fungal diseases: *Alternaria*, *Pestalotia* and *Fusarium*.
- The current strawberry varieties require more hours of cold temperature to achieve excellent production, which is why work is still being done on the incorporation of neutral day temperature varieties with more resistance to fungal problems.

COVID-19 impacts:

- Considerable losses in the sale of fresh strawberries have occurred, and producers had to sell frozen strawberries at a lower price.
- Delay in the process of acquiring new materials from the USA for new crops to be planted.
- Increase in the cost of inputs such as fertilizers and agrochemicals for the management of pests and diseases.
- Scarce availability of seeds.
- Lack of transportation to other markets.
- Lack of workers in the farms.

##### Basic grains:

Climate change impacts: pests mutate and present an impact on crops, among them is the spread of exotic pests, which cause an increase in phytosanitary surveillance. Example: Central American Flying Locust (2020), endemic in Central America.

#### Below a description of crop related best practices implemented:

##### Strawberry crop:

- During the pandemic, models of protection structures (Semi-Greenhouses) has been incorporated for production, thus controlling the moisture that accumulates due to severe winters or severe drought caused by the effects of climate change. This also allows safer production by controlling the micro environment within the greenhouse.

- 2 new varieties of strawberry will be incorporated (Festival & San Andrea), with technical assistance and monitoring of market for fresh fruit and industry (project implemented with the Technical Mission of Taiwan in Honduras (ICDF) and SAG - DICTA (Secretaría de Agricultura y Ganadería - Dirección de Ciencia y Tecnología Agropecuaria).

#### **In potato cultivation:**

- New varieties have been incorporated that are more resistant to late blight, which is also a problem with sudden changes in climate, thus the seed of these varieties is already being produced locally (this project was implemented thanks to CIP Peru and Technical Mission of Taiwan in Honduras (ICDF) ).

#### **In basic grains:**

- the SAG, through DICTA, has researched and now has available earlier and more drought-resistant varieties of corn and beans with lower yields, which helps to ensure that corn is not damaged more frequently by the heavy rains.

In general, the biggest challenges that farmers in Honduras face in the short term are: to continue producing without getting infected with COVID-19, to produce more in less area, to sell the products through electronic means in an efficient way. In the long term, the challenge they will face is to move from traditional agriculture to smart agriculture.

## **Results**

The strawberry sector is being reactivated, starting with the provision of strawberry plants through the SAG with the variety resistant to pests and diseases such as Pestalotia, Alternaria and mites, benefiting 60 producers in the country with the bonus of productive solidarity. With the importation of mother plants and their production of seedlings at the national level through the SAG DICTA and ICDF TAIWAN farmers will be able to reactivate the sector in 2 years.

Fruit crops such as avocado that have developed thanks to the efforts of SAG through ICDF Taiwan in Honduras have come to leverage the considerable losses of Honduran coffee growers in previous years, due to the fact that coffee and avocado are now being produced in the highlands of the country as an area of farm diversification.

The Government of the Republic is managing the funds through INVESTH in order to build the first 20 Semi-Greenhouses with a commercial strawberry production model.

In the potato sector, this year, SAG will benefit 500 producers with certified seed potato of a national production variety to mitigate the effects of the pandemic in this sector, establishing more than 30 blocks.

With the implementation of the BSP (Bono Solidario Productivo), more than 2000 producers of basic grains, such as beans, will benefit of it, ensuring production this year.

## **Climate smartness**

These practices are focused on the increase of climate adaptation capacity, and productivity increase. The greenhouses and improved seeds tolerant to drought, pests and diseases allows production stability and farmers' incomes during seasons with high climate variability.

In the case of avocado crop, it is recommended to implement practices such as the use of grafts with patterns that are tolerant of drought or flooding (whatever the case may be) and others from those identified by Sova et al., 2018.

Likewise, for all the productive systems described, it is recommended to facilitate farmers' access to agroclimatic information<sup>7</sup>, so they can understand climate behavior and the relation with their crops. This will enable them to make decisions about planting dates, the type of varieties to use, and measures to implement to reduce their climate-related risks.

<sup>7</sup> It is advisable to use climate information from official institutions. However, in case this information cannot be accessed, it is possible to use global secondary information such as CHIRPS (<https://climateserv.servirglobal.net/>). To transfer agroclimatic information, it is advisable to create spaces such as the Local Technical Agroclimatic Committees (LTACs) (<https://www.sciencedirect.com/science/article/pii/S2212096316300298>) and use methodologies such as PICSa (<https://climateserv.servirglobal.net/>).

## FAMILY FARMERS NEEDS BASED SOLUTIONS IN A CLIMATE CHANGE AND PANDEMIC SCENARIO

### Presenter

Cote d'Ivoire National Seeds Association (ANASEMCI)/ National Platform for Family Farming (PANAFCI)

### Description

Since the beginning of 1970s, Ivorian rain-fed agriculture has suffered the effects of climatic variability declined by a decrease in rainfall, increase in temperature (1), and worse repartition of rains, floods (2). From 1960 to 2010, rainfall deficit is of 28.9% in the humid forest zone, 7.7% in North region, 12.5% in Centre and North-East, 23.5% in South-West, with a barely perceptible decrease in Centre-West and East. Temperature increase is of 1.6 °C in average (Yao Nguettia et al., 2013). This led to disruption of the cropping seasons with advent of long-lasting dry sequences during the cropping seasons, shortening rainy season [late start and early end] (Kouame et al., 2020).

On the other hand, the measurement of the socio-economic impact of COVID-19 showed, that more than half of households whose head works in agriculture and the food industry, have seen their income decline. The increase in the number of people infected inducing a corresponding drop in overall demand, breakdown of production and supply chains, and fall in the prices of raw materials, constitute a real threat.

Thus, in short term, Ivorian State decided, mainly, to provide an immediate assistance to the most vulnerable households, distribute agricultural inputs kits (seeds, fertilizers, phytosanitary products) to farmers, strengthening the actions of crops grouping for their primary marketing, etc. Therefore, farmers have to adopt the recommended barrier measures for containing the level of contamination.

The projected decline in national agricultural production of 15 to 20 % (MINADER, 2020) related to COVID-19 impact (INS-MPD-BM, 2020), led to an inventory at the local level. Although not associated to this action by the Ministry of Agriculture and Rural Development (MINADER), the National Platform for Family Farming (PANAFCI) chaired by Cote d'Ivoire National Seeds Association (ANASEMCI) supported this initiative.

Our independent survey revealed a drastic disruption of agricultural inputs distribution, reduction of quality control activities, job and crop losses, producer's income decline, etc. (PANAFCI, 2020).

PANAFCI brought to the attention of MINADER its benchmarks for monitoring the application by the Ivorian State of the recommendations of ECOWAS Conference of Ministers of March 31, 2020, with regard to the outputs for the agricultural world, particularly for the family farming.

The following measures were recommended to the State: (i) Supply all producers with agricultural input kits (seeds, fertilizers, phytosanitary products); (ii) provide agricultural advice by using technological innovations (mobile applications devices for the monitoring of farmers); (iii) continue research, while ensuring the application of the health barrier measures recommended by WHO; (iv) identify the production sites, actors and their professional organizations, as well as their input needs for the 2020-2021 agricultural campaign; (v) preserve the free movement of trucks transporting agricultural products to the country's consumer markets; (vi) strengthen epidemiological surveys of transboundary animal diseases (CBPP, PPR, avian flu, swine flu, etc.) in member countries and develop information sharing between countries and the Bamako Regional Centre of Animal Health (RCAH/CRSA); (vii) coordinate information systems (production, markets, stocks, etc.) and strengthen them, so that they can continue to provide a basis for analysis and decision support.

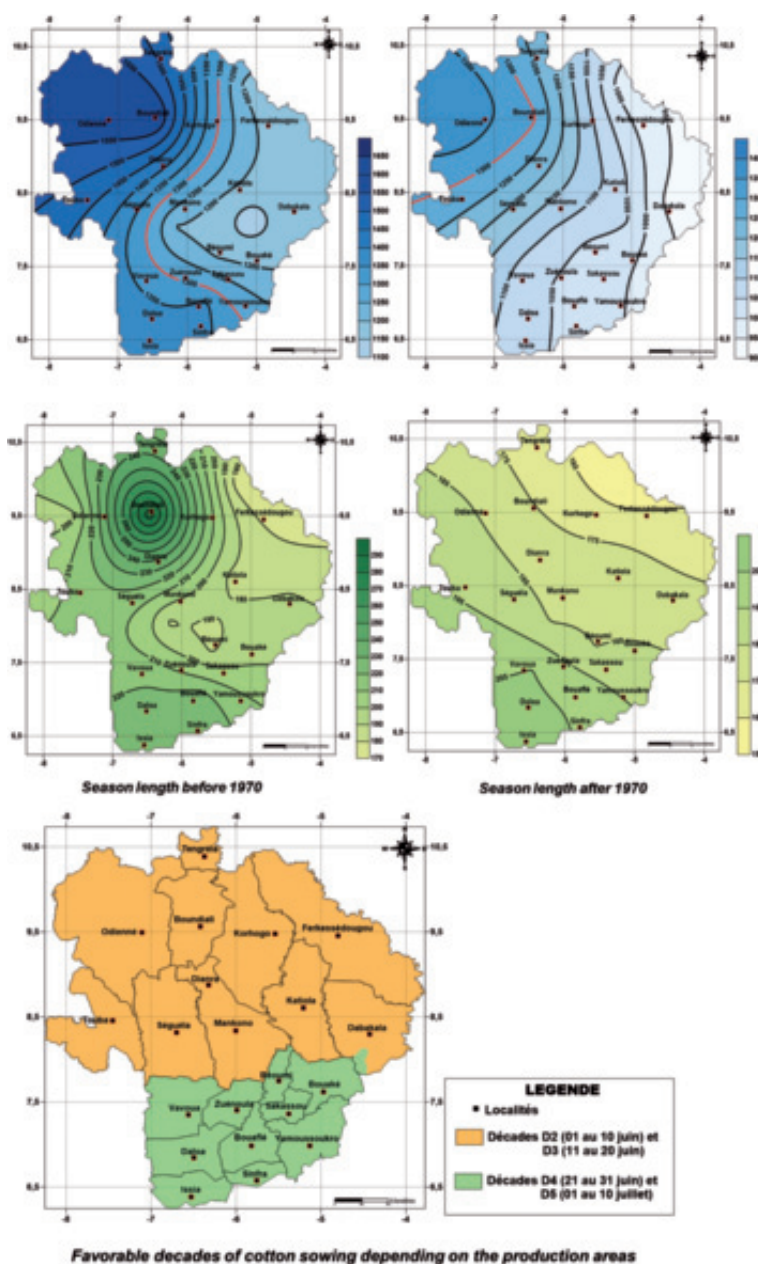
In order to impact all the emergency measures implemented by the Ivorian State, this proposal document was sent to the agricultural professional organizations' members of PANAFCI, as reference elements to be adapted to their regional context, for their proposals at the local level to the decentralized authorities. This made possible to ride up the needs of farmers from the basis.

## Description

More in depth, as part of the management of Coronavirus health crisis in the agricultural world, PANAFICI carried out the following actions: (i) Collection by phone of data on the impacts of COVID-19 on the life and activities of family farmers; (ii) elaboration of a PANAFICI proposal document to support the Ivorian State in its emergency strategy for agriculture revival; (iii) Submission of the elaborated proposal to the ministries in charge of agriculture (MINADER), of animal production and halieutic resources (MIRAH), and to the ministry of rice promotion [MPRI]). This document retraces the favourable economic period in which the country was engaged, the intervention of COVID-19, the emergency measures taken by the Ivorian State to face the risks of food shortage and insecurity, and the recommendations of PANAFICI member organizations, with a view to containing the crisis and repositioning itself to pursue the agricultural development. In the meantime, PANAFICI also sent instructions to its members at local level, to translate their needs to the decentralized authorities, with a view to give their rapid feedback to political decision-makers.

Regarding the effects of climate change and the fight against those, several farmers' initiatives to adapting production systems have been recorded in the Country. These are summarized in the following points as an example, where to each product correspond one or more initiatives implemented by farmers:

- Cocoa tree: direct sowing plus seedling in bags-sowing under cashew were implemented.
- Rubber tree: Nursery, Planting and grafting instead of nursery, grafting and planting.
- Cashew: was introduced instead of coffee and cocoa trees.
- Annatto: was introduced instead of coffee and cocoa trees.
- Yam: shifting the date of ridging.
- Cassava: Cuttings on mounds, ridges (buried/inclined).
- Maize: shifting the date of planting.
- In addition to the above-mentioned solutions, to mitigate climate change effects, mulching is also used to protect crops from soil moisture losses.



# IVORY COAST

## Results

A response plan to COVID-19 negative impacts, including support to health system, of 171 838 565.02 USD was adopted by Ivorian State. Also, 1.5% of 2020 GDP will be used to assist the most vulnerable households and support agricultural production.

On the other hand, in order to mitigate climate change, the following measures were recommended by the MINEDD (YAO N'GUETTIA et al., 2013) to:

### Central and local Authorities

- Strengthen agriculture mechanization by providing accessible machines adapted to the soil characteristics.
- Carry out hydro-agricultural layouts by valorisation of floodplains and water control.
- Set up an agro-meteorological warning system providing reliable information on rainy seasons.
- Create a consultation and awareness-raising framework to prevent conflicts between rainmakers and local populations, who attribute climate change to them.
- Develop livestock and agro-food processing as sustainable sources of income.
- Promote credit for funding producers' activities in time.

### Extension services

- Prioritize climate change issues.
- Extend agroforestry systems (fruit species) to increase producers' income.
- Support farmers in reforestation and soil protection against erosion.

### Farmers

- Promote exogenous adaptation knowledges.
- Share producers' successful adaptation experiences.

### Research

- Develop short-cycle and resilient crop varieties.
- Improve existing farmer adaptation initiatives.



## Climate smartness

The ANASEMCI (Association Nationale des Sémenciers de Côte d'Ivoire [National Association of Seed Companies of Ivory Coast]) – PANAFCI (Plateforme nationale pour l'Agriculture Familiale en Côte d'Ivoire [National Platform for Family Agriculture in Ivory Coast]) initiatives have focused in large part on increasing the adaptation to climate change and climate variability by implementing a large quantity of Climate-Smart agricultural practices, which can be further strengthened with the use of the system of early-warning systems already established. A key element to consider in these initiatives is to strengthen the ability of the farmers to understand and use the climate information<sup>8</sup> generated through this network, understanding how the climate affects the crops, and what tools are available for better-informed decision-making processes in the short and medium term in order to enable scaling processes. This can also support the generation of production surpluses in addition to food production for self-consumption, so that the farmers can have additional incomes.

The project also has an important planning component based on vulnerability analysis and financing for practices implementation, which is also linked to the focus of climate-smart agriculture. In general terms, this project is very complete and rich in the implementation of portfolios of Climate-Smart agricultural practices and productive alternatives, for that reason it is recommended to maintain its operation over the time. As an additional recommendation, it would also be good for the project to be able to address activities related to the GHG emissions reduction and carbon sequestration.

<sup>8</sup> It is advisable to use climate information from official institutions. However, in case this information cannot be accessed, it is possible to use global secondary information such as CHIRPS (<https://climateserv.serviglobal.net/>). To transfer agroclimatic information, it is advisable to create spaces such as the Local Technical Agroclimatic Committees (LTACs) (<https://www.sciencedirect.com/science/article/pii/S2212096316300298>) and use methodologies such as PICSA (<https://climateserv.serviglobal.net/>).

## KENAFF FARMERS' NEEDS BASED SUPPORT

### Presenter

Kenya National Farmers' Federation - KENAFF

### Description

The COVID-19 pandemic came at a time when Kenya as the rest of Africa is still grappling with serious pre-existing burdens of climate change and food insecurity. In Kenya, the pandemic coincided with the planting season. Many farmers planted crops in anticipation of rains, unfortunately, there were prolonged dry spells in localized parts of the country. More recently (During the months between March-May 2020) heavy rains set in, causing floods and mudslides in some areas, pointing to possible poor harvests or even crop failure given Kenya's reliance on rain-fed agriculture and the dominance of smallholder farmers who produce 80% of the food consumed in the country as well as the African continent.

Relatedly, many countries in Eastern and Central Africa notably Kenya, Ethiopia, Somalia, Eritrea, Tanzania Djibouti, Eritrea, Uganda, South Sudan and the Democratic Republic of Congo are still struggling to manage desert locust invasions that could ravage vast acreages of crop fields. The situation has worsened as a result of disruptions in food supply systems and access to agricultural inputs and food caused by the COVID-19 pandemic.

In fulfilling her mandate to represent, articulate, protect and promote the interests of farmers, owing to the emergency crisis brought by the triple effects of COVID-19, Climate Change and the locusts' invasion, the Kenya National Farmers' Federation (KENAFF) developed an emergency response plan to support farmers respond to COVID-19, Climate Change and desert locusts' invasion and, ultimately, adapt and build resilience. The implementation of this plan is ongoing and will be for the next 16 to 22 months. The emergency response plan had four components namely: Information dissemination and knowledge sharing, USSD, market facilitation, Model Kitchen Garden/ Farmer Field School (FFS) and need based support.



Adaptation and resilience under the emergency response mean farm families are food and nutrition secure; able to access and engage in reliable markets; prioritise the participation and well-being of women, youth and persons with disabilities and able to withstand internal and external shocks on their enterprises.

As part of its commitment to enhanced livelihoods, KENAFF is working with various partners to support farmers build resilience against COVID-19, climate change and market challenges. Some of the adaptation and resilience work KENAFF is doing with farmers includes the promotion of sustainable home gardens for enhanced household level food and nutrition security, provision of basic inputs and liquidity support for the establishment of apiculture projects, tree, fruit tree and vegetable nurseries, kitchen/home gardens, FFS, support to youth and women groups, support to VMGs, fodder plot establishments, intensive sharing of information and knowledge on COVID-19 mitigation, adaptation and resilience building across several farmer friendly media (local radio and TV) but also on social media (Twitter), USSD and the KENAFF Farmers' Voice newsletter (online) and website, training and supporting rural entrepreneurship; training on and promoting farm forestry; setting up a network of Farmer Field Schools and creating awareness and sensitising farmers on Vision 2030, the Big Four Agenda, ASTGS, the Warehouse Receipt System, Regreening Kenya Initiative and SDGs.

KENAFF also organises farmers into groups and associations and strengthens their organisations from the grassroots. Strong and well managed farmers' organisations have the capacity and resources to organise members for production as well as access to inputs and technical advisory services.

## Description

Ultimately, such farmers are able to negotiate market dynamics from a stronger position; a win-win for all actors along the value chain and, indeed, for the country.

In the new reality of a global health pandemic, KENAFF turned to technology to support farmers and keep agriculture open for business. The explosive and rapid spread of mobile phones across Kenya offered an opportunity to enhance service delivery for our members and farmers amidst the pandemic. The specific objective was to establish and manage a national USSD code for communicating with farmers on a wide range of issues including containment and management of COVID-19, support services for farmers, seasonal weather forecast, technical advisory services and market intelligence and information. To this end, KENAFF set up and developed a farmer self-service (KENAFF Self-care USSD Code \*501#).

The global pandemic has hit farmers with disruptions in health, food security, transport, finance and demand. Of immediate concern is the disruption to food systems and impact on food security. Farmers and households, that are already food insecure need a boost for resilience building. Labour has been suddenly restricted in many regions due to quarantine measures and loss of workforce from COVID-19, farm systems resilience, agriculture system connectivity have all been affected. There is a new competition for critical inputs, especially water, due to increasing emphasis on public health and sanitation systems; there are impacts of supply chain and processing disruptions on animal welfare. COVID-19 has further exposed existing economic inequality and relative resilience of agricultural systems, as well as other social network systems reliant on agricultural income generation and stability. From the insights collected in the emergency response plan by KENAFF, four broad strategies are the most effective to help farmers go beyond surviving this crisis and also thrive in the long term. These are: Establishing integrated, climate-smart production systems with food crops, cash crops and agroforestry; exploring new markets and value addition to generate better returns, more income streams and new commercial channels; expanding alliances for investment, innovation and equitable value distribution, enhanced food safety from farm to fork as well as engaging consumers and shift to digital tools and platforms. These insights are informing the development of a KENAFF response strategy through the COVID-19 Response, Adaptation and Resilience building (KENAFF CORAR) with 7 components through which the Federation shall raise funds to support smallholder farmers all over Kenya cope with the new normal imposed by the pandemic.



## Results

The farm-system-for nutrition approach through the promotion of sustainable home gardens for enhanced household level of food and nutrition security has gone a long way to address the nutritional needs of small holder farm families in rural Kenya. Awareness of balanced diet, nutrient content in different foods and leveraging agriculture for nutrition has made it possible to boost immunity of farming families amidst the pandemic.

KENAFF lobbied for farmers, farm inputs and farm produce to be given the status of “essential services/essential service providers” during the COVID-19 shutdown, a recommendation that was granted by the government.

A USSD code environment targeted at farmers in Kenya was developed that provides easily accessible and farmer-focused information and knowledge on COVID-19 mitigation, adaptation and resilience building, weather data (better farming) and technical advisory services (better farming) reaching thousands of farmers in rural areas.

Through the market facilitation component, value chains alliances have emerged providing farmers with a steppingstone for future growth. Such include partnerships entered into between counties that have potatoes as a priority value chain and the National Potato Council of Kenya (NPCK) for market support services, MOU entered between counties with dairy as a priority value chain with the Kenya Livestock Breeders Association (KLBA) for quality assurance during dairy cow sales, framework partnerships on sweet potato vine trading and cassava cuttings established between counties.

## Climate smartness

This project is focused on the use and empowerment of agro-climate information for decision-making processes, which is key for Climate-Smart Agriculture (CSA). Starting from this knowledge, the prioritization and implementation of climate-smart agricultural practices has been developed, focusing on farmers’ real needs, their advantages and disadvantages, as well as on their real climate threats.

In general terms, this project is very complete and we observe a great quantity of strategies aimed at the development of CSA, focusing on all the pillars (adaptation, mitigation, productivity and food security). Because of this, it is recommended to maintain their functioning and sustainability over the long term and, if possible, use their example in order to scale and address larger population.

Likewise, it is recommended to work on strategies for facilitating climate financing that would make it possible to accelerate the transformation of the production systems to be more resilient to the climate.



## NATURE – BASED SOLUTIONS TO COPE WITH CLIMATE CHANGE AND COVID-19

### Presenter

Farmers in Agriculture, Livestock, Cooperative, Organic Network - F.A.L.C.O.N Association

### Description



Indeed, the COVID-19 pandemic coupled with climate change, have amplified the existing pressures on the farming sector. In Mauritius, during the lockdown period, an appalling amount of natural resources were wasted. Due to restricted mobility, farmers were unable to irrigate crops, leading to a considerable loss of vegetables and fruits. Other challenges faced by farmers during the pandemic were:

- Failure of many local planters to use e-commerce for sales. Innovation and adaptation to a novel marketing platform are major challenges.
- Introduction of a sanitisation kit in farming activity is now compulsory (surgical masks, hand sanitisers, temperature recording device). The new routine has led to additional production costs.
- Wearing masks while working on fields and in markets generate discomfort but the farmers have to adapt to the new set rules.
- Poor tourism activity in Mauritius has generated a surplus in the availability of vegetables/fruits, thus leading to low prices of the produce. Farmers are therefore faced with narrow profit margins and even losses (auction markets are refusing additional vegetables from planters).

Abandoned crop fields decomposed rapidly with rising temperatures, thus upscaling the amount of CO<sub>2</sub> gas in the atmosphere. Livestock farms situated far from the farmers' localities led to increased stresses in the livestock, resulting to poor productivity in terms of reduced milk production, high emission of methane and ammonia gases from neglected cow dung and poultry faecal materials respectively as well as potential death of the animals. Additionally, a surplus in the crops harvested after the lockdown was noted, which further exacerbated episodes of food waste. However, the reduced farming activities mitigated, to some extent, air pollution since agricultural machinery was not mobilised. Consequently, the soil did not suffer from mechanical damage, leaving undisturbed the soil biodiversity. Soil erosion scenarios were also reduced. Furthermore, bee activity was enhanced with the absence of pesticide spraying.

In Mauritius, many farmers experienced and are still experiencing

huge losses due to the serious pre-existing burdens of climate change such as prolonged droughts, floods and harmful insects' invasion amongst others. Moreover, the contribution of the local households towards the preservation of the environment is highly scarce. Besides, the pandemic has further accentuated on the urgent need to expand local food production and to configure resilient food systems to curtail the dependency on imported food. The local communities realised the importance of being self-sufficient (producing own food). Food security in Mauritius has been fragilized by both the climate change effects and the pandemic. Being a member of the World Farmers' Organisations (WFO) and representing the farmers in the Republic of Mauritius, FALCON Association has been encouraged to develop the concept of Family Farming (FF) at national level. Following the COVID-19 pandemic, a necessity of Family Farming in Mauritius has been observed. Many locals wanted to do backyard farming but unfortunately lacked the basic skills and know-how for farming.

### Needs:

- Educating farmers on e-commerce.
- Introducing medical insurance scheme for planters is necessary since they need to report to work despite the pandemic.
- Training of farmers in adhering to strict hygiene protocols imposed by the government is critical.
- For better ROI, farmers can transform the excess of fruits and vegetables into processed foods, which could be sold for profits.
- Launching of new schemes for planters to alleviate the financial burden and to motivate them for future production.

### Best practices implemented to adapt to and/or mitigate climate change effects considering the COVID-19 pandemic impacts include:

- Engaging in Agroecological Farming, including, hydroponic (bioproduction), aquaponic, organic cultivation, organic sheltered farming and Agro photovoltaics.
- Minimising the use of the pesticides and synthetic fertilisers.
- Production and sales of local natural fertilisers (fermented cow

## Description

dung and urine as main ingredients) and herbal pesticides.

- Sensitising local communities on sustainable agriculture, for instance workshops on composting and free distribution of compost bins are being actively initiated with the assistance of FALCON Association.
- Free training on Agroecological practices is provided by FALCON Association in collaboration with National Cooperative College in Mauritius.
- Collection of seeds are being carried out to produce local organic vegetable & fruits that are resistant to the prevailing climatic conditions. The initiative is also adding up to food security.
- Surplus in crop production is transformed into processed food to mitigate food waste.
- Automated irrigation system (drip irrigation system) is being implemented in numerous farms.
- Many locals wanted to do backyard farming but unfortunately

lacked the basic skills and know-how for farming.

- In the context of the aforementioned issues, FALCON is creating a novel concept whereby each inhabitant will collectively join together to safeguard the environment while upscaling the supply of local food. Consequently, the project plan consists of sensitising the locals about the importance of conserving their natural surroundings and to motivate them for their crucial contributions. The introduction of community gardens will be the first step towards the fulfilment of the Agroecological Home project. In fact, each community centre will consist of one Young Farmer club who will be inspired to establish an agroecological community garden.

A community garden has already been set up at Morcellement St. Andre by a group of motivated youngsters. Subsequently, the youth will then encourage the village to develop an agroecological home. Beneficiaries will be architects, the locals, and stakeholders in the economic and environmental sector.

## Results

The implementation of agroecological practices in farms have benefited both the natural ecosystem and sustained the farmers' financial status. In fact, pesticide free crops are available for local consumers. Coupled with the sale of organic and bio produce, natural fertilisers and herbal pesticides, other income generating practices have been successfully identified with the selling of locally produced electrical energy from photovoltaics, placed on greenhouses. Recycling of livestock manure and other faecal materials have led to a decrease in the emission of greenhouse gases. With longer periods of drought, the irrigation system acts as water saving tool. The trickle system also condenses the pest, weed and disease pressures on farms and it requires minimal human intervention. The project of family farming will entail to independent, income generating households and uplift the local production. Young Farmers project will lead to successful set-up of community gardens by Young Farmers and boosting the households to initiate agroecological practices at home. Other outcomes encompass job openings in the architectural designs for agroecological infrastructure, moulding the future generations to invest fully in the conservation of their natural ecosystems, encouraging food security and for Mauritius to be a role model for other African countries in the engagement on agroecological practices.

## Climate smartness

The F.A.L.C.O.N. Association project has mostly implemented practices related to greenhouse gas emissions reduction including decrease of fertilizers use, increase of organic fertilizers use, use of composts, and reduction of waste. Adaptation practices have focused on water resources management such as irrigation systems and hydroponics. All these practices have direct or indirect effects on productivity and family food security, in the short, medium, and long term. All the practices promoted in the project aim at sustainable production, the reduction of emissions, carbon sequestration, and resilience increase of agricultural systems to different climatic events; and for that reason, this project is framed within the focus of Climate-Smart Agriculture (CSA).

In order to be able to have a greater reach, it is recommended to include processes of capacity building to strengthen the manner in which the farmers understand and use the climate information<sup>9</sup>, so that they may make better-informed decisions, considering the specific conditions of the context and the practices available to be implemented.

Likewise, it is recommended to develop strategies for strengthening climate financing mechanisms to accelerate a sustainable transformation of productive systems and be able to have a greater scaling of this initiative in other places.

<sup>9</sup> It is advisable to use climate information from official institutions. However, in case this information cannot be accessed, it is possible to use global secondary information such as CHIRPS (<https://climateserv.servirglobal.net/>). To transfer agroclimatic information, it is advisable to create spaces such as the Local Technical Agroclimatic Committees (LTACs) (<https://www.sciencedirect.com/science/article/pii/S2212096316300298>) and use methodologies such as PICSA (<https://climateserv.servirglobal.net/>).

## ORGANIC AGRICULTURE AND COOPERATION MODELS TO FIGHT CLIMATE CHANGE AND COVID -19 IN NEPAL

### Presenter

Nepal Agriculture Cooperative Central Federation Ltd. - NACCFL

### Description

In the present context, due to the COVID-19, these are the main challenges that farmers in Nepal are facing:

- Due to nationwide lockdown, farmers are unable to get the market for their produce, hence milk and vegetables for example are being dumped.
- Livestock (cows, buffalos, pigs, goats) are lacking enough feed and grass, and the same applies for poultry.
- Due to the lack of proper management of dumped or deceased produce, methane gas emissions increased.
- Farmers are not getting the agro-inputs (seeds, fertilizer, and labour) which will result in low production.
- Besides this, people living in urban areas are not getting the vegetables due to lockdown.
- Farmers are unable to carry out the different intercultural activities in their farmland.

Therefore, the agricultural sector is facing multiple challenges and smallholder farmers involved in these sectors are badly affected.

In this context, NACCFL has been involved in the marketing of vegetables produced in the rural areas. Before this pandemic, NACCFL had three outlets which were selling only the non-perishable products (pulses, cereals, different flour, honey, butter, fruits etc...). Due to the COVID-19 outbreak, NACCFL has also initiated to market perishable products, such as vegetables, to help its producers find a market.

With the support of its member's organizations, NACCFL has been selling fresh vegetables from 11 places of Kathmandu valley. Under the slogan "rural products in urban areas", NACCFL is working in the front line on this activity, according to three procedural steps:

- Collection of demand from customers through email, direct call.
- Packaging as agro-produces as per the demand.
- Home Delivery of agro-produces.

Besides this, the mobile van is travelling to different locations within the Kathmandu valley to market the vegetables. Also, NACCFL is trying to promote C2C (cooperative to cooperative) business, even at the district level – the NACCFL network works at the central level, provincial level, district level and local level. That means that if one cooperative (A) is processing rice, and another cooperative (B) needs rice, NACCFL facilitates/links B with A.

In the framework of the fight against climate change, NACCFL decided to train farmers in organic agriculture, who started farming accordingly, adopting agricultural practices with the aim to mitigate the effects of a changing climate. The action started after testing the soil of numerous small holder lands, as it has been noticed that the soil was degraded and acidic due to the overuse of fertilizers. Below some practices implemented:

- **Seed treatment:** Utilization of organic methods for treatment of seeds such as hot water treatments, disinfectants, herbal treatments, treatments with trichoderma, usage of salt for rice seeds etc.

## Description

- **Soil treatment:** Application of well-decomposed farm yield manure, vermi-compost, and compost.
- **Weed management:** Manual or mechanical control of weeds. No use of weedicide on farm.
- **Fertilizer management:** Well-decomposed farm yield manure is applied in order to prevent diseases. Organic fertilizers, such as compost, have been used for crops. Different organic fertilizers have been used as per recommended doses. Different types of beneficial microorganisms, such as trichoderma and rhizobium, have been incorporated in the soil.
- **Pesticides and insecticides management:** Integrated pest management practices are carried out on the farm. Biopesticides and insecticides have been preferred for the management of pests. Several types of insect traps have been used in the farm. Different beneficial microorganisms like *Bacillus thuringiensis*, egg parasite *Trichogramma*, *Beauveria bassiana* have been used to manage whiteflies, thrips, aphids and weevils. *Lecanicillium* spp. are deployed against white flies, thrips and aphids. *Metarhizium* spp. are used against pests including beetles, locusts and other grasshoppers, hemiptera, and spider mites. *Paecilomyces fumosoroseus* is effective against white flies, thrips and aphids.
- **Diseases control:** Beneficial microorganisms such as *Bacillus subtilis* and *Trichoderma viridae* are also used to control plant pathogens. Crop rotation, intercropping has also been practiced in the field for the control of diseases. Different home-made bio-fungicides, bio-bactericides have been used to control diseases.

## Results

Organic agriculture is taken as one of the appropriate farming systems which has twin objective of climate change mitigation and adaptation. Organic farming mainly depends upon crop rotations, use of crop residues, well decomposed farm yield manure, mineral rock and bio-fertilizer, natural pesticides and insecticides. Organic agriculture reduces emission of greenhouse gases, thanks to the avoidance of chemical fertilizers in farm. Thus, it enhances the carbon content of soil. Organic farming is also more energy efficient. It is reported that the use of energy is 20 to 50% less in comparison to the conventional farming system (Pimentel et al., 2005; Schader et al., 2011 and Muller). As organic farming avoids the use of insecticides, pesticides, hormones, etc. it helps in mitigating the climatic change. Organic farming easily sequesters carbon in the soil. (Panwar et al., 2010; IFOAM, 2009).



## Climate smartness

This project is very rich in the use of Climate-Smart agricultural practices. As described in the results of the project, the practices promoted increase the capacity for adaptation, yields and incomes generated by the agricultural systems. The project also promotes greenhouse gas emission reduction and soil carbon sequestration increase. It is recommended to strengthen farmers' knowledge in regards to access and use agroclimatic information<sup>10</sup>, to improve decision-making process such as planting dates, use of varieties, etc. This project can benefit from the inclusion of other practices (some of them in CIAT et al., 2017), which can be identified by the farmers themselves through participatory processes aimed at building capacity.

<sup>10</sup> It is advisable to use climate information from official institutions. However, in case this information cannot be accessed, it is possible to use global secondary information such as CHIRPS (<https://climateserv.servirglobal.net/>). To transfer agroclimatic information, it is advisable to create spaces such as the Local Technical Agroclimatic Committees (LTACs) (<https://www.sciencedirect.com/science/article/pii/S2212096316300298>) and use methodologies such as PICSA (<https://climateserv.servirglobal.net/>).

## LOWERING THE CARBON FOOTPRINT OF FARMS WHILE COPING WITH COVID-19 IN NEW ZEALAND

### Presenter

Federated Farmers New Zealand



### Description

When the pandemic arrived in New Zealand, farming could continue even during lockdown periods. However, there have been effects on local towns and cities, especially, small shop owners who sell fresh fruit, vegetables and meat were the most affected, since they closed their shops due to lockdown rules and therefore some product was spoiled. The supermarkets were not affected because they were allowed to continue to trade under strict rules. Traffic checks held up or prevented farmers from getting to some properties, especially when lockdown rules differed among districts. Some animals had to be kept on farm for longer than normal, because the number of workers allowed at meat processing plants was reduced, and also due to the complete shutdown of stock selling at sale yards. It took some time for online sales to fill that gap. Moreover, the situation worsened when a drought hit the country, which made it even harder for farmers

to feed their animals, because they couldn't destock to match feed supply. The country's borders are still closed hence creating problems because of the lack of trained staff to drive planting and harvesting equipment, and for fruit pickers.

Among the best practices implemented there are:

- Online trade.
- Increased farm planting of trees.
- Actions to increase biodiversity.
- Riparian protection.
- Stock shelter.
- Researches conducted on sheep flocks.
- Tools indexes available for farmers to check their ranking for methane and nitrogen efficiency for cows.

### Results

Farmers are continually lowering their carbon footprint a little bit at a time, but collectively it starts to amount up to meaningful reductions for the country. Some results from the above-mentioned solutions to cope up with COVID-19 and climate change challenges are:

- More opportunities to trade online save fossil fuels on travelling to view stock.
- Carbon farming.
- Increased Biodiversity.
- Thanks to research, new Rams were available that have less methane emissions from the prodiginine.
- Awareness among farmers on the methane and nitrogen efficiency of cattle.

## Climate smartness

The majority of practices promoted in the project significantly contribute to the three Climate-Smart Agriculture (CSA) pillars, since they are focused on both climate mitigation and adaptation, generating an impact on the profitability of the crops.

It is worth noting that practices such as increasing tree planting and the use of tools for monitoring greenhouse gas emission are largely related to mitigation. On the other hand, practices focused on the use of conservation of water sources increase the adaptive capacity of the productive systems.

Finally, the practices promoted in this project for opening new markets and marketing strategies have had an undeniably positive impact on farmers' incomes.

It is recommended for optimal implementation of climate-smart agricultural practices to strengthen the flow of climate information<sup>11</sup> to the producers, as well as empowerment as regards the use of this information. All this will make it possible for farmers to make decisions about forage planting dates, the species and varieties to plant, and the place on their farm that is best for planting, the type of management of the animals, among many others.



<sup>11</sup> It is advisable to use climate information from official institutions. However, in case this information cannot be accessed, it is possible to use global secondary information such as CHIRPS (<https://climateserv.servirglobal.net/>). To transfer agroclimatic information, it is advisable to create spaces such as the Local Technical Agroclimatic Committees (LTACs) (<https://www.sciencedirect.com/science/article/pii/S2212096316300298>) and use methodologies such as PICSA (<https://climateserv.servirglobal.net/>).

## ADDRESSING CLIMATE CHANGE IN THE AGRICULTURAL SECTOR, IN TIMES OF COVID-19 PANDEMIC: EXPERIENCES OF SEED BANKS IN NICARAGUA

### Presenter

Banco de Semillas de arroz, Regalo de Dios Ochomogo-Nandaime, Nicaragua  
Banco de Semillas El Esfuerzo, La Paz, Carazo, Nicaragua

### Description

Climate change has brought extreme climatic variations that have significantly affected the national territory and caused the loss of agricultural production and even life losses:

- Between 2014-2016 there were droughts, while in 2017 the rains were intense.
- Droughts caused low yields (i.e. Bean's yield between 450- 650 kg / ha), causing in this way deficiency in food security, pushing producers to make variations in the dates of sowing due to the shortage of water in some years.

Moreover COVID-19 caused economic recession coupling with the effects of climate change:

- The lack of rain in some key periods of the crop and due to the effect of the pandemic, the prices of inputs have increased, resulting in a reduction in areas and lower production.
- Due to the pandemic, the closure of markets and the difficulty in transportation make production sale less easy.
- There is a shortage of labour for crops and marketing is concentrated in the community with less mobilization in the city.

Despite the challenges faced, seed banks proved to be a model that can survive in this difficult scenario as seed facilitators.

Since 2016, Seed Banks in Nicaragua has provided:

- 290 tons of bean seeds.
- 362 tons of rice seeds.
- Better prepared producers.
- Value Added to the Market.

Below the experiences and best practices implemented by two Seed Banks in Nicaragua:

#### • Bean seed bank "El esfuerzo"

In this seed bank, three main actions were implemented with the support of the Technical Mission of Taiwan (ICDF) in Nicaragua:

- Production: improved seed for drought, use of biological materials and biofertilizers, use of mulch etc.
- Organisation: cooperation fund to establish production areas; sufficient manpower.
- Marketing; promotion activities, seed supply to Managua.

The combined use of the INTA Rojo variety and the biofertilizer Rhizobium resulted in increased production: each plant produces 20 to 30 pods, with 5 to 6 grains, obtained 1,3 ton/ ha (before it was 0.7 ton/ha) of bean seeds.

#### • Rice seed bank "Regalo de dios"

In this seed bank, capacity building activities were implemented, resulting in increased production of rice seeds. In this seed bank, they used to produce less than 3 ton/ha, and after the capacity building, they could have more the 5 ton/ha, because of the training through the project of the Technical Mission of Taiwan (ICDF) in Nicaragua. Producers will achieve certification of their seed banks and be self-sustaining.

## Results

Main results of best practices implemented by the Seed Bank community:

- Use of varieties resistant to drought, pests and diseases.
- Efficient use of resources to obtain good yields, reducing production costs.
- Making use of appropriate crop practices such as planting distance, densities and use of bio-inputs.

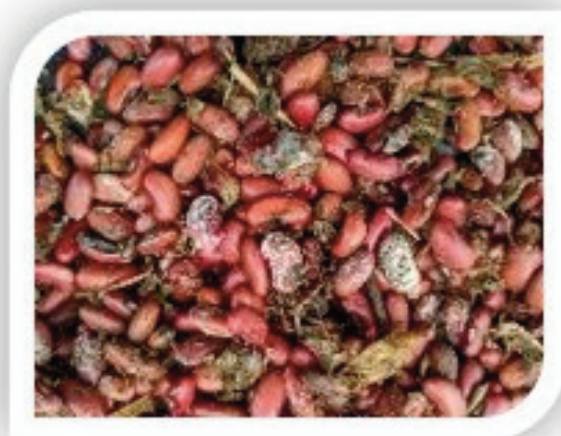
## Climate smartness

Certainly, the practices implemented in Nicaragua are climate-smart because they address climate smart agriculture pillars: adaptation, mitigation, and productivity.

The use of seed banks, for both beans and rice crops, is an adaptation practice that allows replanting in the event of losses due to climate variability. The approach used in this project guarantees farmers access to seeds tolerant to drought, pests, and diseases. On the other hand, the use of mulch and other biological preparations contributes to mitigation, since those are practices that reduce nitrogen and carbon losses (in the form of organic matter) from soil.

All these practices have a positive impact on productivity, because they help to increase yields or reduce the costs of production depending on the case.

It is recommended to review some best practices for the study developed between the World Bank and CIAT (2015), which can have synergies with those described in this project. Likewise, it is recommended to include in this project the strengthening of the flows of climate information<sup>12</sup> to the producers, as well as empowering them in the use of such information, so as to ensure that the producers can make better decisions based on climate knowledge.



<sup>12</sup> It is advisable to use climate information from official institutions. However, in case this information cannot be accessed, it is possible to use global secondary information such as CHIRPS (<https://climateserv.servirglobal.net/>). To transfer agroclimatic information, it is advisable to create spaces such as the Local Technical Agroclimatic Committees (LTACs) (<https://www.sciencedirect.com/science/article/pii/S2212096316300298>) and use methodologies such as PICSA (<https://climateserv.servirglobal.net/>).

# PARAGUAY

## SEEKING SOLUTIONS TO THE CHALLENGES OF CLIMATE CHANGE AND COVID-19 FOR THE FLORICULTURE AND AQUACULTURE SECTORS IN PARAGUAY

### Presenter

Panambiveve Committee – Production and Sales Organization

### Description

The pandemic has brought with it challenges and Paraguay has been no exception. Two were the main challenges identified:

- Economic challenge: in terms of management and identification of markets, sales systems.
- Working system challenge: the health and care of the workers, as well as the availability of inputs for production, since most of them are imported.

**Below a description of the main challenges faced by Panambiveve Committee in different sectors:**

#### Floriculture area:

- Climate change is a great challenge for agriculture, since it is one of the factors that have generated the greatest environmental impact on the planet. As an example, orchids are produced in a protected environment that reduces and optimizes resources for production, which leads to a higher level of investment in technology that in turn translates into higher costs for production.
- In the area of Floriculture there were around 2 months of uncertainty, generating a total nullity in the sales, that even caused the decrease in the crops for fear of not being able to place the production and to avoid unnecessary expenses in inputs and labor.
- However, once the quarantine was partially opened, a strong marketing with state support was generated for the sale of the products through several platforms. The closing of the border and the non-entry of Brazilian plants helped to place national production in large quantities.
- The COVID-19 pandemic has forced people to a different way of living, since many of the events that involved income for the flower industry have been totally relegated, such as fairs, even social events that were the ones with the highest income. Seeking alternatives to income and improving growing conditions to compete in quality are the new opportunities for the flower industry.

#### Aquaculture area:

- For the aquaculture sector, the hardest stage of the pandemic was the quarantine in March and with no income for two consecutive months.

**Below a description of the best practices implemented in each sector:**

#### Floriculture Area:

- Reinvention: generating new marketing channels, use of digital platforms and delivery.
- Infrastructure: with the corresponding sanitary measures adapted both for health care and environmental care.
- Proper crop management: optimizing inputs such as water, phytosanitary products and others that can generate impacts on the environment.

#### Aquaculture Area:

- Organization of the producers: more than 100 ponds have been excavated and the association has taken advantage of this to

lower its cost of pond construction, purchase of fry, etc.

- Multifaceted agriculture: the hardest stage of the pandemic was the quarantine in March and with no income for two consecutive months, fortunately there was a lot of produce from the farm. That's why farmers were able to fight during this time.
- Product map: there is no shortage of diversified food production on the farm, but farmers need help in selling agricultural products to facilitate the operation of the association so that they can buy other daily needs. They are promoting the producers through internet sales (Product Map) and want to sell all the products they produce like milk, cheese, eggs, vegetables, etc

## Results

Main results:

- Organized association.
- Product diversification.
- Market diversification- Product Maps (Online store).

## Climate smartness

The practices described in Paraguay contribute to Climate-Smart Agriculture (CSA) through the increase of climate adaptation and farmers' incomes. The experiences described, both in the growing of flowers and aquaculture systems, with respect to market channels diversification and new markets, are practices focused mainly on farmer's incomes.

On the other hand, the optimal use of agricultural inputs and the management of water in the cultivation of flowers are practices for climate adaptation. Likewise, production diversification in aquaculture systems promotes climatic risk distribution so that the producers are more climate resilient.

The introduction of practices related to greenhouse gas emissions reduction in the productive systems described is recommended. Focus can be made on nitrogen fertilizers management and rationalized fish feeding in aquaculture systems. It is worth reviewing the practices evaluated at a worldwide level that could be implemented in Paraguay, as described in the document published by Sova et al., 2018.



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