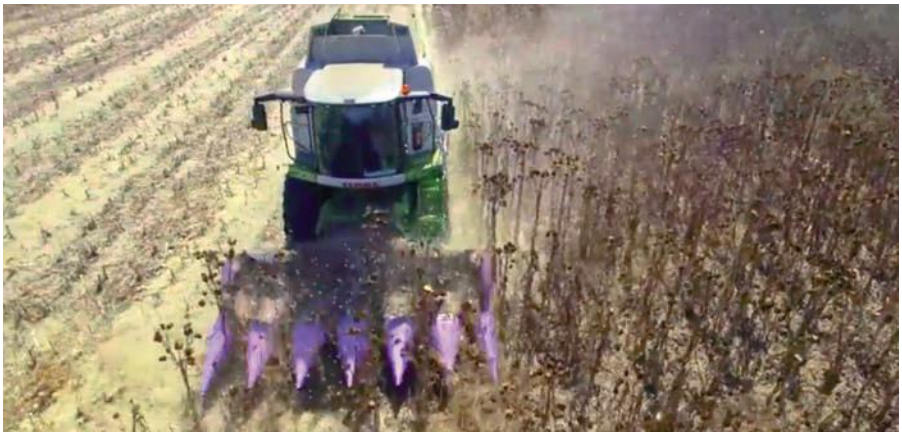
ITALY

MATRICA



Presenter

Coldiretti National Confederation

Description

In 2015, the Italian farmers' organisation Coldiretti signed an agreement with the company Novamont for the establishment of a new agro-industrial value chain for bioplastics and bio-lubricants. This joint venture is named Matrica and is focused on the exploitation of the cardoon. The cardoon is a naturally occurring species, grown on abandoned and uncultivated lands, that spontaneously grows in a large area of the Sardinia region; it does not need water irrigation, provides an anti-erosion effect and it has a good adaptability to harsh territories, if compared to other productions.
This input - together with other agricultural waste - is sold by farmers to the Matrica bio-refineries, which transform these elements into biochemical, bases for bio-lubricants, monomers for bioplastics and bio-additives for rubber.
The core idea is to create an agricultural value chain that respects the territory, valorises abandoned non-irrigated areas and introduces a bio-refinery deeply integrated into the territory in synergy with the food supply chain and aimed at producing high added-value products exploiting local raw materials.

Results

The project introduces a new model of regional development based on a collaboration between agriculture and the innovation industry and that gives practical application to the concepts of circular economy and innovation, at the same time providing additional sources of income for farmers and increasing vitality of rural areas. Main results are:

- The exploitation of abandoned lands, considered no longer profitable for food production;
- The creation of an integrated supply chain, gathering together farmers and industry;
- Efficient use of agricultural waste and/or residues;
- Cascade use of resources;
- Creation of new income opportunities for farmers;
- Development of new innovative and sustainable products.

Climate smartness

This project is designed to diversify production within farms and use highly tolerant species to drought conditions, to generate raw materials with commercial value in the biochemical industry. Additionally, by including the use of crop residues, contributes to the reduction of greenhouse gas emissions. Therefore, the project is framed in the three CSA pillars: adaptation, mitigation, and productivity.
It is important to highlight the agreements made with the processing industry, since this type of trade agreements guarantee the success of this type of initiatives, which is important for scaling up of these innovative production systems.

JAMAICA

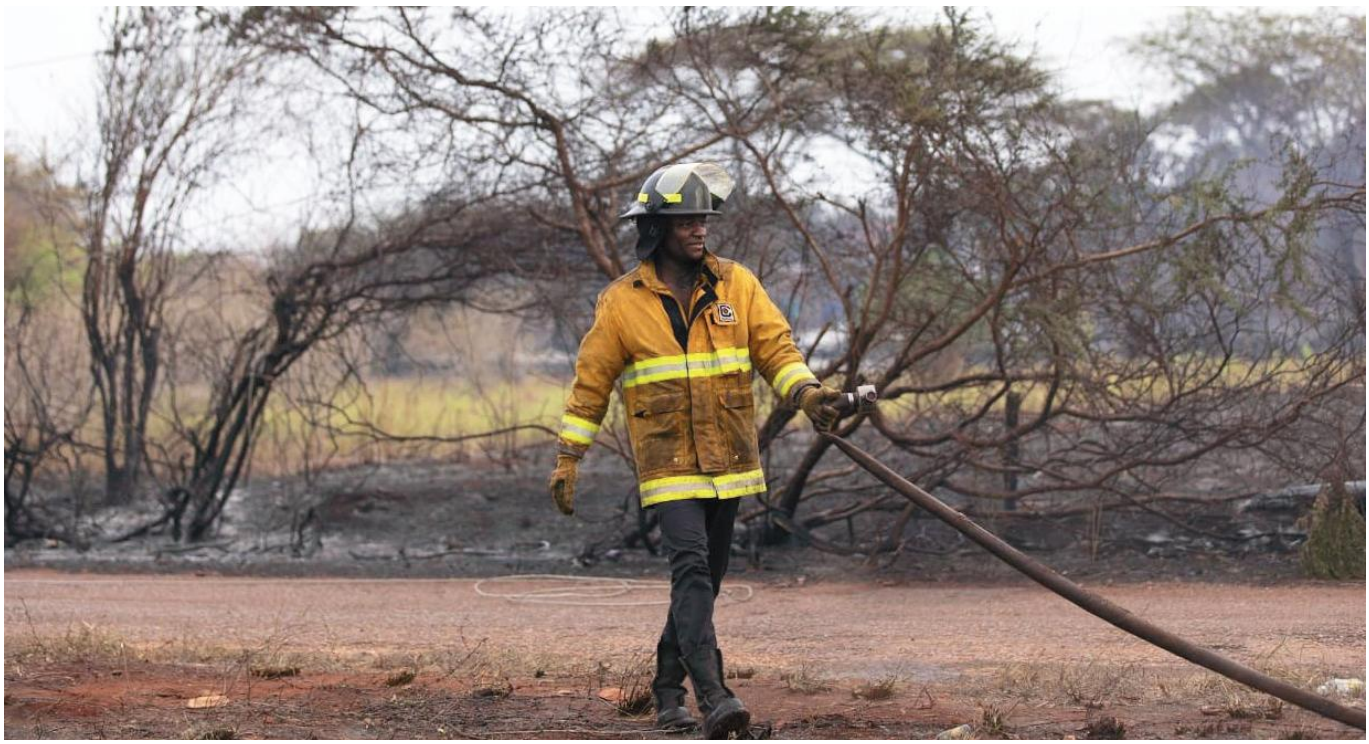
RIO MINHO WATERSHEDS

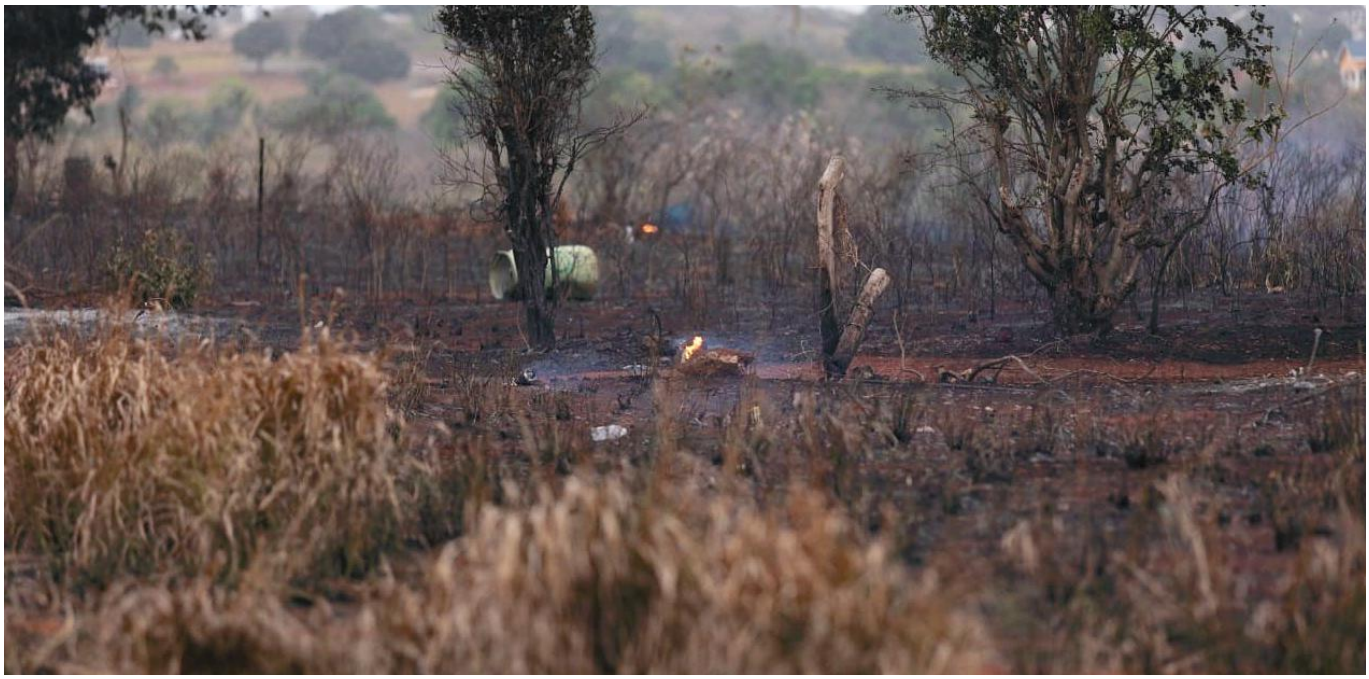
Presenter

Jamaican Network of Rural Women Producers

Description

The main cause of climate change is the concentration of carbon dioxide in the atmosphere, coming mainly from fossil fuels, carbon dioxide, nitrogen and other gases. Jamaica's contribution to global emissions is very little compared to other countries, due to less industrialisation and presence of infrastructures. However, Jamaica's commitment to mitigate emissions is high: in Jamaican national policy, the country has set targets for the reduction of the dependence on fossil fuels and set targets for reforestation. Targets has been set as well in relation to reduction of emissions from vehicles by cutting down the importation of older vehicles which are less fuel efficient. Jamaica is also turning to more renewable sources of energy. The Country signed the Paris Agreement and have set a 30% target to reduce emissions by 2030. It is part of the group 'Seventy-Seven', maintaining a significant voice in international forums bringing the voice of farmers.
Jamaica has in place a national policy framework on climate change. This policy outlines the strategies that Jamaica will employ in order to effectively respond to the impact and challenges of climate change. The Country led the way in terms of political action, as the first one to create a Ministry with responsibility of climate change.
Practices are being implemented to manage watersheds that are being degraded throughout the Country. One important example can be identified in the project on Rio Minho watershed, where dams have been built in order to manage the run of the water coming from the hillside, channelled for irrigation purposes.
Moreover, farmers are looking for sustainable water harvesting techniques (reservoir ponds), instead of unsustainable catchment systems.





Results

Even though Jamaica is a small country - and not only Jamaica but other Caribbean islands - risks are large. In other bigger nations, if sea levels rise 2 feet they can retreat to a mountain, if in the Caribbean Sea levels rise above 2 feet, people may become climate refugees. In the Caribbean it is important to share best practices, to learn from each other and to make the necessary representation on behalf of rural farmers. There is a need for farmers to aggregate and be part of the discussions at International level through their representations.

Results of best practices implemented in the country are:

- Better water management;
- Resilience to droughts.

Climate smartness

It is worth highlighting that the project focused on the implementation of collective benefit practices and practices of an individual nature, which allow climate risk management at different scales, this contributing more effectively to the success of the project.

The project is mainly focused on helping producers to adapt to climate change and variability with regards to water resource management. The practices implemented allow farmers to have water available during both the rainy and dry seasons. In the same way, by promoting practices that allow crops to develop in dry seasons, the income is increased through enabling farmers to sell their products throughout the year. Therefore, this project is climate-smart since it is framed within two of the fundamental pillars of this approach, which are adaptation and productivity.

To be more comprehensive, the project could include practices focused on the conservation of the basin and the implementation of forest systems that help improving the hydrological cycle, which may be beneficial for the objectives of this initiative.

Additionally, this type of practice, which includes the use or conservation of tree species, enables adding the mitigation component to the initiative, since carbon sequestration in tree biomass could also be considered.

MONTSERRAT

RESILIENCE, INNOVATION AND KNOWLEDGE

Presenter

The Montserrat Farmers Association

Description

Climate change is bringing more intense rainfall during the wet season and longer periods of drought during the dry season. This creates greater challenges to farmers. The heavy rain creates problems for land tillage operations on arable lands especially on the soils where clay content is high and if the tractor operations are not timely the farmer is forced to operate on soil with improper tilth.

Heavy rainfall causes erosion, flooding and in some instances, crops are waterlogged so they lodge, suffer from rotted roots or rotted produce.

The prolonged drought negatively affects productivity as the crops require more water. Plants often wilt or are affected by vertebrate pests like iguanas eating their foliage.

Bare patches of land left after a serious drought also contributes to more serious erosion when rain comes.

Another serious threat is the increased frequency of devastating hurricanes which affect both the living and farming conditions of the farmer. Damage to property, machinery and crops can be extensive and recovery can be costly. Sometimes after a strong hurricane, new invasive pests are introduced, these can prove to be a challenge to control.

The best practices adopted include:

- Water harvesting;
- Drip irrigation;
- Protected agriculture;
- Contour farming and establishing proper drainage.

Farmers are encouraged to harvest water mainly through the use of tanks that collect water from the roof of houses and farm buildings where they exist. Dams or small ponds are also encouraged where feasible. Solar pumps have been recently introduced. They are used to pump water from ponds or cisterns to these water tanks and then the water is gravity fed through the drip irrigation system. Contour barriers in combination with windbreaks are also used. Protected agricultural practices have grown in importance initially as a response to the volcanic eruption but now proving to be important regarding climate change as well.

Greenhouses provide protection from acid rain and are used for pest control. They are very expensive to establish and maintain. The structures are susceptible to hurricanes and although the recommendation is to take off the covering during a storm it can be quite challenging especially in years when the storm frequency is high. There is also the problem of heat generated in the greenhouses and hoop houses and to avoid the expense of extractor fans which do not work well in Montserrat, the farmers have been using shade netting as a ceiling in modified greenhouses where the entire house has an insect netting covering and vents.

The greenhouses also are effective in pest control as insects are screened out and every effort is used to ensure that they cannot get in. It also protects the plants from vertebrate pests like the rodents (rats, mice and agouti), iguanas and birds like the pearly eyed thrasher and feral chickens.

Results

• Water harvesting: Montserrat is very hilly, so many areas are not suitable for drip irrigation, but where possible this is encouraged in combination with water tanks from which the water is usually gravity fed.

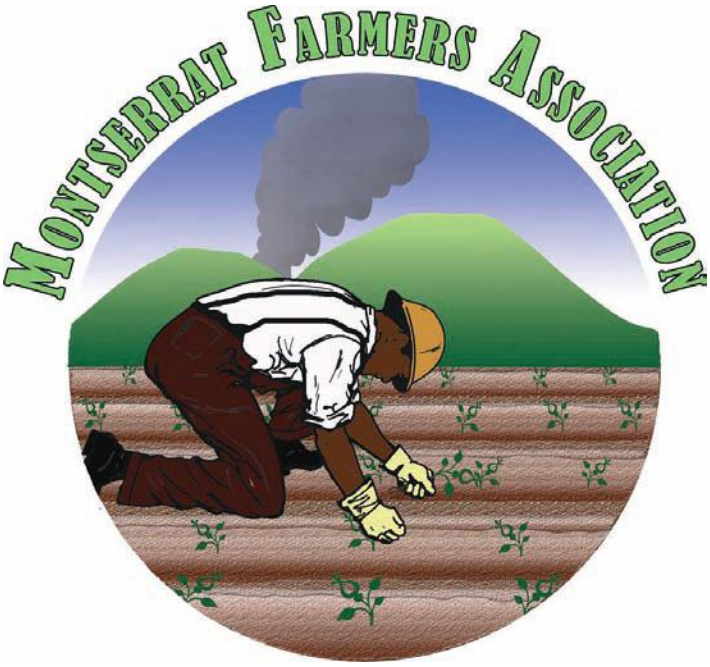
• Contour barriers in combination with windbreaks: as the parcels of land become smaller, this poses a great challenge. In an estate setting, large areas could be contoured, and proper drainage established and even if the land is divided among several farmers the contours drains and windbreaks remain established. This is not the present situation in Montserrat, and one farmer can quite easily be affected negatively by another farmer or a householder (depending on where he/she is farming) who does not practice proper soil conservation.

Climate smartness

The diverse practices promoted in the project support the bases of CSA since they focus mainly on adapting to climate change and increasing the profitability of crops. Most of the practices promoted in the project are identified among the main ones in terms of a global CSA evaluation at a global scale by Sova et. al., 2018.

The project also recommends working on some practices that contribute in terms of carbon capture or reduction of greenhouse gas emissions, aiming to increase the affinity of the initiative with the CSA approach.

It is also recommended to include other additional practices in the region to the ones that are in the implementation phase, which can be identified by the producers themselves. In order to do this, it is important to strengthen the flow of climate information towards producers, as well as their empowerment when it comes to use such information, in order to ensure that in the future they can make good decisions, adjusted to their socioeconomic and environmental conditions. Likewise, working on building community awareness and strengthening social networks in these communities show up as relevant factors that can help producers to understand that what they do on their farms can affect other producers. This helps to scale promoted practices and contributes to sustainability over time.



NEPAL

ORGANIC AGRICULTURE AND CLIMATE CHANGE ADAPTATION: A CASE STUDY OF A SMALL FARMER

Presenter

Nepal Agriculture Cooperative Central Federation Limited - NACCFL

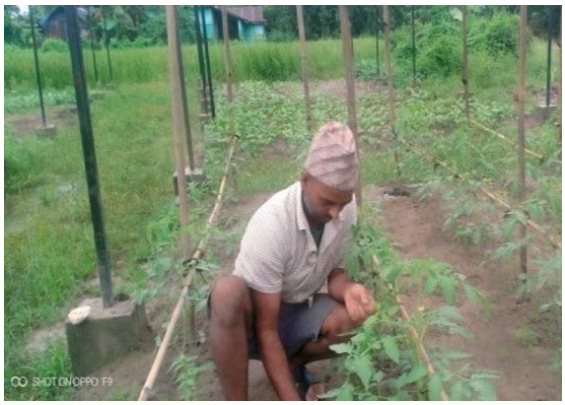
Description

Punya Ghimire, a small farmer of Maharanijhoda, Jhapa had been practicing non-organic farming for 8 years. After testing the soil of his land, the farmer noticed that the soil was being degraded and acidic due to overuse of fertilizers. For this reason, he decided to be trained in organic agriculture and started farming accordingly, adopting agricultural practices with the aim to mitigate climate change:

- **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.;
- **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. Bio-pesticides 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 have 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. It is because of 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

As described in the project results, practices promoted contribute to all CSA pillars (adaptation, mitigation and productivity), because these practices increase adaptive capacity, yields and incomes from agricultural systems, as well as, support the reduction of greenhouse gas (GHG) emissions and increase soil carbon sequestration.

The project may benefit from including other practices (some of them in CIAT et al., 2017), which can be identified by the farmers themselves if participatory processes for building capacity are put in place. This may be done through strengthening farmers understanding of historic and future climate information and its effect on agricultural systems. Such processes may increase farmers resilience in terms of providing them tools for better-informed decision-making processes which may be tailored on their needs, socioeconomic and environmental contexts.

NORWAY

CLIMATE SMART AGRICULTURE CALCULATIONS

Presenter

Norwegian Farmers` Union

Description

Farmers experience more rain and more intensive rain, with avalanches. They experience more of the same type of weather for longer periods of time.
The weather is also "wilder" and more extreme weather events occur, including droughts. For example, during the Summer of 2018 farmers in many parts of Norway experienced extreme drought. Changes in the ecosystems also affects the farmer.
Norwegian farmers' Union is about to start a program called climate smart agriculture, where farmers get help to calculate climate emissions on his/her farm and how they can be reduced. The program calculates emissions, benchmarks towards other productions and simulates which measures are most efficient. The aim is to adopt better systems for documentation and calculation of potential for reduced climate footprint for each farm for better sharing of knowledge. In 2017, a hunt for 100 climate solutions in agriculture started as part of the project. Use of biodiesel in tractors, breeding more climate friendly cows and climate smart trenching are some of the solutions identified.
Training of climate counsellors has also been run all through the country. The project is owned by a coop called Landbrukets Klimaselskap AS (Agriculture`s climate company). The coop is owned by 15 Norwegian agricultural companies, organisations and coops. It is financed by the owners and government funds.
Norwegian farmers are already seeing the challenges with a changing climate. They have to cope with the change in weather conditions. Farmers need to improve the soil quality and preserve ecosystems. They need to get more control on the inputs on the farm, and to build up necessary capacity to sow and harvest in a shorter period of good weather. There are huge differences from farm to farm about which climate measures will be most efficient. Through the climate smart project, farmers will get help to measure his emissions and find out how to run the farm more climate efficiently.

Results

The expected outcome of the climate smart agriculture project is lower climate gas emissions from the farm by getting a better overview of where the emissions come from and how emissions can be cut in the agricultural sector. The farmer will get tools to run the farm more climate friendly through the project.

Climate smartness

It is worth highlighting that this initiative is led by a national producers' association, which may enable its scaling up and out, and ensures benefits to a larger group of farmers. As described in the project profile, the approach focuses on reducing GHG emissions, which constitutes one of the main pillars of CSA. Moreover, practices promoted within the project have also a significant contribution to adaptation to climate change of agricultural systems, which makes the project even more climate-smart.
Building capacity of climate advisors is a very important aspect of the project as farmers can refer to them to assess their climate behaviour. Methodologies are available in order to share climate information to farmers, so they can understand the linkages between climate and crops, which will allow farmers a better-informed decision-making processes on their agricultural activities. It might also be useful to monitor the impact of the practices implemented in terms of income generation; therefore, the project could also determine if it is also contributing to the CSA pillar on productivity.

SAINT KITTS AND NEVIS

FARM RESILIENCE TO CLIMATE CHANGE

Presenter

Farm – Saint Kitts

Description

Climate change has been affecting Saint Kitts area in different ways. Farmers had to cope up with disastrous weather events like hurricanes, while running out of water during prolonged droughts.

Other effects of climate change experienced in Saint Kitts are:

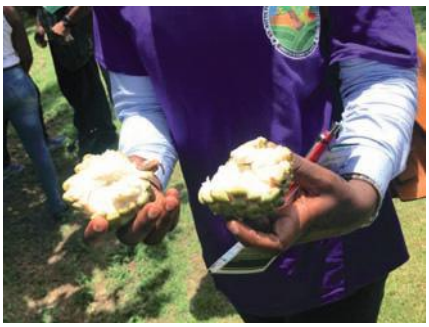
- Pests and alien species;
- Loss of seasonality of production;
- Change in produce (black spots etc).

In order to cope up with those effects of climate change, the experience of the presented farm in Saint Kitts show the adoption of several best practices:

- Own production of fertilisers not to be reliant from providers;
- Production of organic fertilizers and pesticides customized on the different plantations;
- Investments in water tanks;
- Free range chickens that help fertilize the soil;
- Diversification of income (i.e making oil out of nuts produced on the farm).

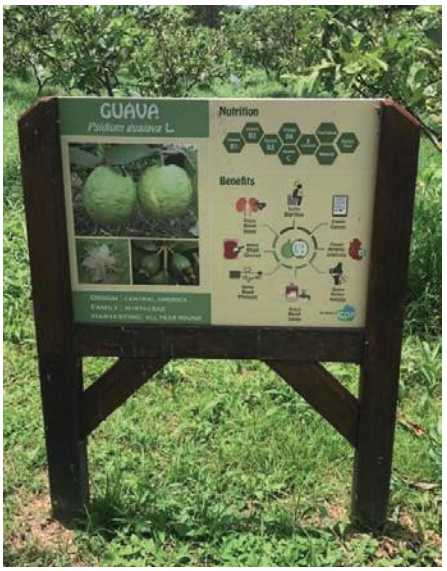
Results

- Resilience from extreme events;
- Wiser use of pesticides;
- Circular use of what is grown on the farm;
- Positive change in soil composition.



Climate smartness

The different practices promoted in the project, contribute significantly to the three CSA pillars, since they focus on mitigation and adaptation to climate change, and the increase in profitability of crops. Most of the practices promoted in the project are identified within a global CSA evaluation carried out by Sova et. al., 2018. It is highlighted that the project promotes circular economy practices, where all products and by-products are used for the development of the production process within the farms, which results in the reduction of greenhouse gas emissions. The inclusion of additional practices is recommended, with the purpose of supporting farmers to improve yields and climate resilience. In addition, it is essential for the optimal implementation of climate-smart agriculture to strengthen climate information flows to producers, as well as the empowerment regarding the use of climate information, to ensure better decisions in the future, adjusted to their socioeconomic and environmental conditions.



SAINT KITTS AND NEVIS

ADAPTATION TO CLIMATE CHANGE

Presenter

Taiwan International Cooperation and Development Fund, ICDF

Description

According to World Bank data, Saint Kitts and Nevis have already been affected by climate change:

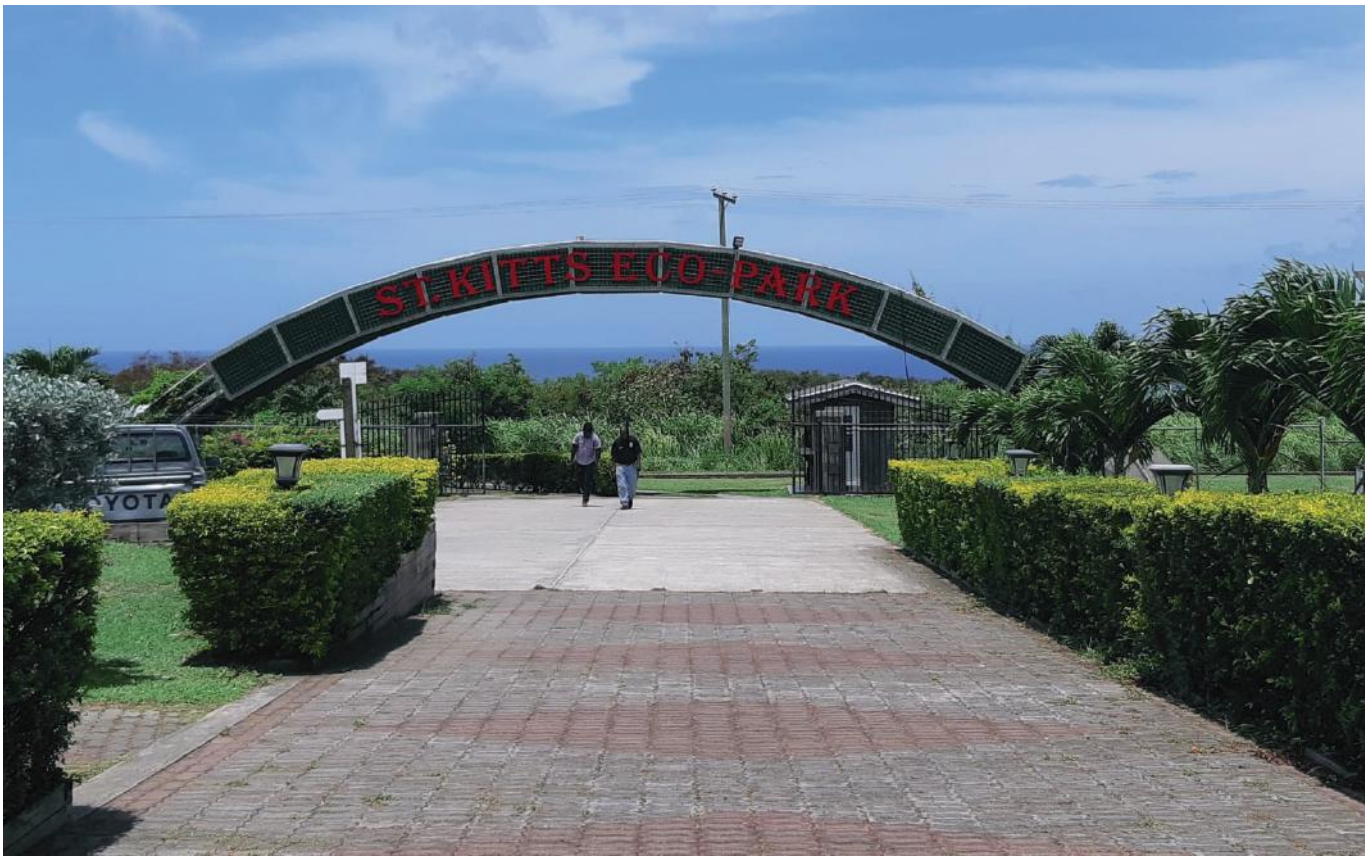
- Temperature has risen by 6.06 degrees Celsius since the '60s; by 2050 temperature in Saint kitts and Nevis will increase by 1.3 Celsius;
- Speed of wind has increased;
- The number of dry days is expected to increase;
- Sea levels are expected to rise between 0.3 and 0.5 metres by 2090;
- Extreme weather events: 12% increase in hurricanes, 4%increase in floods and 3% increase in droughts.

ICDF started several projects in the region, in order to tackle the challenge of climate change for the agricultural sector:

- Gathering of early warning information: installation of weather stations for real time data, integrated with the collaboration with ICT centres for the storage of data and with CIMH, the Caribbean Institute of Meteorology and Hydrology;
- Developing and introduce crop disaster mitigation and prevention techniques. This is done by:
  - Assessing challenges faced by the agricultural sector with farmers;
  - Developing and/or introduce crop disaster mitigation and prevention techniques: in model farms and farmers' demo fields with crop cultivation trials (introducing relevant Taiwanese varieties) and disease and pest monitoring in response to extreme weather conditions;
  - Cultivation management methods, materials and equipment. Some cultivation techniques:
  - Nursery;
  - Plant Spacing;
  - Mulch;
  - Rationalized fertilization;
  - Irrigation;
  - Flower/fruit thinning;
  - Training and Pruning;
  - Pest control;
  - Crop rotation to avoid soil sickness.

Results

- Availability of information for farmers;
- Increase in yields;
- Control pest diseases;
- Annual reports on crop disaster mitigation and prevention techniques.



Climate smartness

The diverse practices promoted in the project contribute significantly to the three central cores of CSA, since it focuses on increasing crops profitability, mitigation and climate change adaptation. Most of the practices promoted by this project are identified as part of the most relevant ones at a global scale, according to the review and evaluation made by Sova et. al., 2018.

The implementation of weather station networks as well as setting up early warning systems are relevant aspects in this project, since they will allow producers to have access to weather information helping them in decision making. Nevertheless, it would be interesting to use medium term forecasts that allow better crop planning and management processes some months ahead. In order to do this, it is key to empower producers on access and use of weather information and its linkage with agricultural activities. By doing this, producers will be able to identify the aspects to be strengthened in their production systems and based on previous experiences, they would be able to implement more CSA practices.

SCOTLAND

TORLOISK FARM MANAGEMENT

Presenter

Torloisk Farm

Description

In Scotland, climate change and the resulting change in weather patterns have already notably affected the growing season and increased the life cycle and activity of many plant and animal parasites/pests. Colder springs in the West are causing a shortening of the growing season and warmer winters allow livestock parasites to thrive all year round.

The increase in extreme weather patterns has caused grass production and crop harvest issues as a result of dry or wet spells being more concentrated and storm activities having notably increased. The much higher rainfall rates in many parts of Scotland is causing limited field access to machinery as well as livestock poaching, leading to a narrow harvest window and animals having to be housed for longer periods between autumn and spring. This adds further pressures in form of a greater need to purchase external inputs such as feeding and bedding, and potentially increased animal health issues associated with housed livestock.

The main focus on the farm to adapt to climate change is to selectively breed for animals suited to specific environment and climate and which are therefore more capable of dealing with the challenges thanks to their superior genetic potential, as well as to adjust health management and feeding regime in response to changing weather patterns in order to ensure that animal health and welfare is not compromised.

The main focus of Torloisk farm to try to mitigate the effects of climate change is to work with traditional breeds best suited to the farm type and able to thrive on minimum external inputs in order to be as self-sufficient as possible and keep any purchased inputs to a minimum. This helps to significantly reduce GHG emissions associated with the manufacturing and processing of these inputs and the associated travel incurred for the delivery of those goods to the farm. Another focus is to increase and improve efficiencies via genetic trait improvement to produce more output per unit of input, and to manage the grassland in such a way that it does not require high levels of fertiliser input and is able to sequester carbon.

Practices implemented on the farm:

1) Genetic trait selection and performance recording (adaptation and mitigation);
2) Adjusting health management (adaptation);
3) Grassland management (adaptation and mitigation);
4) Changing the feeding management (adaptation).

Results

- Genetic trait selection and performance recording (adaptation and mitigation): the selective breeding and detailed performance recording has led to better animal health and welfare by reducing incidences of ill-thrift and poor animal health, better overall performance of the farm's stock, and better use of both on-farm resources and external inputs. It has had a significant financial impact by reducing costs and increasing income, and the improved efficiency of the system thanks to these measures has reduced the impact on the environment and carbon footprint. Working with animals that are perfectly suited to the environment in the region/area also means that they deliver important environmental benefits by maintaining and enhancing local plant and animal habitats, therefore allowing local species to thrive and biodiversity to be encouraged.
- Adjusting health management (adaptation): the adjusted health management has ensured that animal health and welfare are maintained throughout the year despite the increased parasitic activity. The increased need for purchased animal health products to protect livestock from parasites has led to higher financial costs to the business and the resulting emissions associated with the manufacturing and delivery of the products has led to a higher impact on the environment.
- Grassland management (adaptation and mitigation): the better grassland management overall has led to better grass production on the farm from less fertiliser inputs which has led to a higher profitability to the business and less emissions associated with fertiliser manufacturing and delivery, therefore delivering benefits to the environment. The more natural grassland management has also been of particular importance to a range of important and endangered plant and animal species which can thrive on these areas. The natural and traditional appearance of the landscape as a result is of wider benefit both socially and economically by attracting tourism to the area.
- Changing the feeding management (adaptation): the adjusted feeding management has ensured that animal health and welfare are maintained throughout the year despite the more challenging growing conditions. The increased need for purchased feeding where the growing season is poor has led to higher financial costs to the business and the resulting emissions associated with the growing, processing and delivery of the feeding has led to a higher impact on the environment.

Climate smartness

It is important to highlight that this project was designed to respond to possible climate change impacts on livestock systems and create a highly productive and efficient process on the use of available resources. Practices focused on food management are highly related to mitigation, as they help reduce the amount of methane and nitrous oxide emissions, two of the most important greenhouse gases. On the other hand, the practices on genetic selection and sanitary management are more focused on climate adaptation. All these actions, in a certain way, contribute to increase the system's productivity, which is reflected in a higher income for producers.
The project addresses the CSA approach and its three pillars: adaptation, mitigation and productivity. Additionally, it is important that the project focuses on supporting the strengthening of weather information flows so that farmers have access to that information. Moreover, their empowerment regarding the use of such information is highly relevant to the process, in order to ensure that producers can continue implementing CSA practices based on the identification of the aspects to be strengthened in their productive systems and adjusted to their socioeconomic and environmental conditions.

SOUTH AFRICA

PRODUCTION FINANCE IN DISASTER AREAS

Presenter

The Southern African Agri Initiative (SAAI)

Description

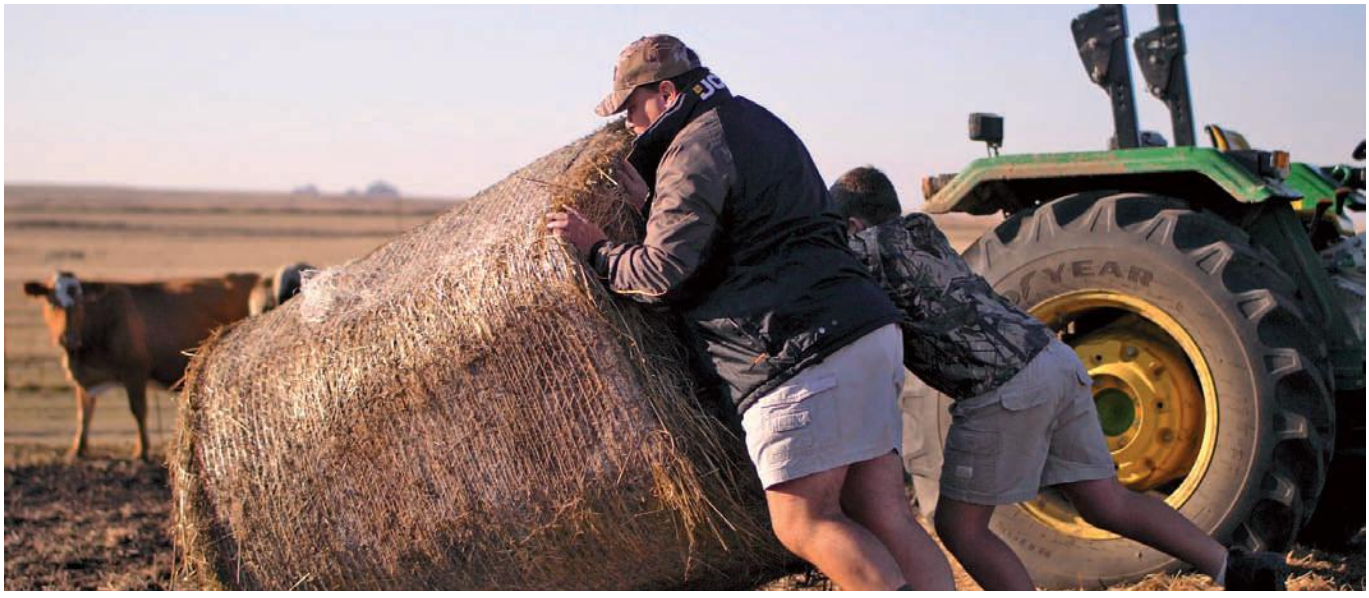
A third of South Africa is currently facing a drought crisis that has reached such serious levels that entire communities are in trouble, including agricultural businesses. This is the third consecutive year that the dry conditions loom, in some areas even longer, and it has caused a major debt problem for most part of family farmers. Because of ongoing debt, farmers are unable to get financing and obtain production loans.

Instead of using land as collateral, the project consists in a supply contract or production contract that stipulates a price and a supply date; inputs are then financed based on that. Comprehensive harvest insurance is a requirement for the project as well.

Participating family farmers are organised into a traditional agricultural co-operative. The co- op will enter into a supply contract, lend money for seed, fertiliser, diesel, pesticides and insurance, and rent for the mechanisation that farmers need. Regardless of how solidly such a scheme is structured, even in the most favourable scenario a producer will need his own minimum contribution of 30% to obtain financing. In order to cover that 30%, the five largest input suppliers were requested to each leave 6% of their invoices in the pool until the supply contract is honoured. In Saai's proposed plan, the input suppliers will help carry a portion of this risk.

Saai and its network partners also offer assistance in this regard. Crowd funding, fundraising projects and corporate donations will contribute to a newly established collateral fund. There are even some well-known artists who offered to donate proceeds of their concerts to the fund. The fund will serve as a first risk buffer and contribute to make the project and its farmer beneficiaries bankable. Should the co-op not be able to repay its debts to the banks, the collateral fund will take responsibility for a percentage of the debt.

In 2015 the Southern African Confederation of Agricultural Unions (SACAU) started a similar pilot project in Arusha, Tanzania during which excellent agricultural technical advice was shared by input suppliers. A portion of their profits was still on the farmlands and they were readily available to advise the farmers and look after their interests.



Results

This innovative financing model is currently aimed at farmers whose farming activities have been debilitated by the drought in certain areas of South Africa. If implemented successfully, it has huge potential for production finance in other disaster areas, communal areas and for beneficiaries of land reform, where land cannot be offered as security against loans.

Climate smartness

Climate-smart financial mechanisms are very important as a way to reduce agro-climatic risks and therefore, increasing resilience to climate variability. This initiative may benefit from tailored capacity building in local adaptation planning in order to understand how using current climate vulnerability and short-term weather forecasts, farmers can plan their agricultural activities (crop planning, management and harvest) accordingly. Therefore, it could reduce the probability of yield losses when knowing how weather may behave and how each crop may be affected (e.g. water stress indicators). This will reduce the chance of losing the investment and better prepare to deal with climate variability.

In some countries, index insurance products have been developed and put in place in order to secure farmers investments even before finishing the cropping season, because the triggers are associated to climate variables rankings according to the crop, agro-ecological zone, among other criteria (Greatrex et al. 2015).

SWEDEN

GREPPA NÄRINGEN - FOCUS ON NUTRIENTS

Presenter

Federation of Swedish Farmers (LRF)

Description

Main effects of climate change consist of more extreme weather, storms, droughts, flooding and high temperatures. Winter crops are moving north in Sweden. There is a higher impact from fungus and insects.

Big, harsh debate on farmers responsibility for climate change, while there is a big lack of proportion towards other emissions. The meat sector is especially in focus and accused of emissions. The debate affects the belief in the future for farming and will to invest.

"Greppa näringen" or "Focus on Nutrients" is the largest single commitment in Sweden to reduce losses of nutrients to air and water from livestock and crop production. The project also focuses on the safe use of crop protection products. Focus on Nutrients is a joint venture between The Swedish Board of Agriculture, The County Administration Boards, The Federation of Swedish Farmers and a number of companies in the farming business.

The purpose of the project is to:

- Reduce losses of the greenhouse gases: nitrous oxide, methane and carbon dioxide;
- Reduce losses of nitrate from farmland;
- Reduce ammonia emissions from manure;
- Reduce losses of phosphorus from farmland;
- Avoid losses of pesticides into surface and groundwater;
- Increase energy efficiency on farms.

In order to fulfil these objectives, the project focuses on increasing nutrient management efficiency by increasing awareness and knowledge. The farmer is in focus and therefore the core of the project is education and individual on-farm advisory visits.

Photo credits: Mårten Svensson (from website of the project http://greppa.nu/om-greppa/om-projektet/in-english.html)

Results

- Soil compaction results:
  - Awareness of soil compaction has increased;
  - The proportion of farmers who customize tire pressure and tires has doubled from 40% to 80%.
- Results of feed adaptation:
  - In the dairy farms, the proportion of farmers who take into account their forage analysis has increased from 62% to 92%;
  - Farmers who are actively working to reduce feed losses have increased from 49% to 92% .
- Wetland Advisory:
  - Over the years, Greppa Näringen advisers have made over 3500 wetland advisory services in Sweden;
  - Greppa Näringen has supported the construction of around 500 wetlands.
- Reduce nitrogen losses:
  - Plantation farms reduced by 7.5 kilos of nitrogen per hectare (-17%);
  - Pig farms reduced by 13.5 kg of nitrogen per hectare (-13%) ;
  - Dairy farms reduced by 8.6 kg of nitrogen per hectare (-6%).
- Reduced phosphorus losses:
  - Farm with plant production;
  - Phosphorus deficit has increased from -1.4 to -4 kg of phosphorus per hectare.
- Pig farms:
  - The surplus of phosphorus has decreased from about 8 kg of phosphorus per hectare to just over 1 kg.
- Dairy farms:
  - The surplus of phosphorus has decreased from about 5 kg of phosphorus per hectare to 3 kg.

Climate smartness

GREPPA NÄRINGEN initiative is highly focused on reducing GHG emissions, that is, mitigation pillar of climate-smart agriculture. As per the figures shown, it has resulted in outstanding benefits. Adaptation is also being addressed through the nutrient perspective of soils and forages themselves. Capacity building component is also highlighted in this initiative, which is an essential practice for farmers to create awareness, understanding the implications of management practices in the environment and in their overall productivity. Knowledge exchanges may be a good way to scale the lessons learned through this experience.

It would be important to consider the feasibility of including silvo-pastoral systems that may reduce animal stress during summer season.

USA

STONEY CREEK – NO TILLAGE FARM

Presenter

Stoney Creek Farm

Description

Weather has turned wet during the past four years. Farmers have received two to three times the average moisture and the have seen more extremes in temperature and weather.

The effects of this on the landscape is a massive increase in water erosion and wind erosion. Water infiltration rates on the average farm fields have dropped significantly, causing run-off, creek/riverbank destabilization, and flooding.

On Stoney Creek farm, farmers operate a 100% no-till system with increased diversity of o cropping enterprise through the addition of cover-crops through inter-seeding and planting after the harvest of row crops. Cattle are raised on pasture and on these cover-crops and are no longer kept in confinement. With increased water infiltration and increased soil organic matter on pastures and in cropping fields, the health of crops and animals in Stoney Creek has improved immensely. Increased soil health has allowed farmers to decrease the rate of use of synthetic fertilizers and they now use much less pesticides than before.

They also now have soil structure which allows them to be on the fields after rain events without leaving tracks or ruts while their neighbours sometime wait days to get back out on their fields. This can affect profitability. They no longer need treated seed technologies because the system has become healed. They also no longer spray any insecticide or fungicide on any part of the farm because the health of plants has been restored through improved soil health.

Results

Farmers in Stoney Creek have seen many improvements:

- Improved soil structure eliminating tillage;
- Increased rainfall infiltration (8-12" per hour);
- Increased soil organic matter (3-4% in 10 years);
- Increased soil health;
- Increased livestock health and decreased antibiotic use for livestock;
- Increased nutrient density of livestock feed raised on the farm.

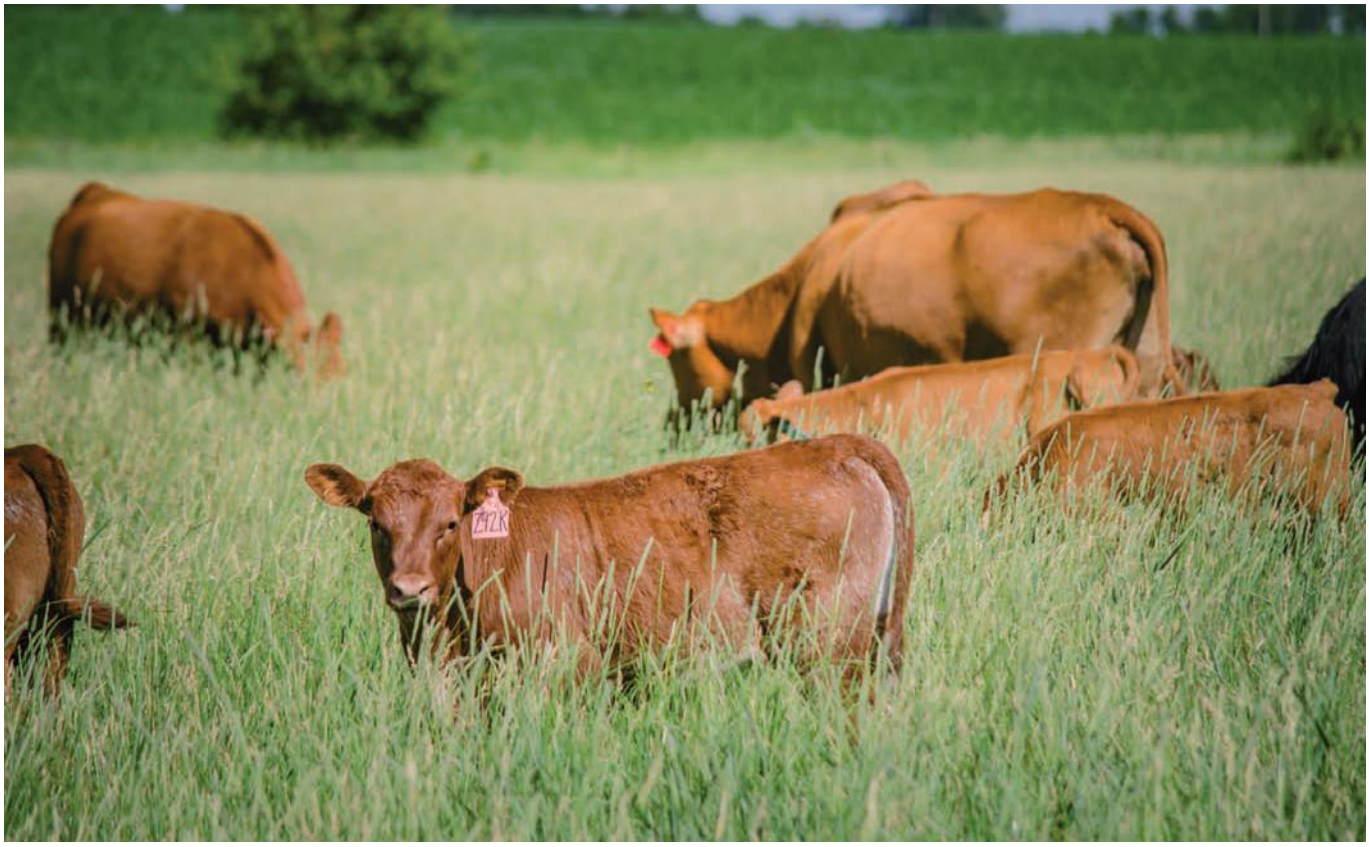
They have seen decreased water and wind erosion because they keep soil covered and try to keep a living root in the soil for as long as possible each season. They have also seen a massive increase in wildlife of all forms on the farm. The best improvement is increased profits because they have reduced input costs of seeds, chemicals, and fertilizers, while they have improved their own runoff/erosion.

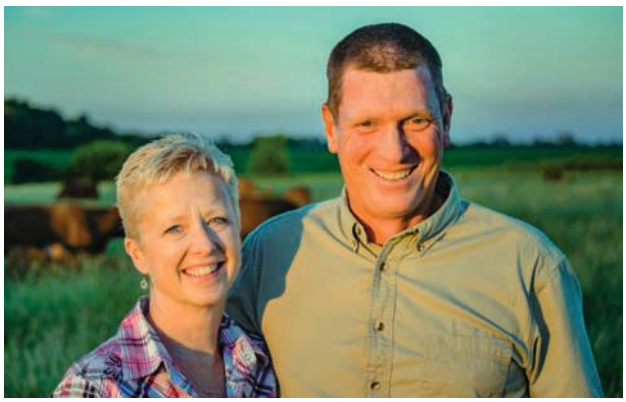
Climate smartness

Helping reaching the goals of the three base cores of CSA, had also contributed to improve livestock wellbeing and increase biodiversity inside the farm.

Implementation of crop cover, soil and pastureland management practices have contributed mainly to climate vulnerability reduction, while feeding management practices and the reduction of the use of chemical fertilizers have helped on greenhouse gas reductions. All the practices implemented in this project contribute to increase the income and productivity of producers.

Additionally, it is recommended to include on this project the strengthening of climate information flows towards producers, as well as their empowerment regarding the use of such information, in order to ensure that producers continue with the implementation of CSA practices.





ZAMBIA

MOOTO FARMS

Presenter

Mooto farms limited

Description

Zambia has not been spared by the effects of climate change. The amount of rainfall is minimal and temperatures have continued raising making farming very difficult and expensive.

Most farmers in Zambia cultivate maize since it is the staple food. Due to the shortage of rainfall, the maize crop is slowly failing to perform, resulting in hunger in the low-income class and very high prices for those that manage to harvest a little in order to compensate for their loss in the failed crop.

The cost of production is very high and since the yield is very low due to drought, this increases the poverty levels of the farmers.

In order to cope up with those challenges, farmers of Mooto Farms implement the following:

- Planting early maturity crops and also diversifying from maize only to other drought resistant crops such as cashew nuts, cassava and millet;
- Providing shade using shade nets for small trees on the nursery to prevent them from the scorching sun;
- Practicing vegetative propagation through soft wood grafting to ensure that they have high breed produce, early maturity, high yield and good quality produce;
- Pruning trees to make sure they are exposed to the required sunlight for photosynthesis and high yield;
- Coordinating with support groups, such the metrological department for weather updates, to make informed decisions;
- Using the recommended pesticides to ensure crops are healthy and free from diseases;
- Practicing irrigation by use of bole hole water supply powered by generator and use drip irrigation systems;
- Coordinating with agro-dealers to ensure having inputs on time to avoid delays and disturbances in framing programs;
- Practicing conservation farming;
- Having planted economic value trees such as mangoes, oranges, nuts, lemons, paw paw and other fruits to lessen the burden on maize;
- Having sensitized other farmers to avoid bad farming practices of burning bushes, cutting down trees for charcoal and other uses;
- Practicing mixed farming that is poultry, piggery, fish farming and crops. This chain is good as these activities support each other. Example chicken manure can be feed for the pigs, pig dung can be used as feed for fish, and water from the fishponds can be used as manure for the crops;
- Making sure to be up to date with market trends and prices.

Results

- Early maturity crops reduce on crop failure as the crops will mature fast within the short rain season;
- Because of the rightful information, losses are minimized;
- Conservation farming assists in the retention of the little water collected during the rains. This assists in keeping the crops moist and reduces water loss through evaporation;
- Because more trees are planted, this assists to cool the high temperatures on the farms and increases the chances of rainfall;
- The planting of fruit trees helps the diversification of income, as farmers are able to sell fruits as well. Most fruits produce throughout the year, thereby assisting Mooto farms with a continuous flow of income;
- Tree plantations are easy to manage and are cheaper and have long term benefits;
- Cashew nuts are valuable products also because the cost of production is minimal and the harvest can last for about 50 years.
- The cashew nut plantations do not need a lot of water, therefore, it reduces costs of production.

Climate smartness

MOOTO FARMS initiative include a number of practices, which may contribute to all CSA pillars. For example, diversification of crops, the use of early and drought resistant varieties and irrigation contribute significantly to adaptation and resilience, while reduction/elimination of burning bushes and cutting down trees is effective for mitigation.

The use of weather forecast and agro-climate information might help significantly the effectiveness of the practices proposed by MOOTO FARMS. Combination of recommended pesticides with organic inputs might reduce negative impact on soils and GHG emissions generation. Efforts in building capacity showed in the initiative is highly valuable, strengthening knowledge regarding future climate behaviour, crop management and planning activities would significantly increase adaptive capacity of rural families.

For more information about CSA in Zambia, in the study of World Bank and CIAT (2017b), it is possible to identify several practices for Zambia evaluated around 8 key criteria: Water, Carbon, Nitrogen, Energy, Knowledge / Info risk, Yield, Income and Soil.

ZIMBABWE

CONSERVATION AGRICULTURE: EFFICIENT USE OF NATURAL RESOURCES

Presenter

Zimbabwe Farmers Union (ZFU).

Description

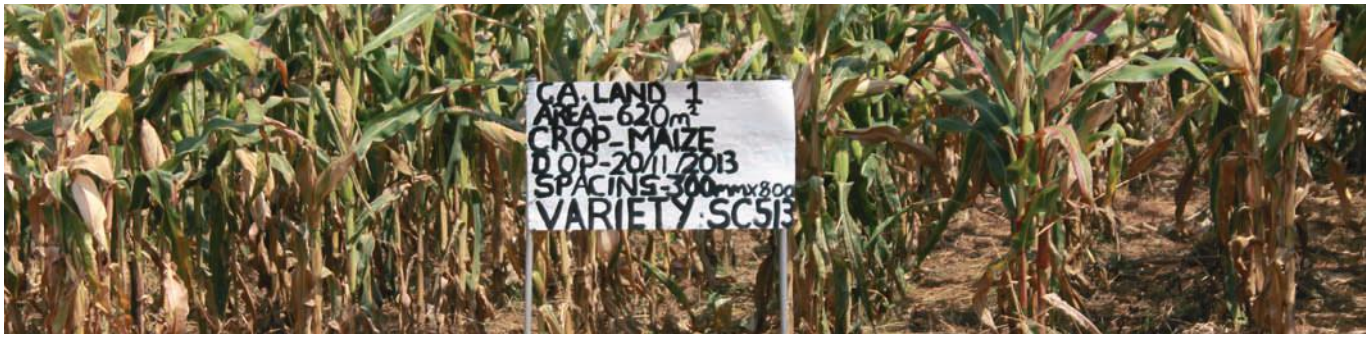
More than 70 per cent of the population in Zimbabwe relies on agriculture for its livelihood. The sector provides the best prospects for large-scale food security, economic development and poverty eradication. This key sector is now under increasing threat from climate change. Agriculture both affects and is affected by climate change. No other sector is more climate sensitive. The changing global climate threatens agricultural systems, livelihoods and the environment worldwide. Particularly vulnerable are the millions of smallholder farmers in Zimbabwe with limited means for coping with the risks posed by a changing climate. Rain-fed agricultural systems on which most of them depend will be adversely affected by extreme weather conditions and events (heat stress, droughts, floods), which are expected to increase in frequency and intensity. The proliferation of pests and diseases in areas where they have typically not been prevalent will also have severe negative impacts on productivity. There is urgent need to support adaptation measures by such farmers and other stakeholders that will increase the sector's resilience to a changing climate.

Although the causes of climate change are primarily from the use of fossil fuel, the agriculture sector is also culpable. The sector directly accounts for about 14 per cent of global greenhouse gas (GHG) emissions, and indirectly much more as agriculture is also the main driver of deforestation and other land-use changes that account for an additional 17 per cent. The responsibility of various categories of farmers is however substantially different. Although agriculture's potential for climate change mitigation still remains to be fully understood, there is growing consensus that emissions reduction and removal of greenhouse gases (mitigation) from agriculture will be necessary if global mitigation efforts are to be successful.

While climate change introduces new challenges to food and agricultural production, in Zimbabwe, new opportunities have emerged for the agricultural sector. The renewed interest in conservation agriculture is one such opportunity.

Zimbabwe Farmers Union sought to harness this momentum to lead a transition to a climate smart agriculture by promoting large scale adoption (scaling up) of this practice. This intervention facilitated farmer led scaling up of conservation agriculture by smallholder farmers in Zimbabwe.

Conservation Agriculture (CA) is an option that has great potential. This farming technology makes more efficient use of natural resources through integrated management. Through the application of the three main principles of reducing soil disturbance, maintaining a permanent soil cover and practising crop rotations, CA improves the soil's physical and chemical properties and reduces run-off and soil erosion while increasing water infiltration. As such the practice has major advantages in dealing with water stress in cropping systems. CA has been shown to improve drought tolerance for crops, increasing yields and encouraging diversified cropping systems that are accompanied by significant environmental benefits.



Results

Conservation Agriculture (CA) is being practised to varying scales in Zimbabwe. The area under CA in Zimbabwe represents less than 1% of the global total. Adoption of the practice is poorest among smallholder farmers who are constrained by poor access to information, lack of assets and limited financing to support such investments. Unfortunately, these farmers are the most vulnerable to climate change and therefore needed urgent support to transform their production systems towards a climate smart agriculture. The role of ZFU in facilitating large scale adoption of CA is widely recognised by many stakeholders who concur that FOs can coordinate partnerships with both public and private players to support smallholder farmers.

ZFU implemented the best practice using demonstration plots that were hosted by school based Young Farmers Clubs (YFCs). The immediate local community surrounding the school participated in the intervention by experiential leaning at the demonstration plot by participating at Avery stage of the cropping cycle from land preparation to harvesting.

The farmers would then apply the CA technology at their individual household farms. Exchange visits were incorporated into the event through holding of field days at the best performing demonstration plot to foster peer learning.

The resources for the intervention were from NORAD through the Southern African Confederation of Agricultural Unions"

The intervention impacted 600 young farmers and 8000 community farmers who are gradually shifting from conventional to CA. Yield level for the participating farmers improved from an average of 1 tonne/ha to 3tonne/ha. Interest in agriculture amongst the youths was increased. Equipment rings were introduced to benefit the participating communities. Agricultural extension workers were trained in the various aspects of CA. Crop diversification, especially the use of legumes improved the soil and soil degradation is gradually slowing down.

Climate smartness

Conservation agriculture is one of the most common climate-smart practices across all regions especially in maize crop according to Sova et al. (2018). Climate smartness of this practice is high considering its contribution to all pillars (adaptation, mitigation and productivity). Conservation agriculture is a practice that can be implemented more easily by the farmers themselves, which tend to be perceived as having a lower number of institutional, economic, information, social and environmental barriers.

Opportunities to strengthen synergies across CSA pillar include the combination with other practices such as agroforestry systems, crop rotation and fertilizer management, in order to increase smartness in the system.

According to Thierfelder et al. (2017), conservation agriculture systems maintain higher infiltration rates and conserve soil moisture, which helps to overcome seasonal dry spells.

For more information about CSA, in the study of World Bank, CCAFS and CIAT (2018), it is possible to identify several practices for Zimbabwe evaluated around 8 key criteria: Water, Carbon, Nitrogen, Energy, Knowledge / Info risk, Yield, Income and Soil.

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