

# UNITE for the Environment

## Crop Choices and Agriculture Economics

### 2<sup>nd</sup> Term 2019 - Teacher Training Manual



#### **LEARNING OBJECTIVES:** Participants will

- Explain farm business profitability and viability, and its relation to environmental sustainability
- Discuss factors that contribute to environmental quality and their significance to agriculture
- Identify ways how to make farming more profitable and contribute to local, national, and global economies
- Be able to make informed crop-choices
- Design sustainable agriculture business projects

## **WHAT IS AGRICULTURE ECONOMICS**

Agriculture economics is concerned with the application of economic theory in production and distribution of food/harvests so as to ensure that agriculture is a profitable venture.

It deals with land usage, maximizing crop yield, economic profitability and maintaining a good soil ecosystem and a healthy environment.

Agriculture economics includes environmental economics, food and consumer economics, production economics and farm management, and development economics.

**Food and consumer economics:** This mainly deals with economics of food consumption. It shows how households make choices between purchasing food or preparing it at home, how food prices are determined, how consumers respond to price and income changes in a consistent way as well as understanding consumer preferences. It is a common practice for farmers to produce traditional crops without analyzing what prices and demand these will attract at the end of the season. Food and consumer economics looks at ways how this can be addressed.

**Production economics and farm management:** This looks at addressing diminishing returns in agricultural production, as well as farmers' costs and supply responses. It includes studies on risk and decision-making under uncertainty as well as understanding how farmers in developing countries make choices in farming. Production economics evaluates how much is invested and how much is realized from practicing agriculture including family labor and time.

**Development economics:** This is broadly concerned with the improvement of living conditions of farmers especially in low-income countries, and the improvement of economic performance in low-income settings. Because agriculture is a large part of most developing economies, both in terms of employment and share of GDP, it aims at understanding the role of agriculture economic development, economic growth and structural transformation.

**Environmental economics:** This looks at ways of controlling environmental externalities such as water, land and air pollution arising from agriculture, as well as estimating and appreciating the value of benefits from natural resources and environmental amenities. It also looks at the complex interrelationship between economic activities and environmental consequences.

### **Activity: Environmental Stewardship**

In most cases farmers disregard the contribution of environmental amenities in agriculture as well as the environmental costs that arise from farming. As a result they don't care about how their practices impact on the environment and how in the long run this directly affects farming.

The activity will help identify factors that contribute to environmental quality and significance, as well as describe how farmers can care for the environment to ensure that farming is profitable and sustainable.

## **Procedure**

**Step 1:** Ask participants to describe ways that humans impact the environment through farming. Have participants share out and capture ideas on the board/flip chart.

Farming by its very nature alters natural ecosystems to produce food and agriculturalists should work hard to ensure they are minimizing the impact they have on the environment and therefore farmers should explore the use of environmentally conscious strategies to grow crops.

**Step 2:** Share the four main components of the relationship between the environment and agriculture and as a group discuss what these mean.

**1. Soil quality and health:** Soil quality is the capacity of soil to function, within its natural or managed ecosystems, to sustain productivity. This is not limited to agriculture, but most work and evaluation has occurred on agricultural lands. Soil health on the other hand is the condition of the soil and its potential to sustain biological functions, maintain environmental quality, and promote plant and animal health. Soil quality and soil health are vital for sustainable agro-ecosystem management and survival on planet Earth.

**2. Water quality and availability:** Water quality is the chemical, physical and biological characteristics of water. It is a measure of the condition of water relative to the requirements of one or more living species and or to any human need or purpose. Water availability is the quantity of water that can be used for different purposes without significant harm to ecosystems or other users. Consideration is given to demands from human and ecosystem needs, equitable apportionment of water among users, and indicators of stress to the water resource.

**3. Air quality:** Air quality refers to the condition of the air within our surroundings. Good air quality pertains to the degree which the air is clean, clear and free from pollutants such as smoke, dust and smog among other gaseous impurities in the air. Air quality is determined by assessing a variety of pollution indicators.

**4. Biodiversity:** Biodiversity refers to the variety and variability of life on Earth

**Step 3:** After understanding what the four components are, discuss how these four help farmers in agriculture and how farmers should make those components a priority through their management practices.

Break participants into groups and assign each group a “component”

### **Soil Quality and Health:**

Why should farmers care about soil quality and health?

What specific practices should farmers use to conserve soils?

### **Water Quality and Availability:**

Why should farmers care about water quality and availability?

What specific practices should farmers employ to ensure water conservation and purification?

## **Air Quality**

Why should farmers care about air quality?

What specific practices should farmers devise to reduce air pollution?

## **Biodiversity**

Why should farmers care about biodiversity?

What should farmers do to maintain a healthy ecosystem?

Explain that they will have 15 minutes to answer the two questions on their prompts. The participants will be putting their findings on to a flip chart and then presenting to the class. The presentations should be no longer than 5 minutes each.

## **Discussion: Is farming/agriculture in communities around Kibale National Park profitable? If yes or no what are the reasons?**

These may include yields, price fluctuation, demand for the item (market), soil quality, records, climate / seasons etc.

## **Activity 2**

Introduction: Decision-making is central to farm management. Each decision has an impact on the farm and on the farm household. The more a farmer is aware of the decision-making processes that affect farming, the more sustainable the enterprise will be and the more likely it will be profitable.

The decisions depend on a number of factors such as climatic factors, soil conditions, water, cropping systems, pests and diseases, availability of land, economic status of the farmer etc.

### **Getting to the activity:**

- Divide the participants into groups of 6
- Allocate each group with a scenario

NB: Each group should devise means of ensuring that their project is profitable and eco-friendly

**Scenario 1:** The government through its wealth creation is giving out free coffee seedlings to farmers in your community. You are a farmer who owns one acre of land, from a region conducive for coffee growing in terms of climate.

What factors do you have to look at before taking up these seedlings and why?

Develop a farm plan for the project including the costs?

**Scenario 2.** Over the radio and on television, it is being said that the price of ginger is 20,000 Uganda shillings per kilogram, and that there is ready market in the Rwenzori Region. However there is no one in your community who has grown ginger before.

What factors do you have to look at before starting ginger growing and why?  
Develop a farm plan for a ginger project including the costs

**Scenario 3:** A factory that makes tomato sauce is starting in a town near your community, and they intend to buy inputs from farmers within the community. However you do not have land yet. Have you attained knowledge and skills on how to grow tomatoes?

What factors would you look at before doing this venture?

Develop a farm plan for growing tomatoes including the costs.

**Scenario 4:** You are a maize farmer and you have been doing it for the last 10 years. Every season you are not certain about what the price will be when you harvest. Sometimes it is as high as 1000 Uganda shillings per kilogram and sometimes it can be as low as 200 UGX. On your maize farm, you have never bothered to establish if you are making profit or loss since you mainly use family labour and recycle the seeds. Come up with a farm plan that ensures effectiveness and efficiency.

**Scenario 5:** The government of Uganda is giving loans of 3 millions to interested families. This money is specifically supposed to be invested in crop farming and should be repaid in 2 years.

What crops are you going to grow?

What factors are you going to consider before taking a decision?

How will you ensure that you invest well this money in farming and do the repayment?

Develop a farm plan including the costs.

## **HOW TO IMPROVE FARM PROFITABILITY**

**Survey the market:** Growing any crop without a specific market in mind is suicidal. Sadly, that's what most people do. They rush into farming business without validating the market potential of their given crop but by looking at what their neighbors are growing.

With no time the market becomes saturated with similar commodities. Competition kicks in and the only way to stand out, is through lowering your prices. But the worst case scenario would be the marketing dictating what price you get.

To be on the safe side, start by approaching all probable market outlets about your farming ideas and then choose an enterprise based on the feedback you receive.

That way you'll be sure that the market really needs what you intend to grow.

**Choose the right crop:** Choosing the right crop to plant is the first step to optimizing farm profitability. In any given market, consumers will demand more than one enterprise. As an entrepreneur under such circumstances, you're faced with a decision on what enterprise to select. It is therefore very important to choose the one that has a higher market value.

This is because the cost of production is almost the same across various enterprises.

For example, whether you need to grow tomatoes or pumpkins, you'll require land, same land preparation, and same operation cost.

But the difference is determined by how the market values a given crop.

For instance, it might value tomatoes more than pumpkins in which case you should go for tomatoes.

**Plan well in advance:** Planning is important in all fields including farming. Having a plan dramatically increases your probability of success. The reason why most farming ideas no matter how great never succeed is that they neglect this vital step. Knowing this gives you unfair advantage over the rest of the folks.

When you take your time to write a detailed farm plan, you'll save yourself a lot of time and frustration trying to figure what to do next.

And as with any agricultural produce, time is a luxury you cannot afford.

Given the perishable nature of most agricultural produce, you'll get problems if you lack a plan of action.

**Hire than buy:** Land is the leading factor of production. Without it your dream of becoming a farming entrepreneur is just that.

But in reality this should not hold you back as there are countless opportunities to farm without owning. The most common and cost-effective opportunity is leasing the land.

Leasing the land is an amazing way to get into the farming business while side-stepping the high capital cost of purchasing the land

Besides the land, you can also hire other farm machinery instead of buying. For example, it won't make sense purchasing a tractor when just starting out.

It's better to start small and then advancing as your farm profitability increases.

**Diversify your enterprises:** In farming, specialization should not be on your plans. There are some other instances where specialization is paramount, but if you want farm profitability badly, you can't afford to specialize.

You have likely heard the expression "Don't put all your eggs in one basket."

For example, if you're growing passion fruits for income, it could be a good idea to intercrop them with other crops such as vegetables. These intercropped short term crops will enable you to earn some income before your main crop and will help in case the main crop is affected by pests, diseases or price fluctuation

**Stick to the plan:** Starting a farm of your own is a fantastic way to give yourself some control and possibly earn an extra income at the same time. However, it is not a "magic button" to stardom or riches.

Farming is risky, challenging, and not for the fainthearted.

Farmers deal with unpredictable situations, such as crop failures and market fluctuations. One year may produce an abundant harvest, while another may bring total devastation and little or no income. This is all part of the business of agriculture. Now, when you face such situation, you should not quickly change plans.

While some challenges might require a change of plans, it's better to stick to your plan and learn from your mistakes and correct them. It's all part of the process that eventually leads to farm profitability.

**Invest in yourself:** You need to continually invest in yourself to become better at what you do. Grasp any learning opportunity to help you make better farm decisions.

While you do this, don't worry about being perfect. If you worry too much about being perfect, you're never going to get anything done. Get your farm set up as soon as you can, and you can worry about learning the ins and outs of the trade later. As long as you take the first step, you'll be fine. Events such as field days, open days, and visiting other peoples' farms are good learning opportunities.

**Keep clear and trackable records:** Keep current, accurate records and pay attention to details. Know where your money is generated and spent. Keeping receipts anyhow and waiting to post figures at the end of the year is not a recommended recordkeeping system.

Good records will help you to measure your cash flow as well as to estimate the profitability of the enterprises.

## Example of farm record

<b>Cash inflows</b>	Jan	Feb	Mar	April	May	June	July	Aug	Sep	Oct	Nov	Dec
Crop sales												
Visitor fees												
Government payments												
Hire of equipment												
<b>Operating expenses</b>												
Seed												
Fertilizers												
Labour												
Hiring equipment												
Rent/leases												
<b>Other cash outflows</b>												
Loan interest payments												
Family living												
Taxes												

**Keep food safety in mind:** Remember that you're growing food for human consumption and as such, food safety is important. The only way to ensure that you're growing safe and high quality produce is by following the best agricultural practices.

Internationally producers and consumers are embracing the practices and ideals of food safety and consumers will pay you more when you meet such standards

**Ask for help:** There is no reason why you shouldn't ask for help when you need it.

Many people, are happy to help others out with ideas and information.

Farmers who focus on these best practices are likely to see improvements in their profitability.

Achieving solutions specific to farming operations during lean times to improve profitability will have long-lasting effects, benefitting the farm's bottom line well after more profitable times return.

The biggest challenge is that most farmers around KNP practice subsistence farming which is a system of farming that aims at growing crops that fulfils most of the immediate domestic needs of the farmer and his family. Even when the little excess is sold, it is to address the immediate domestic needs such as food, clothing, and medicine and on rare occasions school fees and other big needs. A few farmers engage in commercial farming which is a farming method in which agriculture is practiced with an intention to sell the produce in the market and generate revenue.



It is sometimes misunderstood that commercial farming is only practiced on a large scale but actually it can be practiced both on small scale and large scale.

Large scale commercial farming in most cases requires a lot of capital in terms of land, labour, and inputs. It is not managed by many in communities around Kibale National Park, but they can get involved in small scale agricultural ventures which are commercial based.

## **FACTORS THAT INFLUENCE DECISIONS ON THE SELECTION OF CROPS**

Farmers need to answer all the below questions while making decisions for choosing crops to grow. During this decision making process, farmers should cross check the suitability of proposed crop with their existing resources and other conditions. This process enables the farmers to undertake a (Strengths, Weakness, Opportunity and Threat/ SWOT analysis internally which in turn guides them to take an appropriate decision.

1. **Climatic factors** –Different crops grow well under different climatic conditions. Therefore it is important for a farmer to ask him or herself the following questions. Is the crop/cropping system suitable for local weather parameters such as temperature, rainfall, sun shine hours, relative humidity, wind velocity, wind direction, seasons and agro-ecological situations?
2. **Soil conditions** - Is the crop/cropping system suitable for local soil type, pH and soil fertility?
3. **Water**
  - Do you have adequate water source like a tanks, wells, dams, etc. to support the type of crop you want to grow?
  - Does your area receive adequate rainfall?
  - Is the distribution of rainfall suitable to grow identified crops?
  - Is the water quality suitable?
4. **Cropping system options**
  - Do you have the opportunity to go for inter-cropping, mixed cropping, relay cropping, crop rotation, etc.?
  - Do you have the knowledge on cropping systems management?
5. **Past and diseases**
  - What were your previous experiences with regard to the crop that you are planning to choose?
  - What is the experience of other people in the community in regards to pests and diseases affecting the crop?
  - Do you have any remedies that affect the crop
6. **Expected profit and risk**
  - How much profit are you expecting from the proposed crop?
  - Is this profit better than the existing crop?
  - What are the risks you are anticipating in the proposed crop?
  - Do you have the solution?
  - Can you manage the risks?
  - Is it worth to take the risks for anticipated profits?
7. **Economic conditions of farmers including land holding**
  - Is the proposed crop suitable for your size of land holding?
  - Are your financial resources adequate to manage the proposed crop?
  - If not, can you mobilize financial resources through alternative routes?
8. **Labour availability and mechanization potential**
  - Can you manage the proposed crop through your family labour?

- If not, do you have adequate labour to manage the same?
  - Is family/hired labour equipped to handle the proposed crop?
  - Are there any mechanization options to substitute the labour?
  - Is machinery available? Affordable? Cost effective?
  - Is family/hired labour equipped to handle the machinery?
9. **Market demand and availability of market infrastructure**
- Are the crops proposed in market demand?
  - Do you have market infrastructure to sell your produce?
  - Do you have organized marketing system to reduce the intermediaries?
  - Do you have answers for questions such as where to sell? When to sell? Whom to sell to? What form to sell in? What price to sell for?
  - Do you get real time market information and market intelligence on proposed crops?
10. **Policies and schemes**
- Do Government policies favour your crops?
  - Is there any existing scheme which indentifies your crop?
  - Are you eligible to avail those benefits?
11. **Public and private extension influence**
- Do you have access to Agricultural Extension services or someone you can contact for guidance?
  - Do you get any support from input dealers, agribusiness companies, NGOs?
12. **Availability of required agricultural inputs including agricultural credit**
- Do you get adequate agricultural inputs such as seeds, fertilizers, pesticides, and implements in time?
  - Do you have access to institutional credit?
13. **Post harvest storage and processing technologies**
- Do you have your own storage facility?
  - If not, do you have access to such facility?
  - Do you have access to primary processing facility?
  - Do you know technologies for value addition of your crop?
  - Do you have market linkage for value added products?
  - Are you aware about required quality standards of value added products of proposed crops?

## **SMALL SCALE CROP FARMING PROJECTS**

Small-scale farming is a natural outgrowth of sustainable agriculture that produces abundant food without depleting the earth resources or polluting it environment. It can be practiced as a business venture, however if this is to happen, there are a number of crops that can be targeted. These include:

**Mushroom growing:** mushroom farming is a profitable venture yet it does not require chunks of land and is labour intensive like other crops. However, they are very sensitive plants; they react to powerful scents from soaps and perfumes, and they are also affected by too much noise.

Mushrooms have ready market and one can preserve them and add value through drying.

**Ginger growing:** Ginger growing is another profitable farming venture that can be practiced on a small scale. Using the dug up method, farmer only needs to use well organized portions of their land as small as 10X10ft to get close to tone of ginger. Under this, method farmers dig up holes in their small gardens that they feel with organic materials and animal waste. The organic material is left to rot in the hole to create a soft

ground for the ginger to grow.

However the dug up hole must be protected from water logging, direct sunlight and strong winds until the ginger sprouts out.

**Vegetable growing:** Vegetable growing is another small scale farming venture that is profitable. Growing vegetable such as green pepper, carrots, and others will not require a lot of land and from these, one can realize more profits. In addition vegetables have high demand and ready market.

## **Passion fruit growing**

### **Practical session on how to grow passion fruits**

#### **Materials**

- Short film
- Hoes
- Passion fruit seedlings
- Organic manure

#### **Procedure**

1. Participants will watch a 20 minute short video on growing passion fruits
2. After, they will head out and follow the procedures guided by the resource person

Passion fruit is a perennial vigorous vine, which grows to give oval or round shaped fruit. This vine is native to tropical regions including Uganda.

The fruit is easy to grow as it gives back to the farmer in only 8-12 months.

Passion fruits not only have a domestic market but the European and the growing supermarkets in Burundi, Democratic Republic Congo, Rwanda and South Sudan present new market opportunities for passion fruits grown in Uganda.

#### **Soil requirements**

Passion fruit plants require fertile soils with plenty of mineral supply in order to achieve optimum growth and yields. If soils are not fertile enough, add organic manure

#### **How to propagate Passion fruits in Uganda**

Propagate your passion fruits using seeds, stem cuttings, or even grafted prop gules

#### **Activity: Growing passion fruits**

- Deep plough the proposed site to open up soil for proper aeration and water filtration.
- Open up planting holes of (45x45x45) cm in advance. Open up the planting holes at least 2-3 months earlier. This gives room to kill the soil pests and it borne diseases.
- The holes must be well fertilized.
- After mix the top soil with compost and then put it back, as this is very important at the initial stages.
- Transplant the germinated seedlings at the onset of the rainy season.
- Transplanting should be in the morning or late evening to reduce chances of their failure due to heat stress.

- You may opt for companion planting as you inter-crop passion fruits with green paper, onion, carrots and other short term vegetables. However avoid crops like maize, bananas; sugar canes as these are heavy feeders.

If using seeds;

- Soak the seeds in warm water to facilitate germination.
- Leave the seeds to air dry before main planting is done.
- Place the seeds in a 1 cm deep in polythene pots.
- Thinly cover with soil and then water to facilitate germination.
- When seedlings grow to a height of (20 to 25) cm, transplant them to their main location.

### **Harvesting passion fruits**

Harvesting of passion fruit starts from 8-12 months especially for the purple ones.

Invest in security for your passion fruit garden.

Pick fruit when they turn from green to purple, and when the calyx has dried up leaving a small stalk attached.

For processing, fruits should preferably be left to drop on to clean mulch. They should not be plucked from their stems.

Usually fruits which have dropped can be collected once or twice a week. During the rainy season they should be picked up every other day and kept in a cool place.

## DAY 2

### **PROJECT BASED LEARNING**

Project-based learning is a teaching method in which a student gains knowledge and skills by working independently and/or in groups to investigate and respond to real world problems. It creates a hands-on, student-centered environment where the teacher supervises and guides without openly offering students the information. In a project based learning students learn by researching, designing and implementing a project to answer a real world problem, meet a challenge, or serve a community interest.

Project Based Learning is a teaching methods in which students gain knowledge and skills by working for an extended period of time to investigate and respond to an authentic, engaging, and complex question, problem, or challenge.

Teachers organize the curriculum into themes and develop projects with questions or challenges to be solved. To meet the challenge, or solve the problem, students work in project teams and are guided by their teacher to find the information they need to plan their project. Students are encouraged to find ideas and answers to their questions from multiple sources. Teachers work with students to provide instruction and skills needed by students as they complete their project. Students apply what they have learned in a way that is both useful and dynamic.

Students pursue solutions to nontrivial problems by asking and refining questions, debating ideas, making predictions, designing plans and/or experiments, collecting and analyzing data, drawing conclusions, communicating their ideas and findings to others, asking new questions, and creating artifacts.

#### **Why is it a good practice?**

- Engages students in exploring their world through the inquiry process.
- Structures subjects around a question or a real world problem to solve.
- It develops critical thinking skills and creates responsible citizens who will be future job creators than job seekers.
- Teaches students to research, plan, design and create a product or presentation of what they learned.
- Includes collaborative student work on projects, in small teams, guided by the teacher
- It offers students the opportunity to learn and experience at the same time.
- It is appropriate for learners who come from different backgrounds and who may learn at different paces, because it allows learning to be expressed in a number of ways.
- When students perceive the work as being personally meaningful, the tendency is to commit to doing well.
- After completing a project, students understand content more deeply, remember what they have learnt and retain knowledge longer than with other methods of traditional instruction.

- Project-based learning can be especially effective in agricultural education and training, as field-based experiences offer many hands-on learning opportunities.
- It also provides opportunities for projects go beyond the classroom and benefit communities. The community surrounding a school can become an educational resource and students can share knowledge and skills learned through a public display of completed projects.
- Additionally, projects can be inexpensive and relevant to a variety of other curricular objectives such as math, science, history and geography.

## **HOW TO IMPLIMENT PROJECT BASED LEARNING**

Project Based Learning entails several key processes: (1) defining problems in terms of given constraints or challenges, (2) generating multiple ideas to solve a given problem, (3) prototyping often in rapid iteration potential solutions to a problem, and (4) testing the developed solution products or services in a “live” or authentic setting.

**Defining the problem:** Project Based Learning projects should start with students asking questions about a problem. What is the nature of problem they are trying to solve? What assumptions can they make about why the problem exists? Asking such questions will help students frame the problem in an appropriate context. If students are working on a real-world problem, it is important to consider how an end user will benefit from a solution.

**Generating ideas:** Next, students should be given the opportunity to brainstorm and discuss their ideas for solving the problem. The emphasis here is not to generate necessarily good ideas, but to generate many ideas. As such, brainstorming should encourage students to think wildly, but to stay focused on the problem. Setting guidelines for brainstorming sessions, such as giving everyone a chance to voice an idea, suspending judgement of others’ ideas, and building on the ideas of others will help make brainstorming a productive and generative exercise.

**Modeling/prototyping Solutions:** Designing and prototyping a solution are typically the next phase of the project based learning. A prototype/model might take many forms: a mock-up, a storyboard, a role-play, or even an object made out of readily available materials. The purpose of prototyping is to expand upon the ideas generated during the brainstorming phase, and to quickly convey a how a solution to the problem might look and feel. Prototypes can often expose learners’ assumptions, as well as uncover unforeseen challenges that an end user of the solution might encounter. The focus on creating simple prototypes also means that students can iterate on their designs quickly and easily, incorporate feedback into their designs, and continually perfect their problem solutions.

**Testing:** Students may then go about taking their prototypes to the next level of design through testing. Ideally, testing takes place in a “live” setting. It allows students to understand how well their products or services work in a real setting. The results of testing can provide students with important feedback on the solutions, and generate new questions to consider. Did the solution work as planned? If not, what needs to be

changed? In this way, testing engages students in critical thinking and reflection processes.

### **ACTIVITY: Projects for teachers**

#### **Procedure**

Divide teachers into groups of 5 to 6 members

Allocate each group a project idea to work on

#### **Project based learning ideas for different groups**

1. How can farmers increase on environmental sustainability?
2. How farmers can make agriculture more profitable?
3. Address the issue of using agrochemicals in your community?
4. A program on human population issues?
5. How to we create an effective way of managing solid waste in our community?
6. How can we conserve water in our community?
7. How livelihoods among people living next to Kibale National Park can be improved?
8. How can schools work closely with district authorities and organizations to promote conservation?
9. How can students in schools be inspired to be proactive in environmental conservation?