

MODULE 2: **Sustainable Agriculture**

LESSON 1: **Definition and Impact of Sustainable Agriculture**

TIME: **1 hour 36 minutes**

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LESSON

DEFINITION AND IMPACT OF SUSTAINABLE AGRICULTURE



TIME:

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OUTCOMES:

On completion you will be able to:

- Provide a definition of sustainable agriculture.
- Understand the impacts of various agricultural practices.
- Identify various sustainability practices.

INTRODUCTION:

Agriculture is a vital sector of the economy, mainly for the life sustaining products that it provides. On the other hand, it is a high-resource demand venture especially if it is carried out with an entrepreneurial approach. Its impact on the environment is wide and varied and call for specific measures, some of which attempt to strike a balance between production output and limiting environmental impact.



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Definition and Aims of Sustainable Agriculture

As a group, we already have some idea of what the concept sustainable agriculture is! It is possible that your understanding is derived from your aim within agriculture. Let us see if we can develop our own definition.

Activity 1



Defining Sustainable Agriculture (10 minutes)



Working in groups of four:

1. Identify key words that help you understand the concept 'Sustainable' and insert them in the table below:

Sustainable (Key words)

2. Now do the same for the concept, 'Agriculture'

Agriculture (Key words)

3. Now insert the words in both tables to construct a definition for the concept 'Sustainable Agriculture'

Combined definition:



See the Feedback section at the end of this lesson to see a definition that can be compared to the definition your group developed.

IMPACT OF AGRICULTURAL PRACTICES

Farming can have an enormous impact on the environment and the availability of resources, and if not monitored and controlled the impact is not often good. If we want to enjoy the environment and have access to natural resources in the future, we will need to think of ways to ensure our activities have minimal impact. But first, what are these potential impacts?

Activity 2



Environmental Impact (20 minutes)



1. Read the following article:

Environmental impacts of agriculture

- a. Land clearing for cultivation purposes leading to
 - Loss of biodiversity
 - Loss of natural habitats and potential human/wildlife conflicts
 - Disruption of ecosystem balances and their functions
- b. Changes in regions reflectance and water balances
 - Loss of forest cover leads to heat build ups
 - Lack of vegetation, especially trees, means that less water is held underground
- c. Tillage of cropland
 - Loosening of soil exposes it to erosion agents (water, wind)
 - Loss of nutrients such as nitrogen from evaporative processes
 - Creation of hard pan in ploughing
- d. Input demands for large scale/mechanized/entrepreneurial farming
 - Pressure on natural resources such water (depletion of ground and surface reservoirs) and fossil fuels (petrol for machines)
 - High input of inorganic fertilizers and application of chemicals such as pesticides and herbicides among others
- e. Negative impacts on soils including:
 - Loss of nutrients/fertility especially from reducing soil organic matter additions
 - Changes in soil structure and soil chemistry
 - Salination and alkalization from irrigation and inorganic fertilizers respectively
- f. Eutrophication of water bodies from:
 - Inorganic fertilizer run-offs
 - Excess manure run-offs
- g. Negative effect of applied chemicals including:
 - Loss of useful insects such as the pollinators
 - Possible impacts on human health
 - Impact of chemical residuals in the ecosystem
- h. Narrowing of crop/animal diversity in favour of high yield varieties
- i. Potential for overgrazing and trampling of land in livestock areas

2. Use the table below and match activities described above with various resource and environmental impacts. The second row has been done for you to illustrate

Exercise on impact of agriculture

Agricultural activity	Resource Impact	Environmental impact
Tilling		
Land clearing	Natural vegetation, wild animals (small and large)	Loss of biodiversity, changes in heat and water balances, human-wildlife conflicts
Chemical applications to crops and animals		
Addition of inorganic fertilizers		
Rearing high livestock numbers in limited open space		
Irrigation		
Rearing high livestock numbers in limited closed space		
Intensive crop/animal production		



See the Feedback section at the end of this lesson to see the model answer for this activity

SUSTAINABILITY PRACTICES IN AGRICULTURE

We can, however, limit our impact on resources and the environment by emulating known agricultural practices that are environment friendly and thus sustainable. Some of these practices are known to you.

Activity 3



Sustainable Practices (30 minutes)

Work in a group of four members and see if you can brainstorm some of these sustainable measures. Fill in the table below based on the group discussions that should identify both the shortcomings and advantages of each method.

Agricultural activity	Sustainable measures	Advantage(s)	Disadvantage(s)
Tilling			
Land clearing			
Chemical applications to crops and animals			
Addition of inorganic fertilizers			
Rearing high livestock numbers in limited open space			
Irrigation			
Rearing high livestock numbers in limited closed space			
Intensive crop/animal production			



See the Feedback section at the end of this lesson to see the model answer for this activity

Conclusion



Farming without thought of the impact of various methods we employ is short sighted. In many ways we farmers have much to lose if we work destructively. Our livelihood is dependent on natural resources and the environment. We need to be sensitive to the potential impact we wield.

Enrichment Resources

Wikipedia. (2011). *Sustainable Agriculture*. Available online:
http://en.wikipedia.org/wiki/Sustainable_agriculture Accessed 02/03/2011
CC: BY-SA

Sustainable Table. (2011). *What is Sustainable Agriculture?* Available
online: <http://www.sustainabletable.org/intro/whatis/> ©

Feedback



Feedback Activity 1

Sustainable Agriculture definition:

Sustainable Agriculture refers to a production process that utilizes resources in a manner that reduces negative impact on the surroundings and ensures that such resources are available for use by future generations



Feedback Activity 2

Exercise on impact of agriculture

Agricultural activity

Tilling
Land clearing

Chemical applications to
crops and animals

Addition of inorganic
fertilizers

Rearing high livestock
numbers in limited open
space
Irrigation

Rearing high livestock
numbers in limited closed
space
Intensive crop/animal
production

Resource Impact

Soil
Natural vegetation, wild
animals (small and large)

General ecosystem

Soil, water bodies

Soil, vegetation

Soil, water reservoirs

Water bodies

Energy, water, nutrients

Environmental impact

Soil erosion
Loss of biodiversity,
changes in heat and water
balances, human-wildlife
conflicts

Loss of useful insects,
chemical residuals and
accumulation in food
chains, health effects on
humans

Changes in soil chemistry,
eutrophication of water
bodies

Soil erosion and soil
compaction

Salination, depletion of
water

Manure run-offs that cause
eutrophication

Fossil fuel, water and soil
nutrient depletion, loss of
crop/animal diversity

Feedback



Feedback Activity 3

Exercise on impact of agriculture

Agricultural activity	Sustainable measures	Advantage(s)	Disadvantage(s)
Tilling	Minimum tillage	Lower soil erosion	Higher pest incidences
Land clearing	Reduced cultivation expansion, over seeding to reduce exposure of soil, soil conservation measures	Reduced soil erosion	Lower food outputs
Chemical applications to crops and animals	Integrated pest management	Less reliance on chemicals, promotion of alternative pest control	Maybe less effective on large scale applications
Addition of inorganic fertilizers	Fertilizer mixes of organic and inorganic	Better soil structure, lower nutrient run-offs	Reduced maximal outputs in the short-term
Rearing high livestock numbers in limited open space	Controlled livestock numbers	Lower land degradation	Lower pastoral incomes
Irrigation	Appropriate irrigation techniques	Reduced water losses in aquifers	Higher costs of irrigation equipment
Rearing high livestock numbers in limited closed space	Alternative manure usages	Lowered additions of manure run-offs into water	Lack of alternative manure usages
Intensive crop/animal production	Diverse crop/livestock varieties including polycultures	Biodiversity conservation	Resistance from large scale farmers