

# AGROECOSYSTEMS IN THE CONTEXT OF SUSTAINABLE DEVELOPMENT

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**ABSTRACT:** *The agroecosystem, is a functional unit of the biosphere created by man for the purpose of obtaining agricultural products and is therefore dependent on man. Sustainable agriculture is a broad concept that foresees the complexity of this production system, the biological stability of cultivated plants and varieties, the conservation and protection of natural resources, but also the introduction, then generalization of modern technologies as productive as possible.*

**KEY WORDS:** agroecosystem, durability

## 1. INTRODUCTION

The agroecosystem, is a functional unit of the biosphere created by man for the purpose of obtaining agricultural products and is therefore dependent on man.

According to some authors, "the agroecosystem is an ideal unit that belongs to the ecological mesocosm because it has a simple vegetation structure with well-defined boundaries and with inputs and outputs of agrochemicals well managed by humans".

Semi-natural ecosystems have emerged based on the use of natural ecosystems for grazing or as a source of animal feed. The agricultural ecosystem (agroecosystem) appears as an effect of the anthropic action of deforestation and fragmentation of some natural ecosystems, in order to cultivate them. Agriculture started in well-stocked biotopes (fertile soils from riverbeds, flood areas, slopes base). When the resources for the cultivation of plants could no longer be provided naturally, other surfaces were taken into cultivation, and later when this way of working was no longer possible, the application of resources outside the system (fertilizers, seeds) was applied. , etc.), an ecological gain was the integration of plant cultivation with animal husbandry.

The techno-ecosystem, appeared as a result of the increase of the productions of the cultivated plants through the application of efficient technologies which allowed to reduce the surface necessary to ensure the food of an individual and the possibility of concentrating the populations in large settlements - villages, cities.

The sustainable agroecosystem should include the following components:

- a vegetal layer that ensures efficient soil and water conservation;
- periodic contribution of organic matter and stimulation of biological activity in the soil;
- recycling of nutrients through crop rotation, the use of legumes, pest control by protecting natural enemies (entomophagy) and promoting biological control.

This agricultural system must integrate all its components to increase its biological efficiency, ensure biodiversity and preserve productivity and its own regulatory capacities. The system will allow the gradual transition to a higher biological level by the progressive elimination of chemicals, the rationalization and correct management of mineral fertilizers, the introduction of technologies with low energy inputs.

Sustainable agriculture is a broad concept that foresees the complexity of this production system, the biological stability of cultivated plants and varieties, the conservation and protection of natural resources, but also the introduction, then generalization of modern technologies as productive as possible.

The relationship of AGRICULTURE - FOOD - HEALTH is increasingly evident, because in large part the "diseases of civilization" are attributed to a poor quality food, due to the excesses of the use of chemistry in intensive technologies and as such the product market, "bio" is increasingly sought after and appreciated.

## 2. CLASSIFICATION OF AGROECOSYSTEMS

According to the degree of artificialization, they are classified into: bio-ecosystems (natural; almost natural ecosystems; semi-natural ecosystems; anthropogenic ecosystems) and techno-ecosystems (human settlements, traffic systems, industrial complexes) (table 1).

Agricultural ecosystems or agro-ecosystems, as managed ecosystems, differ structurally and functionally from natural ecosystems primarily through consumption

increased energy through the use of other energy sources outside the soil and also through an energy flow that does not take into account the natural biogeochemical cycles.

The distinction between agroecosystems and natural ecosystems does not consist in the general trophic structure (which is similar), but in its complexity. Mature natural ecosystems usually have an extremely large internal diversity, highlighted by the high number of component species, which saturates all ecological niches. This diversity generates the multiplication of the trophic chains, the substances circulating through several and narrower channels, the specific structure of a high complexity.

Agroecosystems have a much simplified structure, with a low internal diversity, with unsaturated ecological niches and a distribution of the substance and energy on few (sometimes single) and wide channels. So agroecosystems can be similar in the last analysis with simplified young natural ecosystems (table 2).

Table 1. Ecosystems classification

<b>I. Bio-ecosystems</b>	It is characterized by the dominance of natural components and biological processes
Natural ecosystems	Without direct human influence (capable of self-regulation)
Almost natural ecosystems	Influenced by humans but similar to natural ones (changes little if human influence ceases; they are capable of self-regulation)
Semi-natural ecosystems	It changes significantly if the influence of man ceases; Limited self-regulating capacity; Management is required
Anthropogenic (biotic) ecosystems	Created intentionally by man; Totally dependent on human management and control
<b>II. Techno-ecosystems</b>	Anthropogenic technical systems; It dominates the structures (the artifacts) with the technological processes;
Human settlements	Created intentionally by man for industrial, economic, cultural activities; Depended entirely on human control and the bio-ecosystems with which they alternate or are surrounded.

Table 2. Comparative elements between agroecosystems and young and mature natural ecosystems

Ecosystem characteristics	Agroecosystems	Natural ecosystems	
		Immature	Mature, Climax
<b>Biomass</b>	Small	Small	Big
<b>The P / R report</b>	> 1	> 1 or < 1	aprox. 1
<b>The P / B report</b>	picked up	picked up	low
<b>Self-organization</b>	missing	spontaneous	spontaneous
<b>Trophic chains</b>	very short (usually)	short (pasture dominant)	long, complex (the dominant deterrent chain)
<b>Stratification</b>	very weak or nonexistent	low	pronounced
<b>Diversity of species</b>	very small	small	variable, large watering
<b>Vital cycles</b>	short, simple	short, simple	long, complex
<b>Major mechanisms of population regulation</b>	anthropogenic	physical	biological
<b>fluctuations</b>	big	pronounced	less pronounced
<b>Cycles of mineral substances</b>	open (with large exports and imports)	open	more or more slightly closed
<b>The role of detritivores</b>	little important	important	very important
<b>stability</b>	controlled by man	fluctuating	homeostat
<b>Potential harvest for man</b>	high or very high high	high	low or very low

P - gross production ; R - community breathing ; B - biomass

### 3. THE OBJECTIVES OF AGROECOSYSTEMS

- to produce high quality nutritious and efficient agricultural products;
- to develop and strengthen living systems during production cycles;
- to maintain and improve soil fertility in the long term;
- avoid all forms of pollution that can result from agricultural practice;
- to allow farmers a fair remuneration for the satisfaction of their work and a safe and healthy working environment.
- to promote and diversify biological cycles within agrarian systems, respecting

- microorganisms, soil flora and fauna, crops and animal husbandry;
- maintain and improve soil fertility in the long term;
- use as much as possible the natural and recyclable resources at local level;
- to develop agricultural systems as self-sufficient as possible, in terms of organic matter and nutrients;
- to ensure to all animals living conditions as little as possible contrary to the fundamental aspects of their natural behavior;
- to maintain the genetic diversity of agricultural systems, their environment, including the protection of plants and wild animals;

- to take into account the impact of cultural techniques on the environment and social relations.

#### 4. STABILITY AND DURABILITY IN AGROECOSYSTEMS

The stability of an agricultural system in time and space must involve the following elements:

- reducing energy waste and resources consumed;
- favoring the production methods that restore homeostatic mechanisms, conducive to biocenosis stability;
- optimizing the level of recycling of nutrients and matter; maximizing the capacity of multiple use of the landscape; ensuring an efficient energy flow;
- encouraging a food production adapted to the local ecological and socio-economic context;
- reducing the costs, increasing the efficiency and economic viability of small and medium-sized farms, with the aim of favoring the creation of a more diversified and

#### 5. CONCLUSIONS

- The agroecosystem, is a functional unit of the biosphere created by man for the purpose of obtaining agricultural products and is therefore dependent on man.
- Sustainable agriculture is a broad concept that foresees the complexity of this production system, the biological stability of cultivated plants and varieties, the conservation and protection of natural resources, but also the introduction, then

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potentially more resistant agricultural system;(table 3.)

Table 3 Structural and functional differences between natural ecosystems and agroecosystems

Characteristics	Agroecosystems	Natural ecosystems
Net productivity	Big	Average
Trophic chains	Simple, linear	Complex
Species diversity	Low	Strong
Genetic diversity	Low	Importance
Biogeochemical cycles	Open	Closed
Stability	Low	Strong
Entropy	Strong	Low
Human control	Necessary	It is not necessary
Staying in time	Limited	Long
Habitat heterogeneity	Simple	Complex
Phenology	Synchronize	Seasonal
Maturity	Immature	Mature, Climax

generalization of modern technologies as productive as possible.

- The relationship of AGRICULTURE - FOOD - HEALTH is increasingly evident, because in large part the "diseases of civilization" are attributed to a poor quality food, due to the excesses of the use of chemistry in intensive technologies and as such the product market, "bio" is increasingly sought after and appreciated.

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